Official Journal of

The national association for AMATEUR RADIO

QST

devoted entirely to

AMATEUR RADIO

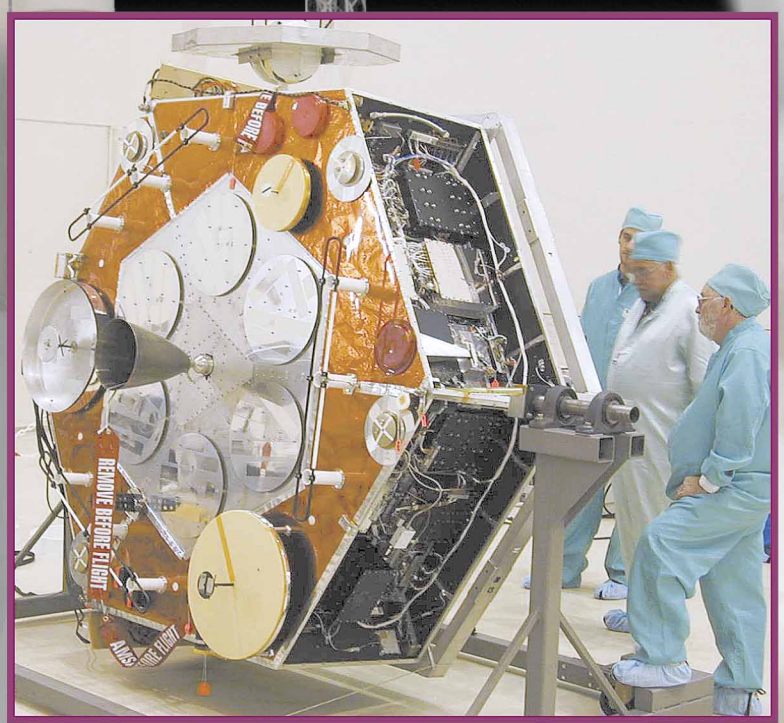
January 2001

QST reviews

- **Alinco DR-135TP FM mobile transceiver with TNC**
- **AOR DDS-2A digital VFO for Collins radios**

Build a ground-coupled portable HF antenna

Try MFSK16 —the new HF digital mode



$4.99 U.S. $6.99 Can.

IC-W32A
Advanced dual bander

- 2M/440MHz
- 5W@9.6VDC
- 200 Memories
- Alphanumeric Display & Paging
- V/V, V/U, U/V, U/U
- Backlit Keypad
- Wide Rx†

IC-Q7A
Super small size, big sound

- 2M/440MHz
- Mini Size
- Big Audio
- 30 to 1300 MHz Rx† (Cell Blocked)
- Advanced Scanning
- Includes "AA" Ni-Cds, Charger
- Work One Band at a Time

IC-T22A
Shirt pocket small, big performance

- 2 Meters
- Easy to Use
- Alphanumeric Display
- Wide Rx ,Air Band†
- 5W@13.5V DC*
- 3W@9.6V DC Standard
- 80 Memory Channels

IC-T81A
World's first QUAD band HT

- Easy to Use
- 6M/2M/440MHz/1.2GHz
- Wide Band Rx†
- 5W@13.5VDC*, 1W/1.2 GHz
- Ni-Mh Battery
- Auto Repeater
- Water Resistant

IC-T2H
Police radio rugged

- 2 Meters
- Super Rugged
- 6W @ 9.6V DC
- 500 mW Audio
- 8 Front Panel PC Programmable* Keys
- 2 AA Ni-Cds & Wall Charger Included
- Our most affordable

WORK THE MAGIC

IC-T7H
Powerful performance

- 2M/440 MHz
- Easy to Use
- Up to 6 Watts
- Work One Band at a Time
- Air Band Rx†
- Pocket Beep
- Auto Repeater

IC-2100H
Rugged 2 meter, large controls

- 55 Watts
- Easy to Use
- Full Function Mic
- IMD Fighter
- MIL SPEC 810††
- Large Green/Amber LCD
- Large Keys and Knobs

There's something magical about amateur radio. The fact that you can speak into a little box and communicate with someone else on the other side of town, or even on the other side of the world, with nothing between you and that person but thin air…what an incredible, powerful feeling. It feels like magic.

WORK THE MAGIC

There's something magical about the latest ICOM radios, too. From the 'Q7A's small size to the '2800's TFT Color LCD screen, the technological advances of today's ICOM rigs are like magic. So why not work a little magic of your own. Visit your authorized Icom dealer today and get in on the fun.

IC-2800H *SAVE $50***
Audio excellence and video exitement

- 2M/440MHz
- 3" (d) TFT Color LCD Screen
- NTSC External Video Input
- WFM & AM (Rx Only), FM
- 50W/2M, 35W/70CM
- 9600 bps Packet Data Port
- V/U, U/V, Dual Band, Cross Band Repeat
- Independent Band Controls
- Air Band Rx†

IC-207H
Super compact,
detachable control panel*

- 2M/440MHz
- 2M(45W)/440 MHz(35W)
- Work One Band at a Time
- Up to 9600 bps Packet*
- Air Band RX†
- MIL STD 810††

WORK THE MAGIC

All ICOM HTs meet

SHOCK MIL STD 810 C/D/E VIBRATION

WORK THE MAGIC ICOM

Want to know more?

www.icomamerica.com

ICOM®

*Optional equipment required. **Limited time offer. See dealer for details. †Reception guaranteed on US ham bands only. ††MIL STD 810 C/D/E for shock/vibration. ©2000 ICOM America, Inc., 425-454-8155. The ICOM logo is a registered trademark of ICOM, Inc. All specifications are subject to change without notice or obligation. VHFWTMQST1100

A new era begins.

