

## 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

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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/](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

### Blurring the Analog / Digital Divide

*QEX* began with the December 1981 issue as *The ARRL Experimenters' Exchange*. The intent was to feature original research as well as practical construction articles of an advanced nature, while striking a balance between covering *digital* electronics — including software — and the *analog* world of receivers and transmitters. We can parse a ham station layout into an antenna system, a transceiver, and a human interface (HI). In 1981 a transceiver was comprised of analog circuitry. The HI supported analog voice, CW, and sometimes digital circuitry such as packet-radio technology, and RTTY, which by then had partially encroached into the transceiver circuitry.

Today, the software defined radio (SDR) technology is moving the dividing line between the digital and analog worlds closer to the antenna on one end, and deeper into the human interface on the other end. As we mentioned previously in *Perspectives*, you can easily build a very capable radio transceiver from readily available modules that feature analog as well as digital electronics. A personal computer serves as a digital HI for either the SDR or an analog transceiver. The digital / analog divide is blurred. Innovation and experimentation flourish at the antenna end (well covered in *QEX*) and at the HI with codes and protocols like the *WSJT-X* (also covered in *QEX*). Our authors continue to provide innovative feature articles on antenna technology, digital devices, RF circuitry, and research and development topics that are advancing the communications arts.

### In This Issue

Anthony Le Cren, F4GOH / KF4GOH, builds an SWR meter with vocal output.  
Rick Littlefield, K1BQT, describes a 300 watt MOSFET HF amplifier.  
Eric Nichols, KL7AJ, in his Essay Series, discusses EE math and Ohm's Law.  
Phil Salas, AD5X, turns a Nano VNA into a more rugged test instrument.  
John C. Westmoreland, AJ6BC, builds an NMEA-based GPS time display.  
Robert J Zavrel, W7SX, tabulates losses in plastics that hams often use.

### Writing for *QEX*

Please keep the full-length *QEX* articles flowing in, or share a **Technical Note** of several hundred words in length plus a figure or two. *QEX* is edited by Kazimierz "Kai" Siwiak, KE4PT, ([ksiwiak@arrl.org](mailto:ksiwiak@arrl.org)) and is published bimonthly. *QEX* is a forum for the free exchange of ideas among communications experimenters. All members can access digital editions of all four ARRL magazines: *QST*, *On the Air*, *QEX*, and *NCJ* as a member benefit. The *QEX printed edition* annual subscription rate (6 issues per year) for members and non-members is \$29 in the United States. First Class mail delivery in the US is available at an annual rate of \$40. For international subscribers, including those in Canada and Mexico, *QEX printed edition* can be delivered by airmail for \$35 annually, see [www.arrl.org/qex](http://www.arrl.org/qex).

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Very kindest regards,  
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*QEX* Editor