

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/ or by e-mail to 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

Moving On

By the time this issue appears in your mail box the Dayton Hamvention® will have moved from Trotwood to Xenia, Ohio. Times change, we move on, but at the new venue you can still find your basic bargain teen-aged transceivers that can be easily upgraded to modern capabilities. Amateur Radio moves on as well, sometimes subtly.

How many of you, Dear Readers, have logged two-way contacts using a Software Defined Radio (SDR) system? I believe, *a greater number than you might think*. A basic SDR system comprises some form of RF front end, followed by conversion between the analog and digital realms, along with a general purpose personal computer (PC). The PC operates software producing a wide range of different communications protocols, or "waveforms". More simply, it is a ham transceiver (that bargain find at the hamfest) connected via a sound card to a PC running digital protocol software — a protocol or waveform that is not native to the transceiver. Surprised? In this scheme the transceiver's SSB "audio" is just the last IF that is centered near 1500 Hz. The PC software implements the protocols, including software filters as narrow as a few hertz, and presents the operator with a suitable graphical user interface. Teen-aged radio, in fact any modern transceiver: meet SDR capability. You point and click your way into a modern-day contact — not otherwise possible with just the bare-bones transceiver — using protocols that were not even in existence when that transceiver was manufactured!

The point is that much innovation has occurred in the design of digital waveforms and digital protocols — the software of this basic SDR — that greatly extends the communications capability of Amateur Radio, and it has happened subtly. More comprehensive SDRs have pushed the digitization closer and closer to the antenna in both transmitting and receiving, and closer to the PC, sometimes avoiding the sound card altogether. But they all thrive on the same digital protocols and waveforms available to the basic SDR. That's progress, embrace the new world. We move on, but watch this space for more new modulation waveforms, and for further SDR evolution.

In This Issue

Our *QEX* authors touch upon wide variety of Amateur Radio topics. These are at the top of the queue.

Riccardo Gionetti, IØFDH, describes an automatic tracking filter for a DDS generator.

Euclides Lourenço Chuma, PY2EAJ, describes a modern RF power meter with accuracy that rivals the best commercial RF power meters.

Charles Preston, K7TAA, uses *WSPR* (Weak Signal Propagation Reporter) software to facilitate reliable and accurate comparison of two HF transmitting antennas.

Marcus C. Walden reports findings in a 5 MHz experiment on HF near vertical incidence skywave propagation.

Scott Roleson, KC7CJ, describes a high-dynamic range broadband amplifier that enhances the usability of an SDR or any HF receiver.

Keep the full-length *QEX* articles flowing in, but if a full length article is not your aspiration, share a brief **Technical Note** that is perhaps several hundred words long 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, (ksiwiak@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.

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73,

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