More Power.
100W UHF/75W
UHF. Phase 3D Ready.
Easy to Use Soft Key Menus.
Dual 9600 bps PACKET Ports. Go Anywhere Size. 1.2 GHz & DSP Capable.

The IC-910H. A new era in satellite transceivers.

100W VHF/75W UHF Variable Output • Simultaneously Works Two Bands at Once • Dual 9600 bps High Speed PACKET Ports • All Mode • .11 uV Sensitivity • Main & Sub Band Functions for IF Shift, Sweep, NB, RF Attenuator • Large LCD Display • Four Versatile Scanning Functions • CTCSS Encode/Decode/Tone Scan • Built-in Keyer • PC Controllable • Memory Pad • Reverse Satellite Functions • Optional 1200 MHz Band Unit • Optional DSP

Begin your new era at your authorized ICOM dealer today.

Visit our redesigned website at
www.icomamerica.com

ICOM®

MAHA

"Your Supplier, Your Partner, Your Friend!"

POWER SOLUTION

www.mahaenergy.com

MH-4AA155

Rechargeable NiMH Battery

- Specifically designed for high drain devices like ham radios, GPS, and family radios.
- Redefining market standard with its 1550mAh capacity.
- Recharge 500 to 1000 times.

MH-C204F

Intelligent Quick Charger

- Rapid charge AA & AAA NiMH / NiCD batteries in about 3 hours.
- Condition battery to improve performance.
- Can be used in the car with the optional car adapter.

MH-C888

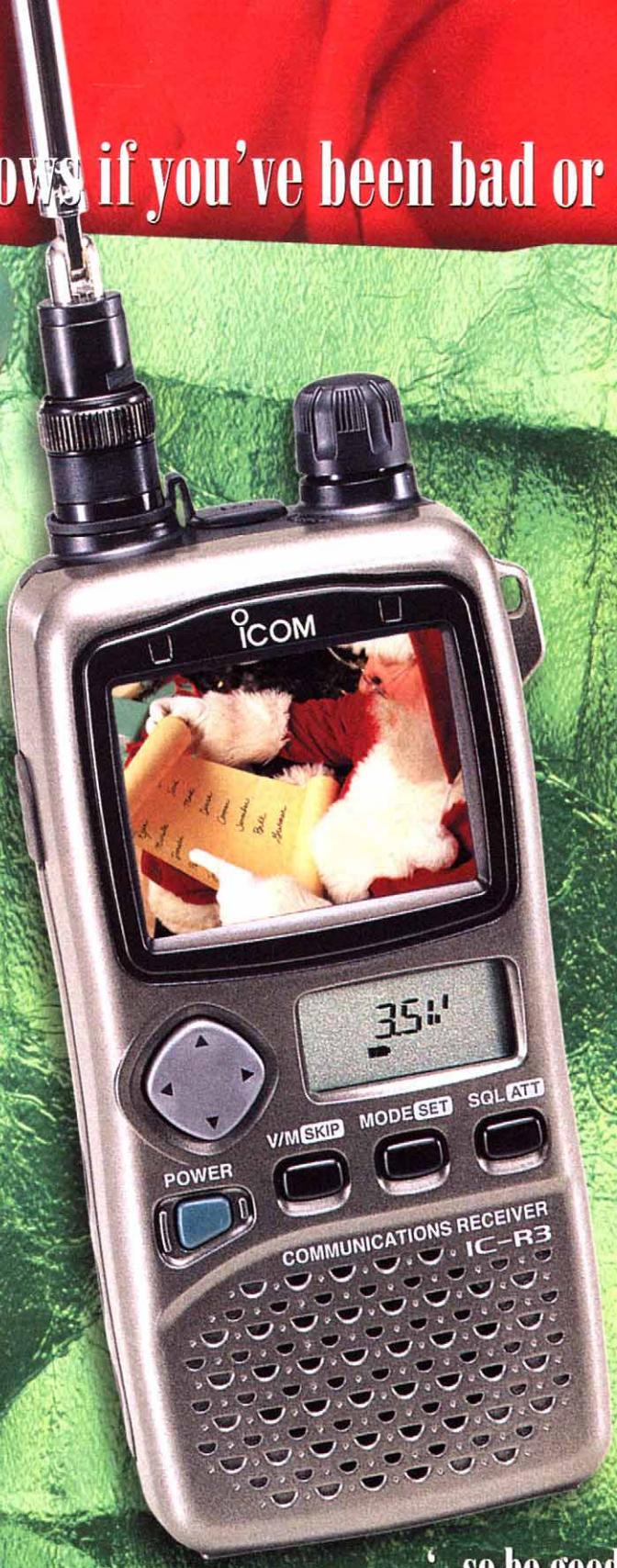
Univeral Drop-in Charger Conditioner

- Universal drop-in design to accommodate various battery packs.
- Advanced battery conditioner to deep condition battery packs.
- FLEX Negative Pulse feature prevents crystallization in batteries.

MAHA ENERGY CORPORATION

545-C W. Lambert R. Brea, CA 92821 Tel: 1-800-376-9992 or 714-990-4557 Fax: 714-990-1325

"...he knows if you've been bad or good..."



The IC-R3. Just in time for the holidays.

0.5-2450 MHz†, 450 Memory Channels with Alphanumeric Names, CTCSS with Tone Scan, 4 Level Attenuator, Telescoping Antenna with BNC Connector, Four Way Action Joystick, Litium Ion Power, *and* a 2" Color TFT Display with Video/ Audio Output.

download frequencies right from the web

www.icomreceivers.com

"...so be good for goodness sake."

Visit our redesigned website at

www.icomamerica.com

ICOM®

†Cellular frequencies blocked; unblocked versions available to FCC approved users.

