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 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/** 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

The Radio Range Knob

We are well into the low portion of the sun spot cycle with relatively poorer ionospheric propagation. This will extend perhaps for a long time into the future. The common knowledge is that the most important part of the station is an efficient antenna system. That will help, as will the choice of operating band and operating times. So what else is different at the bottom of this cycle? This cycle we have a few more choices on the 'radio range knob' or 'link margin knob' on our radio systems — we can choose to operate using the new radio-link efficient operating modes. With the *WSJT-X* modes like JT9, JT65, and FT8, we can see many decibels deeper into the darker ionosphere than ever before. But how does that compare to the decades-old era of spectacular peak sun spot cycles?

The *QEX* readership have a long institutional memory. Many of you may remember operating during those spectacular sun spot cycle peaks of the past, well before the current digital era. How do your recent digital-era experiences compare with those dramatic cycles of decades ago? Let us know in a Technical Note; our more-recent ham readers may like to know!

In This Issue

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

Phil Salas, AD5X, builds a highly linear two-tone test generator for transceiver IMD testing.

Jim Koehler, VE5FP, automates a simple toaster oven for reflow soldering.

Braddon Van Slyke, AC0ZJ, makes a base-band quadrature modulator that operates over multiple bands.

Jan M. M. Simons, PA0SIM, use noise cancelling and noise reduction techniques to extract signals from noise.

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

Kazimierz "Kai" Siwiak, KE4PT