

**Howard E. Michel, WB2ITX**  
Publisher

**Steve Ford, WB8IMY**  
Editor

**Becky R. Schoenfeld, W1BXY**  
Managing Editor

**Jen Glifort, KC1KNL**  
**Caroline Kenney**  
**Allison McLellan**  
Assistant Editors

**Bart Jahnke, W9JJ**  
Contest Branch Manager

**Rick Lindquist, WW1ME**  
*Happenings*

**Bob Allison, WB1GCM**  
*Product Review Lab Testing*

**Mark J. Wilson, K1RO**  
**Al Brogdon, W1AB**  
**Bernie McClenny, W3UR**  
**H. Ward Silver, N0AX**  
**Paul Wade, W1GHZ**  
**Jon Jones, N0JK**  
**Rick Palm, K1CE**  
**Joel R. Hallas, W1ZR**  
**Barry Shackelford, W6YE**  
**Kai Siwiak, KE4PT**  
**Bruce Draper, AA5B**  
Contributing Editors

**Michelle Bloom, WB1ENT**  
Production Supervisor

**Jodi Morin, KA1JPA**  
Assistant Production Supervisor

**Maty Weinberg, KB1EIB**  
Production Coordinator

**Sue Fagan, KB1OKW**  
Graphic Design Supervisor

**David Pingree, N1NAS**  
Senior Technical Illustrator

**Janet Rocco, W1JLR**  
Advertising Sales Manager

**Bob Inderbitzen, NQ1R**  
Marketing Manager

**Yvette Vinci, KC1AIM**  
Circulation Manager

**Diane Szlachetka, KB1OKV**  
Advertising Graphics Designer

**Steve Ewald, WV1X**  
Field Organization Supervisor

**Eric Casey**  
Convention and Event Coordinator

## 9 Second Century

The Spectrum of Hams

## 30 Change Audio Volume Using Keyboard Shortcuts

Kevin P. Chandler, AB1ZQ

## 34 The Basics of Fan Cooling

Al Rabassa, NW2M

## 36 Remotely Switched Directional FoG Array

Jerome Kahn, AC0RL

## 39 Field-Deployable Mini-K9AY Loop

Bob Lombardi, W4ATM

## 42 A Force-Sensing CW Paddle

Art Heft, K8CIT

## 44 Installing Coax Crimp Connectors

Dino Papas, KL0S

## 47 Product Review

Mark Wilson, K1RO

FlexRadio Systems FLEX-6400M HF and 6-Meter SDR Transceiver; HeKits FET DIP Meter Kit; RM Italy BLA600 500 W HF and 6-Meter Linear Amplifier



## 65 Amateur Radio from Antarctica

Reinhard E. Flick, PhD, K6REF, and Peter D. Bromirski, PhD

## 68 A New Mentor Makes a New Ham

Ed Gibbs, KW4GF

## 70 Radio on the Rails

Steve Ford, WB8IMY

## 72 Who's Using FT8?

Masaaki Maeda, W2/JR1AQN

## 75 Sprints: The Indy 500 of Radiosport

Jim George, N3BB

## 78 AREDN Mesh Tunnel via Satellite at Baker 2 Vegas 2018

Oliver Dully, K6OLI

## 90 ARRL International Grid Chase Update

## 91 2018 ARRL 10 GHz and Up Contest Results

Jeff Wadsworth, KI5WL

## 93 2018 ARRL 222 MHz and Up Distance Contest Results

John "JK" Kalenowsky, K9JK

## Columns

Classic Radio.....	87
Contest Corral.....	89
Correspondence.....	24
The Doctor is In.....	59
Eclectic Technology.....	64
Happenings.....	81
Hints & Hacks.....	61
How's DX?.....	94
Member Spotlight.....	13
Public Service.....	85
Up Front.....	20
The World Above 50 MHz.....	96
75/50/25 Years Ago.....	102

## Digital and Mobile Editions

ARRL members can access the digital edition via a link at [www.arrl.org/qst](http://www.arrl.org/qst), download our iOS app from the iTunes Store, and download our Android app from the Google Play Store.