January 2001 ♦ Volume 85 Number 1

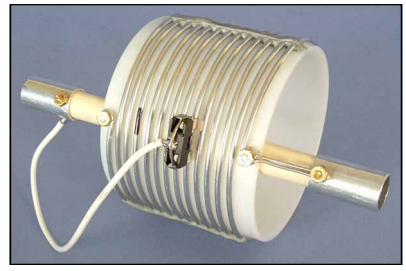
CONTENTS

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.

See page 10 for detailed contact information.

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

Technical



28

66

News and Features

QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494, USA. Periodicals postage paid at Hartford, CT, USA and at additional mailing offices. POSTMASTER: Send address changes to: *QST*, 225 Main St, Newington, CT 06111-1494, USA

QST Workbench

58

111

Operating

Departments

Phase 3D photograph courtesy of Dick Daniels, W4PUJ. Ariane flight 135 photograph provided by Arianespace.

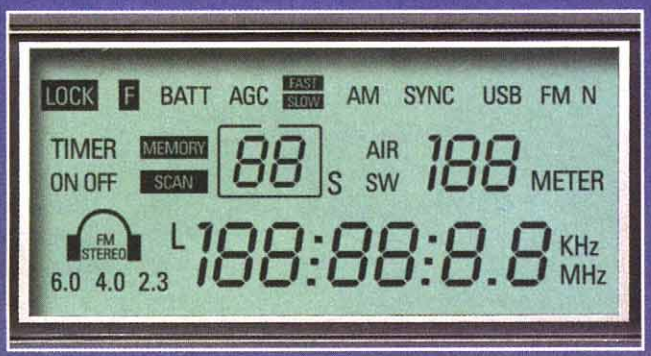
Our Cover: On November 16, 2000, at 0107 UTC, Ariane flight 135 lifted off from it's launch pad in Kourou, French Guinea. On board was the most advanced Amateur Radio satellite ever created—Phase 3D (later to be renamed AMSAT-OSCAR 40). Pictured with the Phase 3D satellite are (l-r): Hermann Guenther, of AMSAT-DL, Konrad Mueller, DG7FDQ, of AMSAT-DL and Lou McFaddin, W5DID, of AMSAT-NA.

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $34. Age 65 and over, with proof of age, $28. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the following rates: Age 12 and under, $8.50 and age 13 through 21, $16.00. Life Membership, in-cluding a subscription to *QST* is available at $850.* Age 65 and over, $700.* Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Subscription rate for libraries and institutions is $34 per year. Single copies $5.

International
To compensate for additional postage for mailing outside the US, the following rates apply:
Canada: Membership in the ARRL, including a one year subscription to *QST*, $47, payable in US funds. Life Membership, including a subscription to *QST* is available at $1175.* Subscription rate for libraries and institutions is $47 per year.
All Other Countries: Membership in the ARRL, including a one year subscription to *QST*, $54, payable in US funds. Life Membership, including a subscription to *QST* is available at $1350.* Subscription rate for libraries and institutions is $54 per year.
*Payment arrangements available. Please write for details.
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 $5 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.

QST is available to blind and physically handicapped individuals on audio cassette from the Library of Congress, National Library Service for the Blind and Physically Handicapped. Call 1-800-424-8567.
Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421

GRUNDIG The Ultimate in



The LCD
Big! Bold! Brightly Illuminated 6" by 3½". Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

The Signal Strength Meter
Elegant in its traditional Analog design, like the gauges in the world's finest sports cars. Large. Well Lit. Easy to read.

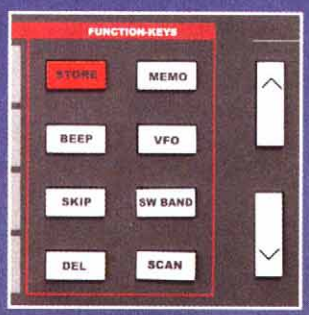
The Frequency Coverage
Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

The Tuning Controls
• For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use.

THESE ARE THE SATELLIT 800 MILLENNIUM'S MAJOR FEATURES. FOR A DETAILED SPECIFICATION SHEET, CONTACT GRUNDIG.

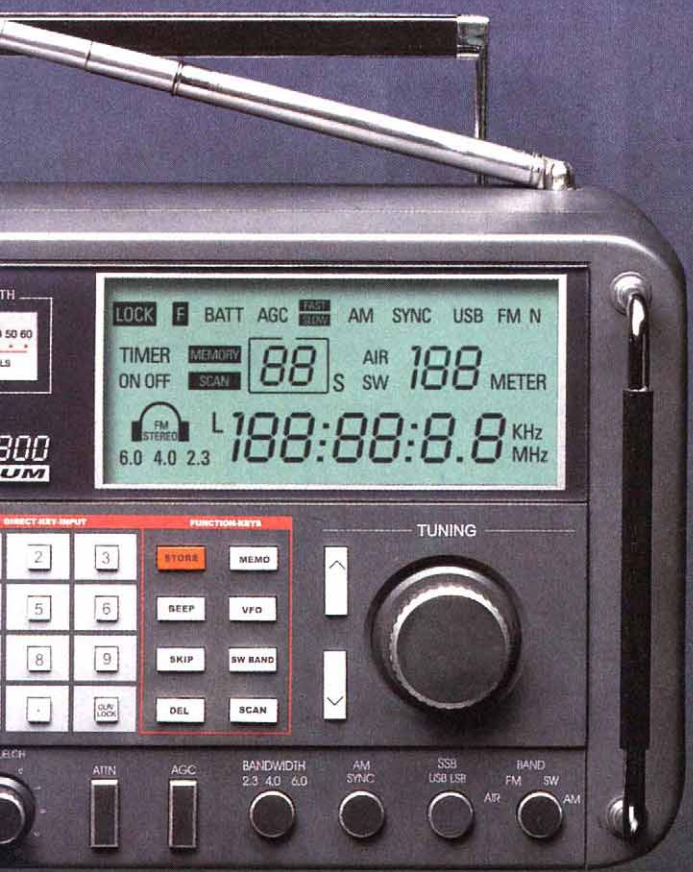
Ultra fine-tuning of 50Hz on LSB/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
• For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.
• For direct frequency entry: a responsive, intuitive numeric keypad.

