

Howard E. Michel, WB2ITX
Publisher

Steve Ford, WB8IMY
Editor

Becky R. Schoenfeld, W1BXY
Managing Editor

Jen Glifort, KC1KNL
Senior Editor

Caroline Kenney
Leanna Zwiebel
Assistant Editors

Bart Jahnke, W9JJ
Radiosport & Field Services
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 Shackleford, 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
Product Development Manager

Yvette Vinci, KC1AIM
Marketing and Sales Manager

Diane Szlachetka, KB1OKV
Advertising Graphics Designer

Steve Ewald, WV1X
Field Organization Supervisor

Eric Casey, KC2ERC
Convention and Event Coordinator

9 Second Century

Dare to Imagine

30 Constructing Metal Enclosures

Robert Miller, KE6F

34 Untangling the Decibel Dilemma

H. Ward Silver, N0AX

39 Comparing Mobile/Portable Antennas on 20 Meters

Ulrich Rohde, N1UL

42 Product Review

Mark Wilson, K1RO

Icom IC-9700 VHF/UHF Multimode
Transceiver; N6BT V-8 Vertical Dipole
for 80 – 10 Meters; mAT-Tuner mAT-125E
Automatic Antenna Tuner



66 Nashua Area Radio Society Outreach to New Hams

Fred Kemmerer, AB1OC

70 ARISS's Next Generation Radio System Progresses Toward Launch

Joe Lynch, N6CL

73 The ARRL Ham Radio Equipment Insurance Plan

Jen Glifort, KC1KNL

82 The Winter ARRL School Club Roundup

82 Hiram Percy Maxim 150th Birthday Celebration Results

Paul Bourque, N1SFE

93 A Look Back: March 1970



Columns

Amateur Radio World	77
Celebrating Our Legacy	99
Classic Radio	100
Contest Corral	81
Correspondence	24
The Doctor is In	56
Edictic Technology	63
Exam Info	80
Happenings	74
Hints & Hacks	64
How's DX?	86
Member Spotlight	13
Microwavelengths	58
Public Service	78
Technical Correspondence	60
Up Front	20
The World Above 50 MHz	88
100, 50, and 25 Years Ago	102

Digital and Mobile Editions

ARRL members can access the digital edition via a link at www.arrrl.org/qst, download our iOS app from the iTunes Store, and download our Android app from the Google Play Store.

Departments

ARRL Section Managers	16
Certificate of Code Proficiency Recipients	90
Convention and Hamfest Calendar	84
Feedback	62
Field Organization Reports	79
Guide to ARRL Member Benefits	14
Ham Ads	140
Index of Advertisers	142, 143
New Products	85
Officers, Division Directors, and Staff	15
QST Cover Plaque Award	28
QuickStats	132
Silent Keys	103
Special Event Stations	83
Strays	83
This Month in QEX	28
W1AW Qualifying Runs	90
W1AW Schedule	91
W1AWs QSL File	92

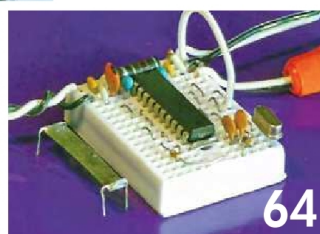
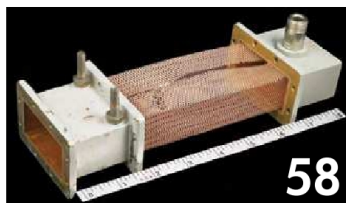
Write for QST

www.arrrl.org/qst-author-guide
email: qst@arrrl.org



Our Cover

Intrepid portable operator Jerry Clement, VE6AB, took this photo west of Calgary, Alberta, Canada on a ridge in Kananaskis Country bordering the Alberta Rockies. Jerry built this 10 – 40 meter magnetic loop antenna (MLA). The antenna and its mount were designed to sit on the pack-frame, along with the radio. The MLA breaks down for storage on the pack-frame when not in use. Jerry said, "On this day with good band conditions on 20 meters, I was working [US] stations located south of my location." [Jerry Clement, VE6AB, photo]



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 © 2019 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/.

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@arrrl.org or 860-594-0200 immediately. Thank you for your assistance.

Reprints and permissions:

permission@arrrl.org

Details of our Online Privacy Policy can be found at www.arrrl.org/online-privacy-policy.

Telephone: 860-594-0200

Fax: 860-594-0259