

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

Making Waves Historically

A historical perspective helps us better understand our radio arts. Radio receivers, transmitters and related devices all went through phases, starting out as purely mechanical-electrical devices. They progressed through vacuum tube electronics, and migrated to semiconductors and integrated circuits. Today's receivers and transmitters are ever more reliant on digital implementations with software defined functions replacing physical circuits. One can well imagine the analog-to-digital and digital-to-analog direct sampling of signals right at the terminals of an antenna. In fact such implementations have been built! Their historical perspective was one of evolution from mechanical-electrical devices to software driven solutions.

Antennas and propagation of course have escaped digitization. We've noted before that the very first technical article in the premier December 1915 issue of *QST* was "Pictured Electro-Magnetic Waves," by Clarence D. Tuska, the co-founder of the ARRL. More than a century later we still map radiation patterns, but with ever more precision using modern simulation tools. The tools went digital. Not long after Tuska's article, Professors Hidetsugu Yagi and Shintaro Uda described their classic Yagi-Uda directional array antenna in 1926. It has since become one of the most popular antenna configurations, along with the half-wave dipole and the vertical antenna. We celebrate the Yagi-Uda array by reprinting the original article in these pages. The antenna originated in the 1920s, but its basic form remains the same. Its experimental and mathematical analysis continues to this day, bringing us extensions and versions optimized for various performance parameters.

Keep your perspective historical!

In This Issue

Hidetsugu Yagi and Shintaro Uda describe the classic Yagi-Uda array antenna in this reprint of their 1926 article.

Robert J. Zavrel, W7SX, extends the Yagi-Uda array concept to the "W7SX Array" by not restricting element lengths to a half wavelength.

Jerry Spring, VE6TL, discusses the onset of Solar Cycle 25 and the MG II index.

Eric Nichols, KL7AJ, in his Essay Series, discusses electro-mechanical devices and control theory.

Phil Salas, AD5X, describes his method and fixtures for measuring antenna tuner loss.

Kai Siwiak, KE4PT, describes lightning-induced electromagnetic pulse effects.

Peter DeNeef, AE7PD, addresses RF exposure from a 70 cm band collinear dipole array.

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, (kswiak@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.

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Very kindest regards, Kazimierz "Kai" Siwiak, KE4PT, *QEX* Editor