Digital Technology



The Operational Controls
Knobs where you want them; Buttons where they make sense. The best combination of traditional and high-tech controls.

The Sound
Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.



The Technology
Today's latest engineering:
- Dual conversion superheterodyne circuitry.
- PLL synthesized tuner.

The Many Features
- 70 user-programmable memories.
- Two, 24 hour format clocks.
- Two ON/OFF sleep timers.
- Massive, built-in telescopic antenna.
- Connectors for external antennas – SW, AM, FM and VHF Aircraft Band.
- Line-out, headphone and external speaker jacks.

The Power Supply
A multi voltage (110, 220V) AC adapter is included. Also operates on 6 size D batteries. (not included)

Dimensions: 20.5" L × 9" H × 8" W

Weight: 14.50 lbs.

by GRUNDIG

Lextronix / Grundig, P.O. Box 2307, Menlo Park, CA 94026 • Tel: 650-361-1611 • Fax: 650-361-1724
nes: (US) 1-800-872-2228 (CN) 1-800-637-1648 • Web: *www.grundigradio.com* • Email: *grundig@ix.netcom.com*

PRYME Radio Products

Accessories that make your radio . . . better!SM

PORTABLE AUDIO

As low as
$21.95
Suggested Retail

SPM-100 Series mini remote mics: These lightweight microphones features a high-quality condenser-style mic element that produces excellent transmitted audio, as well as a powerful speaker. Available to fit most popular handheld radios.

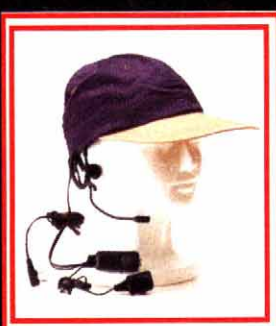
As low as
$119.95
Suggested Retail

PMC-200 Advanced Desk Mic: This desktop microphone features adjustable compression with a built-in analog meter to make adjustments easy! It has both locking and momentary PTT, and a graphic equalizer so you can tailor your on the air audio to your own personal tastes!

As low as
$14.95
Suggested Retail

EH-1 / EH-2 Earphone for portable radios: The EH-1 / EH-2 Series provide comfort, privacy, and convenience. Simply plugs into the external speaker jack of most handheld radios. Available with either flesh colored cord (EH-1) or black colored cord (EH-2)

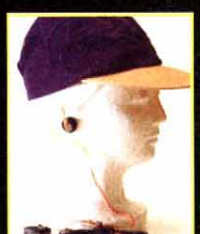
BASE STATION AUDIO



SPM-400 Series mini boom microphones: The SPM-400 series headsets include an in-the-ear speaker and a patented rubber-covered earloop design that adjusts to comfortably fit either the right or left ear of any user. The unit features an in-line Push-To-Talk switch that can be clipped to the user's lapel or belt, or the unit can be keyed remotely using an optional remote cord. The SPM-400 is available wired to fit most of today's popular handheld radios.

As low as
$24.95
Suggested Retail

HANDHELD ANTENNAS



As low as
$25.95
Suggested Retail

SPM-300E Series lapel mics with earhook: The SPM-300 is a lapel mic / earphone combo with coiled cable. The earphone uses our patented rubber earhook which both keeps the earphone in place and makes it extremely comfortable to wear. The SPM-300E is available with a clear earphone and flesh colored cable (SPM-300EC) or black earphone and cable (SPM-300EB).

As low as
$249.95
Suggested Retail

PRYME ClearConnect™ and SportConnect™: These sporty new radios operate on frequencies within the General Mobile Radio Service, and are intended to be used by families for their own personal communications needs. The SportConnect™ is a 7 channel radio for the casual radio user. The ClearConnect™ is a 23 channel unit with repeater capability for the true GMRS enthusiast. Both radios are 4-watts for a range of up to 5 miles radio-to-radio. For increased range, the PRYME ClearConnect™ model also adds repeater capability for a range of up to 25 miles or more! These radios are perfect for your family's communications needs. Because GMRS and Family Radio share 7 channels, you can even used these radios to intercommunicate with FRS radios that you already have! A valid GMRS license is required to operate these units.

MANY more accessory models are available!

For your nearest dealer or a complete catalog call *1-800-666-2654!*

PRYME
Radio Products

*Win **FREE PRYME** equipment on the web at* **www.pryme.com**!

Study for your ham radio license on-line at **www.hamtest.com**!

480 Apollo St. #E 〈 Brea, CA 92821
Phone: 714-257-0300 〈 **Fax:** 714-257-0600
E-mail: sales@pryme.com

* The prices shown above are the suggested retail prices for the items listed. Actual dealer prices may vary. Please call your local PRYME dealer for his price.

"IT SEEMS TO US..."

The Morse Question

When the ARRL Board of Directors meets on January 19, one of the principal topics of discussion will be the international requirement that amateur operators prove their ability to send and receive Morse code before being allowed to operate below 30 MHz. The topic is timely because the issue is on the agenda for the next ITU World Radiocommunication Conference in 2003 (WRC-03) and because the International Amateur Radio Union (IARU) is developing its position on the issue through a series of regional conferences. Of course, the IARU does not get to make the ultimate decision; that authority rests collectively with the administrations of the ITU Member States.

At the IARU Region 3 Conference held last August in Darwin, Australia, in accordance with a standing Board policy, the ARRL cast the only vote against a resolution calling for removal of the requirement. This was quite a change from just three years earlier, when the issue was discussed by a working group at the Region 3 Conference in Beijing. There, a majority agreed with the ARRL in supporting retention of the requirement. The question will arise next at the IARU Region 2 Conference, scheduled for Guatemala in October 2001. Between now and then the ARRL Board will consider whether to change its standing instructions to its delegates in light of this and other developments.

