

QEX (ISSN: 0886-8093) is published bimonthly in January, March, May, July, September, and November by the American Radio Relay League, 225 Main St., Newington, CT 06111-1494. Periodicals postage paid at Hartford, CT and at additional mailing offices.

POSTMASTER: Send address changes to: QEX, 225 Main St., Newington, CT 06111-1494 Issue No 313

Publisher
American Radio Relay League

Kazimierz "Kai" Siwiak, KE4PT
Editor

Lori Weinberg, KB1EIB
Assistant Editor

Zack Lau, W1VT
Ray Mack, W5IFS
Contributing Editors

Production Department

Steve Ford, WB8IMY
Publications Manager

Michelle Bloom, WB1ENT
Production Supervisor

Sue Fagan, KB1OKW
Graphic Design Supervisor

David Pingree, N1NAS
Senior Technical Illustrator

Brian Washing
Technical Illustrator

Advertising Information Contact:

Janet L. Rocco, W1JLR
Business Services
860-594-0203 – Direct
800-243-7768 – ARRL
860-594-4285 – Fax

Circulation Department

Cathy Stepina, QEX Circulation

Offices

225 Main St., Newington, CT 06111-1494 USA
Telephone: 860-594-0200
Fax: 860-594-0259 (24 hour direct line)
e-mail: qex@arrl.org

Subscription rate for 6 issues:

In the US: \$29;

US by First Class Mail: \$40;

International and Canada by Airmail: \$35

Members are asked to include their membership control number or a label from their QST when applying.

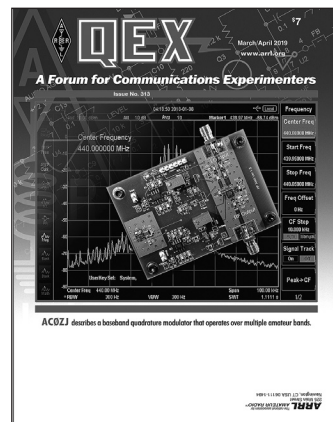
In order to ensure prompt delivery, we ask that you periodically check the address information on your mailing label. If you find any inaccuracies, please contact the Circulation Department immediately. Thank you for your assistance.



Copyright © 2019 by the American Radio Relay League Inc. For permission to quote or reprint material from QEX or any ARRL publication, send a written request including the issue date (or book title), article, page numbers and a description of where you intend to use the reprinted material. Send the request to the office of the Publications Manager (permission@arrl.org).

About the Cover

Braddon Van Slyke, AC0ZJ, describes the design and construction of a quadrature modulator based on the LTC5598. The modulator takes baseband I and Q signals, such as from digital to analog converters or left and right output of a sound card, a local oscillator signal, and puts out an RF signal up to 1 mW. The RF output is filtered and can then be amplified for transmitting on the ham bands. When used as an image-reject up-converting mixer, it is suitable as a modulator building block in a transmitter or transceiver.



In This Issue

Features

2 Perspectives
Kazimierz "Kai" Siwiak, KE4PT

3 Baseband Quadrature Multi-Band Modulator
Braddon Van Slyke, AC0ZJ

11 Low-Cost Low-Distortion 2-Tone Test Oscillator for Transmitter Testing
Phil Salas, AD5X

13 Reflow Soldering for the Radio Amateur — Revisited
Jim Koehler, VE5FP

21 Finding Signals in the Noise Using Two Antennas
Jan M. M. Simons, PA0SIM

Index of Advertisers

DX Engineering:Cover III
Kenwood Communications:Cover II

SteppIR Communication Systems..... Cover IV
Tucson Amateur Packet Radio:28