I7SWX 2T H-MODE MIXER WITH BLANKING

One of the circuits that has been questionable, in the analog receivers, has been the Noise Blanker. Most of the circuits in the commercial amateur receivers were not able to reduce or eliminate noise pulses received while listening, particularly, on the HF. This was, in special mode, during the activity of the russian "woodpecker radar". With a quiet signal, reception worked just fine, but with pulse noise interference, reception could be and was completely jammed.

One problem was that with noise impulses presence the receiver's automatic gain control (AGC) would very rapidly lower the signal path's gain (fast attack) on each pulse and then very slowly restore that gain back to normal again (slow decay) which put a time gap in the signal path that was of far longer duration than that of the interfering pulse had been. That extended signal gap, being repeated at the pulse repetition rate, menomated the listener's ability to hear the intended signal.

The block diagram reported in Figure 1 is, more or less the one of the Yaesu FT101, other radio of the same company or other manufacturers were similar.

Ulrich Rhode, DJ2LR/N1UL, developed a circuit to be used externally to the radio standard configurations that would blank the pulse noise just after the mixer, avoiding the known problems. A simplified block diagram is reported in Figure 2.

I was wanting to experiment about the noise blanker blanking the local oscillator driving the H-Mode Mixer, and not adding a switch on its output. Block diagram sketch is reported in Figure 3, while the 2T H-Mode Mixer with blanking schematic is shown in Figure 4.

The idea was to have a pulse effect mitigated by interrupting the mixer local oscillator signal and not putting a signal switch in the mixer's IF output for each noise pulse so that no noise pulse could make its way into the IF strip and into the AGC circuitry. The signal gap from mixer conversion blanking was expected to be quick for the AGC's slow decay characteristic to respond while the short durations of missing signal was expected not obstruct someone's ability the hear the intended messages. Having other priorites the circuit was put aside and no additional fiddling was performed. This circuit idea is reported for anyone that would like to try it.

Figure 5 reports signal waveforms compared without and with noise pulse, then with blanking, as expected.

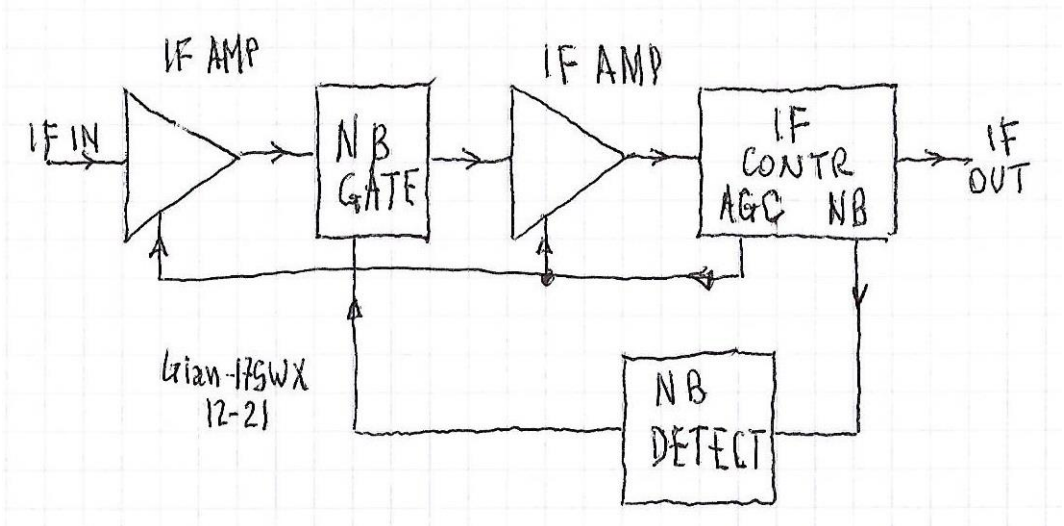

Fig. 1 – sketch of FT101 Noise Blanker block diagram.