The international Morse requirement is a controversial and sometimes emotional issue, so let us clarify exactly what is the question that will be decided at WRC-03. Let us begin by saying what it is *not*.

The question is not whether Morse code will remain a significant operating mode, widely used by radio amateurs. For at least the lifetime of most present ARRL members and probably for much longer than that, it will. The reason is simple: Amateur Radio is more enjoyable and satisfying if you're proficient in Morse code than if you're not. The Darwin Conference expressed strong support for Morse code as an effective and efficient mode of communication. Those of us who are proficient will continue to use it. The ARRL will continue to encourage Morse proficiency and discovery of the joy of Morse operation, whether or not it is a licensing requirement.

Similarly, WRC-2003 decisions will have no effect on the HF subbands that are designated for various modes, either by regulation or by voluntary band plan. CW remains a strong second to SSB in popularity among HF operators and continues to have its applications at VHF and even into the microwaves.

Neither is the question whether the United States will continue to require its HF amateur licensees to pass a Morse code examination. At the present time the FCC has no choice but to require such an examination, because observing the international Radio Regulations is a treaty obligation. However, removing the treaty obligation does not automatically lead to a change in domestic requirements. The United States could have licensed amateurs without subjecting them to a code test as early as 1949, but did not choose to do so until 1991. In its 1999 Report and Order announcing license restructuring the FCC made it clear that it had not prejudged the issue and would not automatically "sunset" the requirement in the event the international regulations were changed at some future date. That said, if the international requirement were to be removed it would certainly open the door to consideration of dropping the Morse exam here in the United States as well as in other countries.

Finally, the question is not about whether the minimum standard for a Morse examination should be five words per minute or some other speed. The international regulations do not specify a minimum speed; they simply state that the operator "...shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals." (For some years the FCC has accepted the somewhat questionable premise that demonstrating the ability to receive Morse code implies the ability to send it, but that's a separate issue.)

Bearing in mind that a WRC is a conference of sovereign administrations, the real question—and it's a difficult one for proponents of the *status quo* to answer—is this: Why should administrations want to be obligated to require Morse code examinations?

Nothing prevents an administration from imposing requirements that exceed those specified in the international regulations. If an administration believes that some or all of its radio amateurs should be required to learn the Morse code, it has the right to craft its domestic regulations accordingly even if the international regulations do not require it.

On the other hand, if an administration believes that the requirement no longer serves a useful purpose in its country—and some have already said so—it is understandable that it would want to be relieved of an existing obligation that impinges on its sovereignty. And remember—it is administrations, not radio amateurs, who will be making the decisions at WRC-03.

—David Sumner, K1ZZ

We're At Your Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Call **toll free** to join the ARRL or order ARRL products: **1-888-277-5289** (US), M-F only, 8 AM to 8 PM Eastern Time.

If you have a question, try one of these Headquarters departments . . .

	Contact	*Telephone*	*Electronic Mail*
Joining ARRL	Membership Desk	860-594-0338	**circulation@arrl.org**
***QST* Delivery**	Circulation Desk	860-594-0338	**circulation@arrl.org**
Publication Orders	Sales Desk	860-594-0355	**pubsales@arrl.org**
Regulatory Info	John Hennessee	860-594-0236	**reginfo@arrl.org**
Exams	VEC	860-594-0300	**vec@arrl.org**
Educational Materials	Educational Services	860-594-0301	**ead@arrl.org**
Contests	Dan Henderson	860-594-0232	**n1nd@arrl.org**
Technical Questions	ARRL Lab	860-594-0214	**tis@arrl.org**
Awards	Eileen Sapko	860-594-0288	**awards@arrl.org**
DXCC/VUCC	Bill Moore	860-594-0234	**dxcc@arrl.org**
Advertising	John Bee	860-594-0207	**ads@arrl.org**
Media Relations	Jennifer Hagy	860-594-0328	**newsmedia@arrl.org**
QSL Service	Martin Cook	860-594-0274	**buro@arrl.org**
Scholarships	Mary Lau	860-594-0230	**foundation@arrl.org**
Emergency Comm	Steve Ewald	860-594-0265	**wv1x@arrl.org**
Clubs	Field Services	860-594-0267	**clubs@arrl.org**
Hamfests	Gail Iannone	860-594-0262	**hamfests@arrl.org**

You can send e-mail to any ARRL Headquarters employee if you know his or her name or call sign. The second half of every Headquarters e-mail address is **@arrl.org**. To create the first half, simply use the person's call sign. If you don't know their call sign, use the first letter of their first name, followed by their complete last name. For example, to send a message to John Hennessee, N1KB, Regulatory Information Specialist, you could address it to **jhennessee@arrl.org** or **N1KB@arrl.org**.

If all else fails, send e-mail to **hq@arrl.org** and it will be routed to the right people or departments.

ARRL on the World Wide Web

You'll find the ARRL on the World Wide Web at:

www.arrl.org/

At the ARRL Web page you'll find the latest W1AW bulletins, a hamfest calendar, exam schedules, an on-line ARRL Publications Catalog and much more. We're always adding new features to our Web page, so check it often!

Members-Only Web Site

As an ARRL member you enjoy exclusive access to our Members-Only Web site. Just point your browser to **www.arrl.org/members/** and you'll open the door to benefits that you won't find anywhere else.

- Our on-line Web magazine, the *ARRLWeb Extra* with colorful news and features you *won't* see in *QST*.
- *QST* Product Review Archive. Get copies of *QST* product reviews from 1980 to the present.
- *QST/QEX* searchable index (find that article you were looking for!)
- Previews of contest results and product reviews. See them here before they appear in *QST!*
- Access to your information in the ARRL membership database. Enter corrections or updates on line!

