Simple, Effective Receiver Input Limiter

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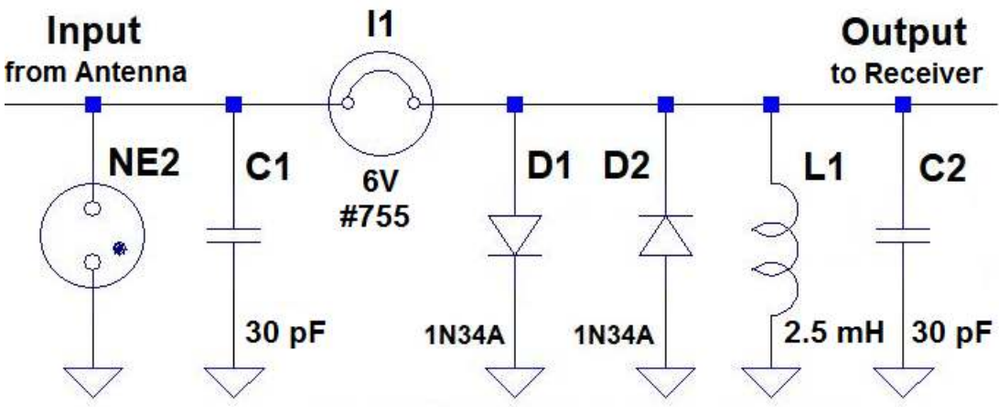

Figure 1: Schematic Diagram. See text regarding D1 and D2.

Introduction. Any receiver can be damaged if too much RF energy is applied to its input. There are ways, through both system planning and receiver design, to manage this risk. Unfortunately, a number of modern Software Defined Radios (SDRs) have only electrostatic discharge (ESD) protection built into them. They'll withstand some joules of transient static easily, but might not survive sustained RF currents and voltages.

The high near-field signal intensities possible when transmitting on the 630 and 2200 meter bands, in particular, may place a receiver at serious risk if an antenna remains connected to it during transmission from another nearby antenna.

I wanted to leave my Flex-6300 receiver connected to its own receive antenna during transmit, so a receive input limiter was needed. The circuit in Figure 1 is a spin-off of some of the limiter ideas published in past *LOWDOWN*s or the *Western Update*.

Circuit considerations. The circuit consists mainly of shunt elements with various functions, plus a series component to provide a little current limiting, pilot lamp I1.

The NE2 neon bulb provides some voltage spike protection from nearby lightning discharges. It would fire somewhere around 60 VAC. C1 and C2 roll off the VHF/UHF frequency response and can be eliminated if desired.

The 2.5mH RF choke provides a DC path to ground to bleed off static charges that may build up on an antenna.

The series bulb (I1) is a 6 V, 150 mA, type 755. Any other small incandescent lamp can be used. A lower bulb current rating is better, but be careful the series DC resistance doesn't get too high. The #755 showed about 5 ohms resting resistance. That will increase—a desirable effect—if the diodes begin conducting RF current.

The indicated 1N34A diodes seemed to provide the most effective limiting compared to 1N60, 1N914/4148, etc. I live in a rural location, so there are no nearby strong AM broadcast transmitters; thus I used only two diodes. If two back-to-back diodes seem to create inter-modulation products or spurious signals in your receiver, try adding two or three diodes in series on each side until the intermod stops. Adding diodes in series will raise the limiting level. Two back-to-back 1N34A diodes limited at about 1.3V peak-to-peak output when driven with 8.5Vpp input.

Construction. I built the circuit in a small metal box with BNC (f) connectors for the in/out. A piece of double-sided PC board was bolted to the bottom of the box and everything was assembled dead-bug style with the PC board providing the ground connections. 73, Ed KI6R.