

When W4FSV asked members of his club who would be interested in building a very low-power CW rig as a club project, more than two dozen signed up, including several who had never used either a soldering iron or a telegraph key.

The “Splinter” QRPp Trans-Receiver: One Club’s Answer to Having Some Fun

BY WILLIAM F. MINIKIEWICZ,* W4FSV

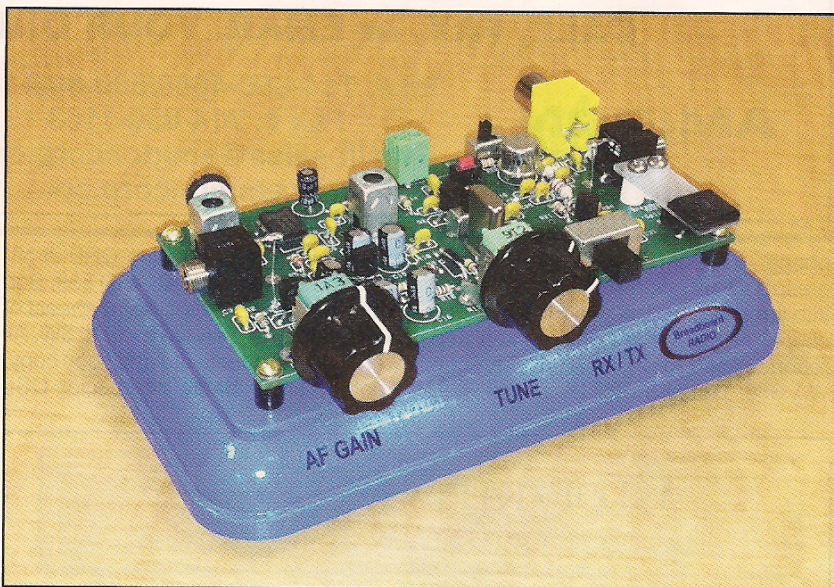
For the past 44 years I have been an avid builder and QRP operator. Recently, I was asked to develop a simple construction project that could be built during Saturday workshop sessions held by the Columbia (SC) Amateur Radio Club. The club’s leadership hoped to give members, especially new hams, a practical way to learn electronics and kit-building skills, culminating in a useful take-home item.

Originally, I developed a simple code practice oscillator, since many of the club’s newest members were “no code” hams. After realizing that a CPO would interest just a small sub-group of the membership, we decided to expand the project into something with broader appeal. After several months of bread-board prototyping, the “Splinter” was born—a combination receiver and separate transmitter (or a *trans-receiver*) for QRPp (very low power) operation on 40 meters. The name was derived from the small wooden breadboard that was used to develop the prototype.

If You Design it, Will they Build it?

Once satisfied with the final circuit (see “Under the Hood” sidebar for circuit description), I took a few weeks to test its performance. Does the Splinter work? Oh yeah. During the test period I worked ten states, Cuba, England, Italy, and had a very nice 5-7-9 QSO with Romania ... 10,424 miles per watt!

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The “Splinter” is a combination receiver and QRPp transmitter for 40 meters. Each of the builders got to decorate his/her own wooden base for the radio. (Photos courtesy of the author)

The prototype was now ready for an introduction at the next club meeting. The club’s board of directors asked me to “show and tell” the little radio to everyone present and offer it as a club project to be built in a series of three monthly Saturday workshops.

I felt a little nervous anticipation as the club president asked for a show of hands to indicate interest in the project. I would have been happy if five or six fellow members indicated interest; after all, most of the members are relatively new hams who have very limited kit-

building experience and most are not CW operators. A moment passed, and then to my astonishment 27 hands were waving affirmatively before me. Pleased with the approval, I now realized that the real test was yet to come.

If They Build Them, Will They Work?

Three workshop dates were scheduled over a three-month period. During each workshop session, six soldering stations and a centralized parts distribution

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Craig Scott, AE6E, inspects his work on a circuit board.

table were employed. Several experienced hams served as building "Elmers" and did an excellent job, teaching and coaching along the way. By the end of the first three-hour workshop, even first-time builders could adequately solder, identify components, and make voltage and resistance checks. Best of all, every circuit board now had a working sidetone oscillator.

The second building workshop session was held at a different and larger location. We learned from the first session that builders need elbow room. We also learned that parts bins located on a table in the middle of the room improved traffic flow, allowing more builders to access the inventory at the same time. This was important, because we also learned that builders

"Under the Hood": The Splinter's Circuitry

The Splinter is a combination QRPP transmitter and separate 40-meter direct-conversion receiver that features an antenna attenuator and bandpass filter ahead of the popular SA612AN mixer/oscillator. The local oscillator frequency is controlled by a 1N4001 diode functioning as a varicap and resulting in a tuning range of about 75 kilohertz. The resultant output of the mixer is followed by a two-stage audio amplifier using a 2N3904 and the TL431 shunt regulator along with some extra R-C filtering. The output easily drives MP3-type earbuds or even a small speaker. Sidetone is provided by a twin-tee oscillator capacitively coupled directly to the input of the phones. The usual downside of the twin-tee is low audio, but by changing the normally balanced values of the resistors in the "tee" circuit, the output was significantly increased.

