



QEX (ISSN: 0886-8093) is published bimonthly in January, March, May, July, September, and November by the American Radio Relay League, 225 Main Street, 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 260

Harold Kramer, WJ1B  
*Publisher*

Larry Wolfgang, WR1B  
*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*

**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](mailto:qex@arrl.org)

**Subscription rate for 6 issues:**

In the US: ARRL Member \$24,  
nonmember \$36;

US by First Class Mail:  
ARRL member \$37, nonmember \$49;

International and Canada by Airmail: ARRL member  
\$31, nonmember \$43;

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 © 2010 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](mailto:permission@arrl.org)).

May/June 2010

**About the Cover**

Rubens Ramos Fernandes (formerly PY2QE), designed and built a handy frequency counter for experimenters. He used a PIC16F876A microcontroller and the prescaler in a National Semiconductor LMX2326 RF synthesizer to build his counter. It covers 30 Hz to 55 MHz and 55 MHz to 2.8 GHz.



**In This Issue**

**Features**

**3 A PS/2 Keyer: Using a Keyer Paddle to Emulate a PS/2 Keyboard and Mouse**

By David Bern, W2LNX

**10 A Frequency Counter for the Experimenter**

By Rubens R. Fernandes, ex-PY2QE

**16 Adjusting BJT Oscillator Amplitude**

By Byron Blanchard, N1EKV

**21 Solving Random Noise Issues in TRM-433-LT Data**

By Mark Spencer, WA8SME

**26 An Inexpensive Laboratory-Quality RF Wattmeter**

By Gary Steinbaugh, PE, AF8L

**33 Amateur Radio Astronomy Projects — Radio Signals from Jupiter**

By Jon Wallace and Richard Flagg, AH6NM

**37 An Oscilloscope Camera Mount**

By Dr. Sam Green, W0PCE

**Columns**

**32 Reader's Page**

**44 Tech Notes**  
By Bob Kopski, K3NHI

**40 In the Next Issue of QEX**

**46 Upcoming Conferences**

**41 SDR: Simplified**  
By Ray Mack, W5IFS

**48 Letters**

**Index of Advertisers**

American Radio Relay League:..... 9, 43, Cover III, Cover IV	National RF, Inc: .....25
Down East Microwave Inc:.....40	Nemal Electronics International, Inc: ..... 15
Kenwood Communications: ..... Cover II	RF Parts .....45, 47
	Tucson Amateur Packet Radio: .....20