Get Your Own @ARRL.NET Address

If you're a member, you can take advantage of our e-mail forwarding service. This is a forwarding (or "alias") service only. No messages will be stored on our servers. You can sign up quickly at the Members-Only Web site.

Stopping by for a visit?

We offer tours of Headquarters and W1AW at 9, 10 and 11 AM, and at 1, 2 and 3 PM, Monday to Friday (except holidays). Special tour times may be arranged in advance. Bring your license and you can operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM!

Would you like to write for QST?

We're always looking for new material of interest to hams. Send a self-addressed, stamped envelope (55¢ postage) and ask for a copy of the *Author's Guide*. (It's also available via the ARRL Info Server, and via the World Wide Web at **www.arrl.org/qst/aguide/**.)

Reprint Permission:

For permission to quote or reprint material from *QST* 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 (e-mail **permission@arrl.org**).

Press Releases and New Products/Books

Send your press releases and new book announcements to the attention of the ***QST* Editor** (e-mail **qst@arrl.org**). New product announcements should be sent to the Product Review Editor (e-mail **reviews@arrl.org**).

ARRL Audio News

The best way to keep up with fast-moving events in the ham community is to listen to the ARRL Audio News. It's as close as your telephone at 860-594-0384, or on the Web at **www.arrl.org/arrlletter/audio/**

Interested in Becoming a Ham?

Just pick up the telephone and call toll free 1-800-326-3942, or send e-mail to **newham@arrl.org**. We'll provide helpful advice on obtaining your Amateur Radio license, and we'll be happy to send you our informative Prospective Ham Package.

ARRL Directors

Atlantic Division

BERNIE FULLER, N3EFN
17668 Price Rd, Saegertown, PA 16433
(814-763-1529);
n3efn@arrl.org

Vice Director: William C. Edgar, N3LLR, 22 Jackson Ave, Bradford, PA 16701 (814-362-1250); **n3llr@arrl.org**

Central Division

GEORGE R. ISELY, W9GIG
736 Fellows St, St. Charles, IL 60174
(630-584-3510);
w9gig@arrl.org

Vice Director: Howard S. Huntington, K9KM, 25350 N Marilyn Ln, Hawthorn Woods, IL 60047 (847-438-3452); **k9km@arrl.org**

Dakota Division

JAY BELLOWS, K0QB
997 Portland Ave, St Paul, MN 55104
(651-983-2420); **k0qb@arrl.org**

Vice Director: Twila Greenheck, N0JPH, 3333 Owasso Heights Rd, Shoreview, MN 55126 (651-483-1214); **n0jph@arrl.org**

Delta Division

RICK RODERICK, K5UR
PO Box 1463, Little Rock, AR 72203
(501-988-2527); **k5ur@arrl.org**

Vice Director: Henry R. Leggette, WD4Q, 7335 Ginger Snap Cove, Memphis, TN 38125-4732
(901-757-0444); **wd4q@arrl.org**

Great Lakes Division

GEORGE RACE, WB8BGY
3865 Gibbs Rd, Albion, MI 49224
(517-531-4758);
wb8bgy@arrl.org

Vice Director: Gary L. Johnston, KI4LA, 3056 Hergott Dr, Edgewood, KY 41017-3377
(859-341-7477); **ki4la@arrl.org**

Hudson Division

FRANK FALLON, N2FF*
30 E Williston Ave, East Williston, NY 11596 (516-746-7652);
n2ff@arrl.org

Vice Director: Stephen A. Mendelsohn, W2ML, 318 New Milford Ave, Dumont, NJ
07628 (201-384-0570);
w2ml@arrl.org

Midwest Division

WADE WALSTROM, W0EJ
7431 Macon Dr, Cedar Rapids, IA 52411 (319-393-8982); **w0ej@arrl.org**

Vice Director: Bruce Frahm, K0BJ, PO Box DX, Colby, KS 67701
(785-462-7388); **k0bj@arrl.org**

New England Division

TOM FRENAYE, K1KI*
PO Box 386, West Suffield, CT 06093
(860-668-5444); **k1ki@arrl.org**

Vice Director: Mike Raisbeck, K1TWF, 85 High St, Chelmsford, MA 01824
(978-250-1235); **k1twf@arrl.org**

Northwestern Division

GREG MILNES, W7OZ
740 SE 24th Ave, Hillsboro, OR 97123-7286 (503-648-6990);
w7oz@arrl.org

Vice Director: Jim Fenstermaker, K9JF, 10312 NE 161st Ave, Vancouver, WA 98682 (360-256-1716); **k9jf@arrl.org**

Pacific Division

JIM MAXWELL, W6CF,
PO Box 473, Redwood Estates, CA 95044 (408-353-3911);
w6cf@arrl.org

Vice Director: Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (510-537-6704);
w6rgg@arrl.org

Roanoke Division

DENNIS BODSON, W4PWF
233 N Columbus St, Arlington, VA 22203 (703-243-3743);
w4pwf@arrl.org

Vice Director: Leslie Shattuck Sr, K4NK, 127 Henderson St, Greenville, SC 29611 (864-421-0732);
k4nk@arrl.org

Rocky Mountain Division

WALT STINSON, W0CP,
999 S Logan St, Denver, CO 80209 (303-770-3926); **w0cp@arrl.org**

Vice Director: Warren G. "Rev" Morton, WS7W, 1341 Trojan Dr, Casper, WY 82609 (307-235-2799); **ws7w@arrl.org**

Southeastern Division

FRANK M. BUTLER JR, W4RH*
323 Elliott Rd SE, Ft Walton Beach, FL 32548 (850-244-5425);
w4rh@arrl.org

Vice Director: Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125 (305-642-4139);
w4wyr@arrl.org

Southwestern Division

FRIED HEYN, WA6WZO*
962 Cheyenne St, Costa Mesa, CA 92626 (714-549-8516);
wa6wzo@arrl.org

Vice Director: Art Goddard, W6XD, 2901 Palau Pl, Costa Mesa, CA 92626 (714-556-4396);
w6xd@arrl.org

West Gulf Division

COY C. DAY, N5OK
RR1, Box 254, Union City, OK 73090-9726 (405-483-5632);
n5ok@arrl.org

Vice Director: David Woolweaver, K5RAV, 2210 S. 77 Sunshine Strip, Harlingen, TX 78550 (956-425-3128);
k5rav@arrl.org

*Executive Committee Member

As an ARRL member, you elect the directors and vice directors who represent your division on ARRL policy matters. If you have a question or comment about League policies, contact your representatives at the addresses shown.

