

The American Radio Relay League

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the state of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every three years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

“Of, by, and for the radio amateur,” ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters:

ARRL
225 Main St.
Newington, CT 06111 USA
Telephone: 860-594-0200
FAX: 860-594-0259 (24-hour direct line)

Officers

President: Rick Roderick, K5UR
P.O. Box 1463, Little Rock, AR 72203

The purpose of QEX is to:

- 1) provide a medium for the exchange of ideas and information among Amateur Radio experimenters,
- 2) document advanced technical work in the Amateur Radio field, and
- 3) support efforts to advance the state of the Amateur Radio art.

All correspondence concerning QEX should be addressed to the American Radio Relay League, 225 Main St., Newington, CT 06111 USA. Envelopes containing manuscripts and letters for publication in QEX should be marked Editor, QEX.

Both theoretical and practical technical articles are welcomed. Manuscripts should be submitted in word-processor format, if possible. We can redraw any figures as long as their content is clear. Photos should be glossy, color or black-and-white prints of at least the size they are to appear in QEX or high-resolution digital images (300 dots per inch or higher at the printed size). Further information for authors can be found on the web at www.arrl.org/qex or by email to qex@arrl.org.

Any opinions expressed in QEX are those of the authors, not necessarily those of the Editor or the League. While we strive to ensure all material is technically correct, authors are expected to defend their own assertions. Products mentioned are included for your information only; no endorsement is implied. Readers are cautioned to verify the availability of products before sending money to vendors.

Ron Diehl, NQ8W

Perspectives

I had the opportunity this month to attend the HamSCI Workshop, this year hosted by ARRL, and came away with a renewed appreciation for what makes amateur radio distinct. The atmosphere was not just academic, nor purely hobbyist — it was a productive intersection of amateurs, professional scientists, and engineers, all contributing to a shared body of knowledge. What stood out most was the openness: ideas were exchanged freely, results were scrutinized constructively, and collaboration was assumed rather than negotiated. This is citizen science at its best — distributed, curious, and increasingly relevant.

Equally encouraging was the presence of newer participants. A rising generation is discovering radio not as a legacy technology, but as a platform for experimentation — one that spans RF hardware, digital signal processing, and now machine intelligence. The same electromagnetic spectrum that has engaged amateurs for over a century continues to offer new terrain to explore.

That same spirit of practical innovation is reflected in this issue.

A low-cost tracking generator for the tinySA Ultra extends a capable spectrum analyzer into a far more complete RF measurement tool. Using an active mixer and a simple VCO offset scheme, it achieves 0 – 800 MHz coverage, with calibration techniques that address dynamic range and coupling limitations.

We also examine an AI-driven amateur radio voice station built from off-the-shelf components. By integrating a chatbot with speech-to-text, text-to-speech, and CAT control, the author presents a working architecture and on-air results, along with a clear treatment of the challenges of speech recognition under HF conditions.

A new FPGA-based SDR concept from Pavel Demin delivers multi-slice receive capability comparable to Red Pitaya-class systems at significantly lower cost — highlighting the impact of efficient system architecture.

Signal quality remains central. Our analysis of CW “soft keying” under the ARRL Clean Signal Initiative shows why raised-cosine shaping can miss CSI limits and introduces an optimized DL1YCF ramp achieving compliant 8 – 9 millisecond transitions while reducing key clicks.

Finally, polar modulation with high-efficiency switching amplifiers points toward a truly digital transmitter, where DSP defines the waveform and RF power is generated with minimal analog compromise.

Amateur radio continues to advance in the same way it always has — experimentally, collaboratively, and with purpose. If these ideas resonate, don’t just read — build, measure, test, and share. Join in. 73.

Writing for QEX

QEX is a forum for the free exchange of ideas among communications experimenters. QEX is published bimonthly.

Please send full-length QEX manuscripts, or share a Technical Note of several hundred words in length plus a figure or two, to qex@arrl.org. We pay \$50 per published page for full articles and QEX Technical Notes. Get more information and an Author Guide at www.arrl.org/qex-author-guide. If you prefer postal mail, send a business-size self-addressed, stamped (US postage) envelope to: QEX Author Guide, c/o Margie Bourgoin, ARRL, 225 Main St., Newington, CT 06111.