Power Feed Modification

WV3S

Purpose

My µBITX exhibits coupling into the audio chain when transmitting. The audio that appears in the headset is distorted, distracting, and proportional to VSWR; the higher the VSWR the greater the coupled audio and distortion.

Procedure

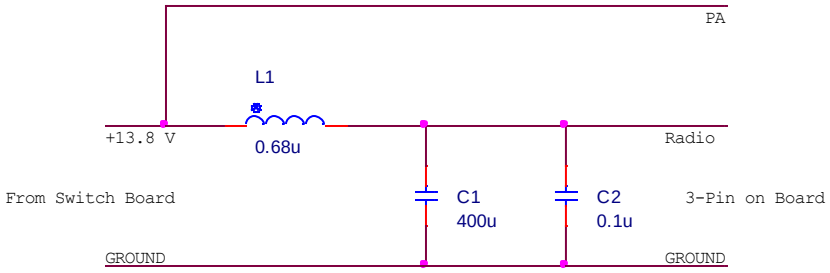
The speaker amplifier is decoupled from the signal chain during transmit by relay k3, however, this relay is also the Transmit/Receive relay and power is still applied to the speaker amplifier. While there is main-board power supply decoupling for the RF power amplifier, there is none for the audio amplifier. Of these two leakage paths, power supply coupling into the speaker amplifier seems the most probable.

Power feeds into the radio through a single jack and is carried as a single trace to the output of the small printed circuit that attaches to the input jack, switch, and fuse. At the output of the board, the input power splits into two lines, one for the RF power amplifier and one for the rest of the radio. These lines are on the same on the input power board; the two power wires are soldered to two holes in the same trace. The wires are thin, and the radio can draw over two Amps in high VSWR conditions. Given the direct connection to the speaker amplifier's DC power, any voltage fluctuation on the power wires will couple to the speaker amplifier. Any voltage fluctuations from the thin power wires supplied with the radio may induce output in the speaker amplifier.

The procedure is to create a daughter board with filtering that removes any voltage fluctuations on the power feeding the radio. The board was created using a small piece of protoboard material, a 3-pin section of female in-line header, four 100 µF capacitors[1], and one 0.68 µH inductor. The OEM supplied 3-wire pig-tail was removed from the small printed circuit card and two wires of larger gauge attached, one for the positive input voltage and one for ground. These wired connected to the home-brew daughter card which slips on to the three male power pins on the radio's main board. I trimmed the guide on the main board's power connector. You may not need to do that, so please check.

The schematic is shown below. If you use different values, check for resonances. The resonant frequency of this network must be well outside the audio band.s

[1] I did not have a single, large capacitor in my junk box.



Results

The assembly worked well. No audio is heard during transmit. Though not measured, I believe the overall receiver noise may have dropped too.

Cautions

1. You may want to acquire additional fuses before attempting this modification. Shorting wires or mis-wiring could blow the fuse.
2. Pay close attention to the wires and which pins on the radio's main board power connector feed what part of the circuit. It is easy to cross-wire and place this filter in the power feeding the RF power amplifier, or apply reversed voltages. Doublecheck everything!
3. Pay attention to the size of your homebrew circuit board. Make sure you have it sized to fit. If you are using one of the Carroll County Amateur Radio Club's H-frames, the board will need to fit between the standoff and the heat sink of the near output transistor.

Parts

1. Scrap protoboard
2. Wire
3. Capacitor(s), 470 µF or equivalent
4. Capacitor, 0.1 µF or equivalent
5. In-line female header, 0.1 inch pitch, with three pins