

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 06111-1400. Periodicals postage paid at Hartford, CT and at additional mailing offices.

POSTMASTER: Send address changes to: QEX, 225 Main St., Newington, CT 06111-1400 Issue No. 323

Publisher American Radio Relay League

Kazimierz "Kai" Siwiak, KE4PT Editor

Lori Weinberg, KB1EIB Assistant Editor

Scotty Cowling, WA2DFI Ray Mack, W5IFS Contributing Editors

Production Department

Becky R. Schoenfeld, W1BXY Publications Manager

Michelle Bloom, WB1ENT Production Supervisor

David Pingree, N1NAS Senior Technical Illustrator

Brian Washing Technical Illustrator

Advertising Information

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 06111-1400 USA Telephone: 860-594-0200

Fax: 860-594-0259 (24-hour direct line)

Email: qex@arrl.org

Subscription rate for 6 print issues:

In the US: \$29

US by First Class Mail: \$40;

International and Canada by Airmail: \$35

ARRL members receive the digital edition of *QEX* as a member benefit.

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.

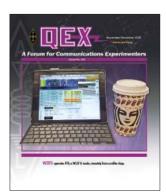


Copyright © 2020 by the American Radio Relay League Inc. For permission to quote or reprint material from *QEX* or any ARRL publication, send a written request including the issue date (or book title), article title, page numbers, and a description of where and how you intend to use the reprinted material. Send the request to permission@arrl.org.

November/December 2020

About the Cover

Harry Bloomberg, W3YJ, interfaces several key pieces of technology to operate CW, digital modes, and SSB remotely. The first piece is the Raspberry Pi single-board computer that runs a distribution of the Raspberry Pi OS (Raspbian) Open Source Linux operating system. The next pieces are *Fidigi* and *FIrig*, part of the *NBEMS* software suite developed by Dave Freese, W1HKJ. *FIrig* enables you to control a transceiver through a USB interface. You can change frequency, adjust power, and control other major parameters on a variety of transceivers. *NBEMS* runs on Windows, MacOS and Linux, including the Raspberry Pi. You can use *FIrig* to act as rig control for *WSJT-X* digital modes. [Harry Bloomberg, W3YJ, photo.]



In This Issue

- Perspectives
 Kazimierz "Kai" Siwiak, KE4PT
- Remote Operating with a Raspberry Pi, Fldigi/Flrig, WSJT-X, and NoMachine
 Harry Bloomberg, W3YJ
- 7 Errata
- Using the NanoVNA to Design an SSB Ceramic Resonator Filter
 Robert J. Fontana, AK3Y
- Limitations of the Transmission Line Resonator Approach to Broad Banding 80 m Dipoles

 Joe Purden, W6AYC
- 17 HOBBIES Software for Computational Electromagnetics Steve Stearns, K6OIK
- 22 UHF Quadrature Coupled Power Amplifier Al Yerger, K2ATY
- 27 Self-Paced Essays Electrical Engineering Lab Eric P. Nichols, KL7AJ

Index of Advertisers

DX Engineering:C	over III
Kenwood Communications:	Cover II

SteppIR Communication Systems:Cover	IV
Tucson Amateur Packet Radio:	21
W5SWLElectronics:	12