

The American Radio Relay League



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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.arri.org/qex/ or by e-mail to qex@arri.org.

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Kazimierz “Kai” Siwiak, KE4PT

Perspectives

The Power of the Basic SDR System

We identified the basic SDR system in this column as comprising some form of RF front end, followed by conversion between the analog and digital realms, along with a general purpose personal computer (PC). The SD or *software defined* part of the system is the Amateur Radio communications software that operates on the PC, producing a wide range of different communications protocols, or “waveforms” that usually are not native to the transceiver used as the RF front end. To be sure, SDR receiver and transmitter platform architectures continue to migrate the boundary between the analog and digital realm closer to the antenna — but even those platforms also require, and benefit from, the development of new PC-based waveforms or modes.

The general purpose personal computer was once called the first consumer product sold without a specific consumer purpose. Added software defined its purpose. Our basic SDR system hardware might remain constant, but it is the added operating software that defines an evolving, clever, highly capable and innovative amateur communications purpose. As a result, our Amateur Radio communications capabilities have grown dramatically without a need to change the basic hardware. Waveforms have and will continue to be designed and fine-tuned for specialized and difficult propagation paths such as a Earth-Moon-Earth, meteor scatter, or just to generally increase the path link margin.

Watch these pages for additional modulation waveforms, and for further SDR evolution.

In This Issue

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

Steven J. Franke, K9AN, and Joseph H. Taylor, K1JT, describe the modulation, message structure, channel coding, and special operational features of the new meteor-scatter mode implemented in *WSJT-X*.

Robert J. Zavrel, W7SX, explains field-strength and power combining in various configurations of dipoles and dipole arrays.

James L. Kretzschmar, AE7AX, gets precision frequency control with assembly code.

David Birnbaum, K2LYV, shows how to calculate the LC trap values given the physical size of the antenna and two desired resonant frequencies.

John E. R. White, VA7JW, presents experimental results of a water seepage into the PL-259 connector.

Ed Callaway, N4II and Kai Siwiak, KE4PT, comment on the signal to noise ratio and polarization at HF considering atmospheric noise.

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, (ksiwia@arri.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.arri.org/qex.

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73,

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