The transmitter is a simple two-transistor type derived from the famous OXO design described by GM3OXX. I used a 2N2219A as the final and directly key the positive voltage to both the oscillator and final transistors. Thanks to John Crockett, W3KH, and the great lab equipment at South Carolina Educational TV, we were able come up with low-pass filter components resulting in 45-dB harmonic suppression, more than enough to comply with FCC regulations. My original five-component design was only a little better than half as good.

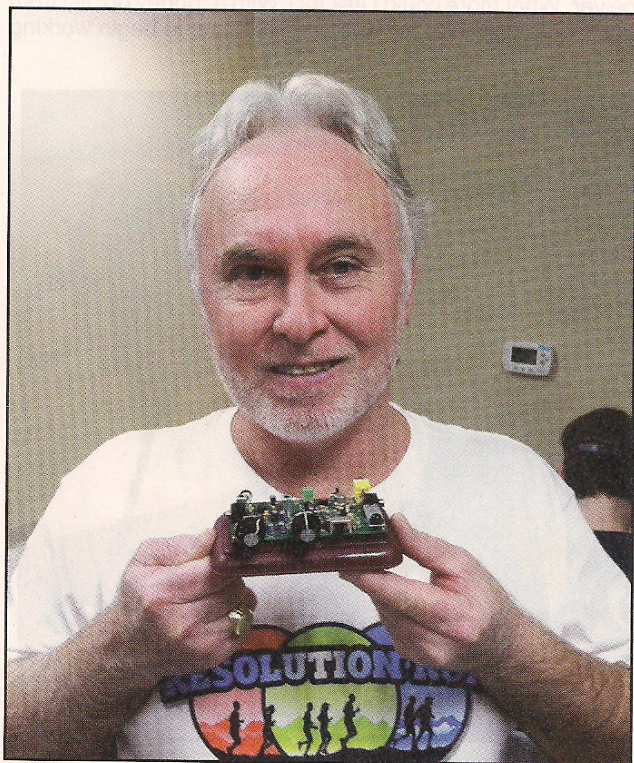
The Splinter also features a VXO, a "spot" switch, two-position crystal switch, and a built-in key! T-R switching is provided by a simple but effective slide switch, and the R. F. output is a nominal 450–500 milliwatts.

All 85 components mount on a 2" x 4" double-sided circuit board. What makes the project really neat is the final touch ... the personal touch. After the board is built and tested, it is mounted on a 3" x 3" decoratively routed wooden breadboard. The builders get to finish their boards any way they choose, and our builders came up with some very attractive and interesting finished paint schemes.

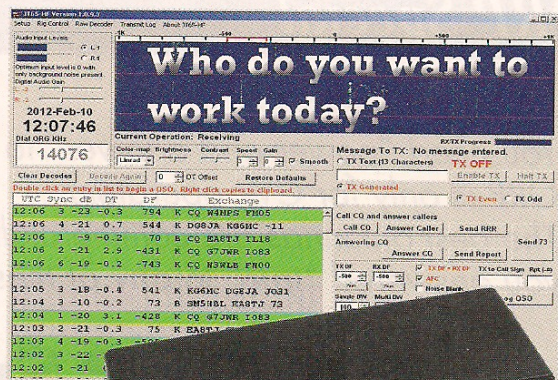
More information about the Splinter and complete kits, including all parts, is available at www.breadboardradio.com.



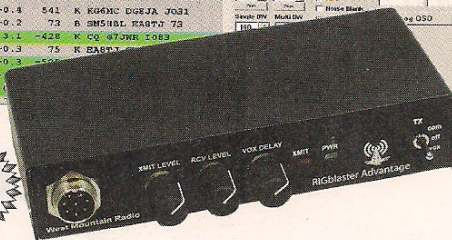
Ammon, age 9 (no call yet), and sister Madelyn, 13, KJ4IJB, display their progress.



Cliff Inabinet, KF4UOR, shows off his Splinter.



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develop skills at different paces. Originally, we tried to keep everyone on the same page, but this actually caused frustration for slow builders and boredom for advanced builders. Additionally, five new kit builders showed up and required a little extra help to catch up. Toward the end of the day, several of the more advanced builders were finished with their circuit boards. A few of them stayed on to help others make progress. Most builders ended this workshop session with working receivers and had only the relatively simple transmitter to finish.

The final building workshop was held at the same location as the second. There was plenty of anticipation, as everyone knew that this day would end with their prize in hand. As expected, by noon the transmitters were coming off the assembly lines, and one by one finished Splinters were making their way to the final testing and alignment station. Only a few of the builders had minor construction problems that needed to be corrected.

Success!

In the end, every Splinter built at the workshops was completed successfully. Still, much more needs to be said about the project. I am inspired by the enthusiasm and support of the builders, especially the newer hams who dared to go where they have never been before. The youngest builder was nine years old and the oldest was over seventy. Our club is now scheduling Morse code classes and a 2-meter code practice net. Soon the ether will be glowing with QRPp, so give a listen for those weaker, but workable signals. It just might be a Splinter!