75



91

## Departments

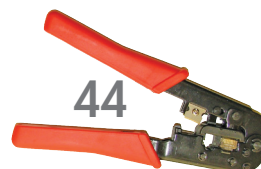
Amateur Radio Band Chart.....	84
ARRL Member Services.....	14
ARRL Section Managers.....	16
Convention and Hamfest Calendar.....	100
Feedback.....	74
Field Organization Reports.....	102
Ham Ads.....	140
Index of Advertisers.....	142, 143
New Books.....	99
New Products.....	43, 46
Officers, Division Directors, and Staff...	15
QuickStats.....	120
Silent Keys.....	103
Special Event Stations.....	98
Strays.....	101
This Month in QEX.....	38
W1AW Qualifying Runs.....	101
W1AW Schedule.....	99

## Interested in Writing for QST?

[www.arrl.org/qst-author-guide](http://www.arrl.org/qst-author-guide)  
email: [qst@arrl.org](mailto:qst@arrl.org)



96



44



65



## Our Cover

In this month's article, "Amateur Radio from Antarctica," journey to the bottom of the Earth with authors Reinhard E. Flick, PhD, K6REF, and Peter D. Bromirski, PhD. As part of a team conducting research on the Ross and Ronne-Filchner Ice Shelves, they installed more than 30 seismometer stations — and K6REF had the opportunity to get on the air. Pictured on our cover is the McMurdo Station ham shack, KC4USV, with its seven-element Yagi beam, on the southern tip of Ross Island. [Photo courtesy of Reinhard E. Flick, K6REF, and Peter D. Bromirski]

QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, Inc, 225 Main St., Newington, CT 06111-1400, USA. Periodicals postage paid at Hartford, CT, USA and at additional mailing offices.

POSTMASTER: Send address changes to: QST, 225 Main St., Newington, CT 06111-1400, USA. Canada Post: Publications Mail Agreement #90-0901437. Canada returns to be sent to IMEX Global Solutions, 1501 Morse Ave., Elk Grove Village, IL 60007.

**US & Possessions:** Membership in the ARRL, including a 1-year subscription to QST, is available to individuals at \$49. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the rate of \$25. Life Membership, including a subscription to QST is available at \$1,225.\* Membership includes \$21 per year for subscription to QST. Membership and QST cannot be separated. Libraries and institutions, \$49 per year. Single copies \$6.95.

### International

To compensate for additional postage for mailing outside the US, the following rates apply:

**Canada:** Membership in the ARRL, including a 1-year subscription to QST, \$62, payable in US funds. Life Membership, including a subscription to QST is available at \$1,550.\* Libraries and institutions, \$62 per year.

**All Other Countries:** Membership in the ARRL, including a 1-year subscription to QST, \$76, payable in US funds. Life Membership, including a subscription to QST, is available at \$1,900.\* Libraries and institutions, \$76 per year.

Membership without QST is available to the immediate family of a member living at the same address, and to anyone who is legally blind, for \$10 per year.

Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds.

Membership in the ARRL, including a 1-year subscription to Digital QST only, is available to Canadian and International members at \$49.

Copyright © 2018 by the American Radio Relay League Inc. Title registered at the US Patent Office. International copyright secured. All rights reserved. Quedan reservados todos los derechos. Printed in the USA.

QST®, DXCC®, VUCC®, DX Century Club®, ARES®, Amateur Radio Emergency Service®, Logbook of The World®, LoTW®, and ARRL, the national association for Amateur Radio® are registered trademarks of the American Radio Relay League, Inc.

The ARRL and QST in no way warrant the products described or reviewed herein.

QST is available to blind and physically handicapped individuals from the Library of Congress, National Library Service for the Blind and Physically Handicapped. Call 1-800-424-8567 or go to [www.loc.gov/nls/](http://www.loc.gov/nls/).

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

\*Payment arrangements available. Please write for details.

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 at [circulation@arrl.org](mailto:circulation@arrl.org) or 860-594-0200 immediately. Thank you for your assistance.

Reprints and permissions: [permission@arrl.org](mailto:permission@arrl.org)

Details of our Online Privacy Policy can be found at [www.arrl.org/online-privacy-policy](http://www.arrl.org/online-privacy-policy).

Telephone: 860-594-0200  
Fax: 860-594-0259