DR-135TP. Two Meters. Features Not Seen Before.

INTERNAL TNC FOR PACKET AND APRS®

- Choose black (DR-135TP) or pewter (DR-135TPG) front panel color
- DR-135T can be purchased without TNC; EJ-41U TNC board can be added later
- 50 watts, H/M/L power settings
- 100 memory channels
- TNC board operates 1200 and 9600 bps
- Front panel GPS input for APRS
- Rear panel DSUB9 computer connection
- No need to remove mic for packet operation
- Ignition key on/off feature
- CTCSS and DCS encode+decode
- Clean, clear Alinco audio
- Super-wide 7 character alphanumeric display
- Wide and narrow FM modes
- Theft alarm feature
- AM airband receive
- Backlit microphone
- Stays in mode you select (voice/packet) through power off cycles
- Ten autodial memories
- Low Alinco price

www.ALINCO®.com

U.S.A. Alinco Branch: 438 Amapola Ave. • Suite 130 • Torrance, CA 90501

Product intended for properly licensed operators. Permits required for MARS/CAP use. Specifications subject to change without notice or obligation. Performance specifications only apply to amateur bands. APRS is a registered trademark of Bob Bruninga, WB4APR.

Get to Know Your Section Manager

The 15 divisions of the League are arranged into 71 administrative *sections*, each headed by an elected *section manager* (SM). Your section manager is the person to contact when you have news about your activities, or those of your club. These news items could find their way into the pages of *QST*! If you need assistance with a local problem, your section manager is your first point of contact. He or she can put you in touch with various ARRL volunteers who can help (such as technical specialists).Your section manager is also the person to see if you'd like to become a section volunteer. Whatever your license class, your SM has an appointment available. If your ARRL section has a Web site, the address can be found at **http://www.arrl.org/field/org/smlist.html**.

Atlantic Division

Delaware	Randall K. Carlson, WB0JJX, 121 Scarborough Park Dr, No 10, Wilmington, DE 19804 (302-655-6179); **wb0jjx@arrl.org**
Eastern Pennsylvania	Eric Olena, WB3FPL, RR5 Box 5687, Mohnton, PA 19540 (610-775-0526); **wb3fpl@arrl.org**
Maryland-DC	William Howard, WB3V, 2304 Snowflake Dr, Odenton, MD 21113 (410-551-6775); **wb3v@arrl.org**
Northern New York	Thomas Dick, KF2GC, 4 Jenkins St, Saranac Lake, NY 12983 (518-891-0508); **kf2gc@arrl.org**
Southern New Jersey	Jean Priestley, KA2YKN, 7158 Chandler Ave, Pennsauken, NJ 08105 (856-662-3587); **ka2ykn@arrl.org**
Western New York	Scott Bauer, W2LC, 1964 Connors Rd, Baldwinsville, NY 13027 (315-638-7551); **w2lc@arrl.org**
Western Pennsylvania	John V. Rodgers, N3MSE, 803 S Main St, Butler, PA 16001-6326 (724-287-0424); **n3mse@arrl.org**

Central Division

Illinois	Bruce Boston, KD9UL, 815 E 3rd St, Beardstown, IL 62618 (217-323-9809); **kd9ul@arrl.org**
Indiana	Peggy Coulter, W9JUJ, 12330 SCR 200 E, Muncie, IN 47302 (765-288-0481); **w9juj@arrl.org**
Wisconsin	Donald Michalski, W9IXG, 4214 Mohawk Dr, Madison, WI 53711 (608-274-1886); **w9ixg@arrl.org**

Dakota Division

Minnesota	Randy "Max" Wendel, KM0D, 8539 Bryant Ave S, Bloomington, MN 55420-2147 (612-888-5953); **km0d@arrl.org**
North Dakota	Roger "Bill" Kurtti, WC0M, RR1, Box 34, Rock Lake, ND 58365 (701-266-5646); **wc0m@arrl.org**
South Dakota	Roland Cory, W0YMB, 815 2nd Ave W, Mobridge, SD 57601 (605-845-2400); **w0ymb@arrl.org**

Delta Division

Arkansas	Roger Gray, N5QS, PO Box 166, Searcy, AR 72145 (501-729-5489); **n5qs@arrl.org**
Louisiana	Mickey Cox, K5MC, 754 Cheniere-Drew Rd, West Monroe, LA 71291 (318-397-1980); **k5mc@arrl.org**
Mississippi	Malcolm Keown, W5XX, 14 Lake Circle Dr, Vicksburg, MS 39180 (601-636-0827); **w5xx@arrl.org**
Tennessee	O. D. Keaton, WA4GLS, 141 Medearis Dr, Old Hickory, TN 37138 (615-758-2329); **wa4gls@arrl.org**