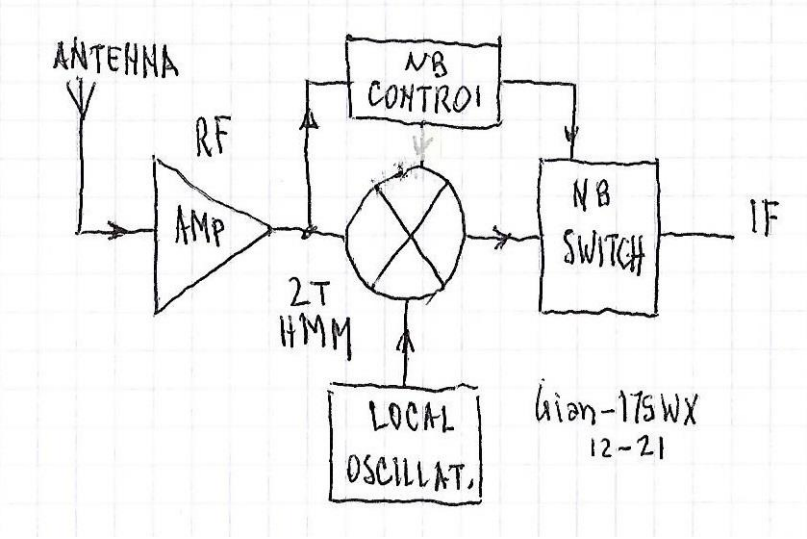

Fig. 2 – sketch of DJ2LR Noise Blanker. See link for circuit diagram: https://worldradiohistory.com/hd2/IDX-UK/Amateur-SW/RadCom-IDX/IDX/80s/RadCom-1980-05-IDX-48.pdf

