

## 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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**Chief Executive Officer:** Barry Shelly, N1VXY

**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).

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Kazimierz "Kai" Siwiak, KE4PT

## Perspectives

### It's a Digital World

Amateur Radio communications systems have steadily and increasingly embraced digital technologies. Among the earliest transitions to the digital world has been digital frequency synthesis, resulting in a dramatic increase in frequency stability of even two-decades old classic radios. This stability enabled the leap forward to *basic software defined systems* (SDS), which use the classic (or newer) frequency-stable radios as an RF front end with the "audio passband" as the last IF. Add a sound card for conversion between the analog and digital worlds, and for coupling and processing the signals on personal computers. The *software-defined* magic is on the computer in programs like *WSJT-X* and *fldigi* that encode and decode modes and provide capabilities that were not even dreamed of when that old radio was designed. Suddenly your classic transceiver's sensitivity jumps from 0.2  $\mu\text{V}$  for native SSB to better than 0.004  $\mu\text{V}$  for the software defined weak signal modes JT65 and JT9!

Furthermore, digital technology is also replacing formerly analog functions with digital radio architectures. The result is the modern *software defined radio* (SDR) that brings the digital world ever closer to the transceiver antenna ports.

Operationally, that magical software on your computer results in an increased propagation link-margin for both the SDS and SDR. It means that with those weak signal modes we can see tens of decibels deeper into a darker ionosphere, even with your classic radio.

We'd like to hear from you ([qex@arrl.org](mailto:qex@arrl.org)), our readers and authors, about your forays into software defined systems, and how you are embracing the digital world, and what operational benefits *you* are seeing with SDS and SDR.

### In This Issue

We feature a range of topics in this issue of *QEX*.

Elwood Downey, WBØOEW, designs an RF generator using an Arduino-controlled direct digital synthesizer stabilized with a GPS receiver.

James L. Tonne, W4ENE, presents some simple high performance circuitry to enhance transmitted speech signals.

Steve Cerwin, WA5FRF, investigates interesting ionospheric propagation phenomena during the August 2017 eclipse and November 2017 ARRL FMT.

Phil Salas, AD5X, shows how to protect the input of your high-power amplifier from potentially damaging transceiver power transients.

Luiz Duarte Lopes, CT1EOJ, tunes a dipole from a knowledge of impedance at the end of a transmission line.

Keep the full-length *QEX* articles flowing in, or share a **Technical Note** of several hundred words in length plus a figure or two. 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, ([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