

## 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:

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### Officers

**President:** Rick Roderick, K5UR  
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### 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.

Bill Liles, NQ6Z, and Ward Silver, NØAX

# Perspectives

Greetings from the QEX team. Bill Liles, NQ6Z, and Ward Silver, NØAX, are sharing the green editorial eyeshade and red pencils for the next few issues, until QEX Editor, Kai Siwiak, KE4PT, returns from sabbatical. In the meantime, we are enjoying having a close look at the submitted material and working with its authors and the ARRL HQ staff to produce the magazine for you.

Antenna and antenna system articles are welcome in the pages of almost any amateur radio magazine. As you can see from the In This Issue section, we have both theoretical and practical selections by regular contributors Rudy Severns, N6LF, and Al Christman, K3LC, respectively. We suggest that you search the ARRL Archives for articles by these experienced hams — you'll find hours of interesting reading. Both have contributed to the *ARRL Handbook and ARRL Antenna Book*, as well.

Additional articles include a theoretical analysis of the pi network, a detective story about UHF noise filtering, a tale of repurposing a decommissioned aviation beacon, and #23 in the series of essays by Eric Nichols, KL7AJ. The breadth of material typifies amateur radio's wide range of activities and interests.

## In This Issue

Al Christman, K3LC, continues his analysis of elevated radials with folded configurations for small spaces.

Paul Wade, W1GHZ, investigates causes of noise and reducing it with filters.

Peter Hall, VK6HP, repurposes a de-commissioned navigation aid.

In his Essay series, Eric P. Nichols, KL7AJ, discusses the vacuum tube's purpose in *Electron Jockey*.

Rudy Severns, N6LF, explains the relationship between radiation and ground loss resistance.

Andrii Bilokon, UR5FFR, derives a equations describing the pi network.

## Writing for QEX

QEX is a forum for the free exchange of ideas among communications experimenters. QEX is published bimonthly and is edited by Kazimierz "Kai" Siwiak, KE4PT, who is currently on sabbatical.

Please continue to 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](mailto: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](http://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 Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111.

All members can access digital editions of all four ARRL magazines: *QST*, *On the Air*, *QEX*, and *NCJ* as a member benefit. A print edition of QEX is available at an annual subscription rate (6 issues per year) for members and non-members; see [www.arrl.org/qex](http://www.arrl.org/qex).