

## 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  
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Newington, CT 06111 USA  
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### Officers

**President:** Rick Roderick, K5UR  
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**Chief Executive Officer:** Howard Michel, WB2ITX

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/](http://www.arrl.org/qex/) or by e-mail to [qex@arrl.org](mailto: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.

Kazimierz "Kai" Siwiak, KE4PT

## Perspectives

### Morse Challenge Initial Results, and QEX Changes

The use of a Morse paddle to input text to a personal computer in Morse code seemed like a promising solution to the age-related and disabilities-related keyboard handicap. Our *Morse Input Design Challenge* to the amateur radio community was inspired by a letter from Dave "Doc" Evison, W7DE, who was experiencing age-related difficulties with typing skills. He's not alone. Doc reasoned that the amateur radio community is overflowing with exceptional people who are skilled technically, resourceful, and compassionate. As a result we opened the *Challenge* with an announcement and rules in the May / June 2019 issue of *QEX*, and in *QST*. The *Challenge* ended on December 1, 2019, and the response has been gratifying. While all of the entries are still under review, we can announce that the earliest complete entry was received from Joseph M. Haas, KEØFF. Joe will receive a free one-year *QEX* subscription (or extension of his subscription). Other winners will be announced in the next issue of *QEX*, and you can expect articles describing the entries to appear soon.

We begin the new year by noting changes in *QEX*. The *QEX* style was recently changed to increase the readability of the text. The changes were in response to a reader's request — we hope you agree that this is a significant improvement. We solicit your comments and suggestions. There are further improvements and enhancements planned for *QEX* later in 2020.

### In This Issue

Gerald T. Whitney, KG2BK, in a *Technical Note* determines matching components with his T-network calculator.

John L. Stensby, N5DF, in a *Technical Note* calculates coax loss directly from impedance measurements.

James A. Koehler, VE5FP, home-builds an inexpensive vector impedance analyzer that is based on a 32-bit single-board processor sub-system and operates up to 600 MHz.

Michael D. Lewis, K7MDL, provides life-extending support for multiple transverters.

Dr. George R. Steber, WB9LVI, relates his experiences with the recently available tiny NanoVNA.

Scott H. Cowling, WA2DFI, revives his "Hands on SRD" column with an introduction to the TangerineSDR.

### Writing for QEX

Keep the full-length *QEX* articles flowing in, or share a **Technical Note** of several hundred words in length plus a figure or two. Let us know that your submission is intended as a **Note**. *QEX* is edited by Kazimierz "Kai" Siwiak, KE4PT, ([kswiak@arrl.org](mailto:kswiak@arrl.org)) and is published bimonthly. *QEX* is a forum for the free exchange of ideas among communications experimenters. The content is driven by you, the reader and prospective author. The subscription rate (6 issues per year) in the United States is \$29. First Class delivery in the US is available at an annual rate of \$40. For international subscribers, including those in Canada and Mexico, *QEX* can be delivered by airmail for \$35 annually. Subscribe today at [www.arrl.org/qex](http://www.arrl.org/qex).

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Very best regards,

Kazimierz "Kai" Siwiak, KE4PT