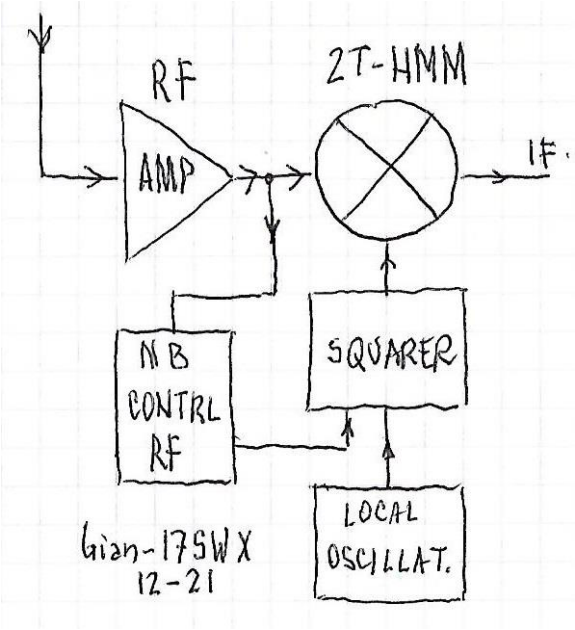

Figure 3 – Sketch of 2T H-Mode Mixer Blanking

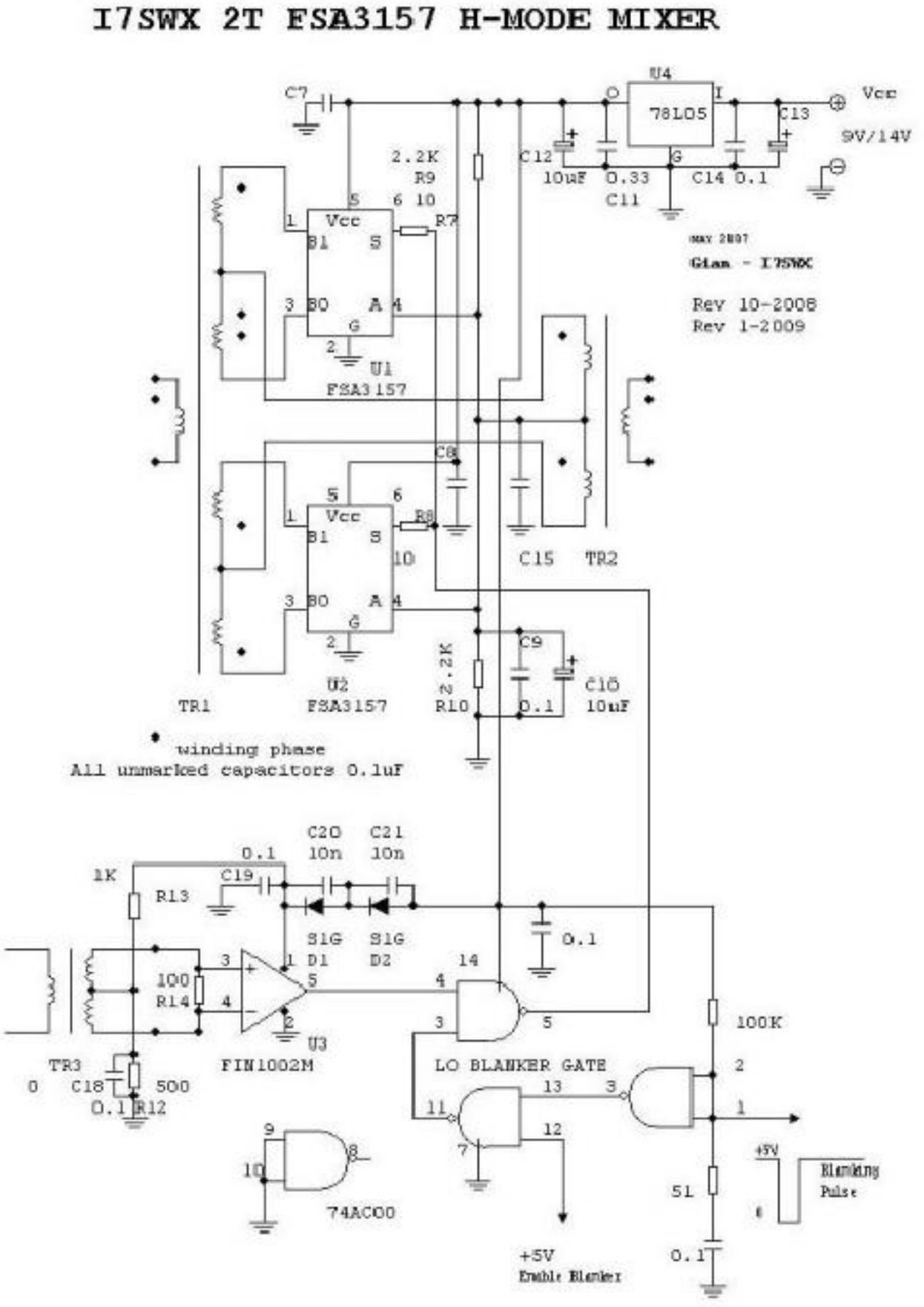

Fig. 4 - Circuit diagram of the I7SWX 2T H-Mode Mixer with LO Blanking

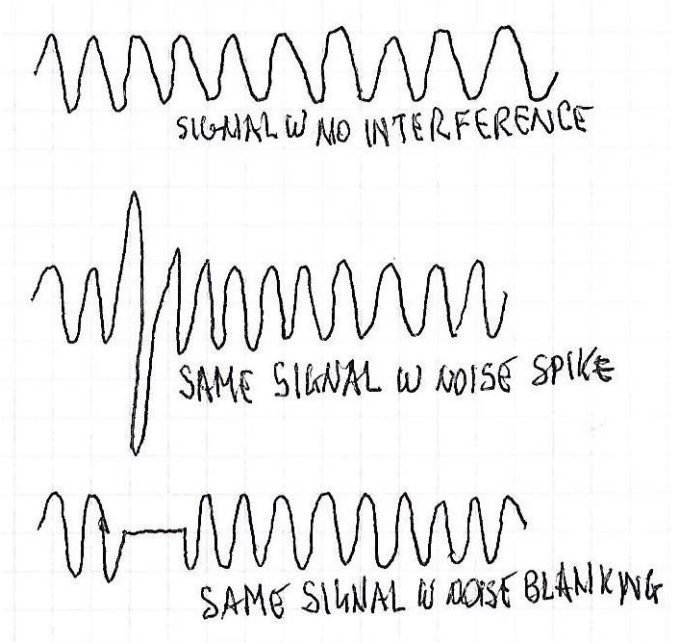

Fig. 5 – Comparing signals at the mixer output / IF input: with No Interference, With Noise Pulse Spike, With Noise Pulse Blanking