

## 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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**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 Street, 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

## Themes and Mentors

In the previous *Perspectives*, I should have identified Rod Newkirk, W9BRD [the call sign now belongs to his son David], who personified Elmers in 1971. Thanks to Carl Luetzelschwab, K9LA, for pointing that out!

We previously raised awareness about the aging of our *QEX* readership, as well as of the Amateur Radio population. We've heard from several of you sages, elders and mentors of Amateur Radio who are reaching across to younger generations. We'd like to hear from more of you ([qex@arrl.org](mailto:qex@arrl.org)). Let's keep ham radio awareness among the younger crowds alive.

## In This Issue

We feature Loop Antennas in this *QEX* theme issue, and cover other topics across the HF to millimeter wave spectrum as well.

Milton E. Cram, W8NUE, shows a simple way to tune and match the HF loop antenna using the Smith chart, and estimates *Q* from the complex impedance.

Peter DeNeef, AE7PD, investigates how the location of the resonating capacitor and coupling to earth ground affect the small HF loop pattern and gain.

Kai Siwiak, KE4PT, and Richard Quick, W4RQ, introduce improved formulas for the current and impedance of the small HF loop, leading to an accurate determination of close-near-fields, and far-field null depths.

John Stanley, K4ERO, compares the performance of stacks of rectangular, hour-glass, and diamond shaped loops having one-wavelength perimeter elements.

Peter DeNeef, AE7PD, reports on the effects of the ground on RF exposure compliance distances of a small HF loop antenna.

Kai Siwiak, KE4PT, lists several equivalent *Q*-factor formulas and their uses.

Rudy Severns, N6LF, measures live-tree dielectric parameters.

Andy Przedpelski, KØABP, uses missile miss distance indicator scoring techniques to determine a satellite's distance and velocity.

Euclides Lourenço Chuma, PY2EAJ, presents construction details for a millimeter wave prescaler and doubler.

Mark Griffith, KDØQYN, describes the PiGate system that with Winlink2000 global email system provides a robust platform that can be deployed in a disaster scenario.

Tom Sowden, W6KAN, stabilizes the frequency of his vintage transceiver with an Arduino based DDS.

Keep the full-length *QEX* articles flowing in, but if brevity is your forte, share a **Technical Note** of several hundred words in length plus a figure or two. Expand on another author's work and add to the Amateur Radio institutional memory with your technical observation. Let us know that your submission is intended as a **Note**.

*QEX* is edited by Kazimierz "Kai" Siwiak, KE4PT, ([ksiwaki@arrl.org](mailto:ksiwaki@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,

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