Great Lakes Division

Kentucky	Bill Uschan, K4MIS, 800 Leawood Dr #27, Frankfort, KY 40601 (502-226-6784); **k4mis@arrl.org**
Michigan	Richard Mondro, W8FQT, 800 Dover St, Dearborn Heights, MI 48127 (313-730-2111); **w8fqt@arrl.org**
Ohio	Joseph J. Phillips, K8QOE, 2800 Jupiter Dr, Fairfield, OH 45014-5022 (513-874-0006); **k8qoe@arrl.org**

Hudson Division

Eastern New York	Robert Leiden, KR2L, 19 Willowbrook Rd, Glenville, NY 12302 (518-399-9343); **kr2l@arrl.org**
NYC-Long Island	George Tranos, N2GA, PO Box 296, Bellport, NY 11713, (631-286-7562); **n2ga@arrl.org**
Northern New Jersey	Jeffrey M. Friedman, K3JF, 1 Churchill Dr, Succasunna, NJ 07876-1803 (973-927-8182); **k3jf@arrl.org**

Midwest Division

Iowa	Jim Lasley, N0JL, PO Box 5, Chillicothe, IA 52548 (515-935-4337); **n0jl@arrl.org**
Kansas	Orlan Q. Cook, W0OYH, 12110 West 71st St, Shawnee, KS 66216 (913-631-0423); **w0oyh@arrl.org**
Missouri	Dale C. Bagley, K0KY, PO Box 13, Macon, MO 63552-1822 (660-385-3629); **k0ky@arrl.org**
Nebraska	Bill McCollum, KE0XQ, 1314 Deer Park Blvd, Omaha, NE 68108 (402-734-3316); **ke0xq@arrl.org**

New England Division

Connecticut	Betsey Doane, K1EIC, 92 Mohegan Rd, Shelton, CT 06484-2448 (203-929-7759); **k1eic@arrl.org**
Eastern Massachusetts	Joel M. Magid, WU1F, 47 Drumlin Hill Rd, Groton, MA 01450 (978-448-5678); **wu1f@arrl.org**
Maine	William Woodhead, N1KAT, 63 1st Ave, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**
New Hampshire	Al Shuman, N1FIK, PO Box 119, Goffstown, NH 03045-0119 (603-487-3333); **n1fik@arrl.org**
Rhode Island	Armand E. Lambert, K1FLD, 144 Summer St, Woonsocket, RI 02895 (401-762-0536); **k1fld@arrl.org**
Vermont	Bob DeVarney, WE1U, 43 W Milton Rd, Milton, VT 05468 (802-482-4280); **we1u@arrl.org**
Western Massachusetts	William Voedisch, W1UD, 240 Main St, Leominster, MA 01453 (978-537-2502); **w1ud@arrl.org**

Northwestern Division

Alaska	L. Kent Petty, KL5T, 2229 Turnagain Parkway, Anchorage, AK 99517 (907-243-5856); **kl5t@arrl.org**
Eastern Washington	Kyle Pugh, KA7CSP, W 5006 Houston Ave, Spokane, WA 99208 (509-327-5039); **ka7csp@arrl.org**
Idaho	Michael Elliott, K7BOI, 9832 W Gurdon Ct, Boise, ID 83704-4080 (208-376-3458); **k7boi@arrl.org**
Montana	Darrell Thomas, N7KOR, 743 33rd Ave NE, Great Falls, MT 59404 (406-453-8574); **n7kor@arrl.org**
Oregon	William Sawders, K7ZM, 19821 Ponderosa St, Bend, OR 97702 (541-389-6258); **k7zm@arrl.org**
Western Washington	Harry Lewis, W7JWJ, 10352 Sand Point Way NE, Seattle, WA 98125 (206-523-9117); **w7jwj@arrl.org**

Pacific Division

East Bay	Andy Oppel, KF6RCO, 1308 Burbank St, Alameda, CA 94501-3946 (510-523-3953); **kf6rco@arrl.org**
Nevada	Jan Welsh, NK7N, 59 Constitution Ave., Henderson, NV 89015-5702 (702-565-0242); **nk7n@arrl.org**
Pacific	Ronald Phillips, AH6HN, HCR 2 Box 6637, Keaau, HI 96749 (808-982-6513); **ah6hn@arrl.org**
Sacramento Valley	Jerry Boyd, K6BZ, PO Box 252, Igo, CA 96047 (530-396-2256); **k6bz@arrl.org**
San Francisco	Leonard Gwinn, WA6KLK, 2960 Blackhawk Dr, Willits, CA 95490-9704; **wa6klk@arrl.org**
San Joaquin Valley	Donald Costello, W7WN, 1900 N Ashby Rd, No. 9, Merced, CA 95348 (209-383-5739); **w7wn@arrl.org**
Santa Clara Valley	Glenn Thomas, WB6W, 502 Walnut Dr, Milpitas, CA 95035-4133 (408-263-9450); **wb6w@arrl.org**

Roanoke Division

North Carolina	John Covington, W4CC, PO Box 217122, Charlotte, NC 28221(704-577-9405); **w4cc@arrl.org**
South Carolina	Patricia Hensley, N4ROS, 164 N Main St PO Box 70, Richburg, SC 29729-0070 (803-789-5810); **n4ros@arrl.org**
Virginia	Lynn Gahagan, AF4CD, 208 Velva Dr, Chesapeake, VA 23325 (757-545-1290); **af4cd@arrl.org**
West Virginia	O. N. "Olie" Rinehart, WD8V, 1256 Ridge Dr, South Charleston, WV 25309-2434 (304-768-9534); **wd8v@arrl.org**

Rocky Mountain Division

Colorado	Tim Armagost, WB0TUB, 6337 S Lafayette Pl, Littleton, CO 80121 (303-795-9683); **wb0tub@arrl.org**
New Mexico	Joe Knight, W5PDY, 10408 Snow Heights Blvd NE, Albuquerque, NM 87112 (505-299-4581); **w5pdy@arrl.org**
Utah	Mel Parkes, AC7CP, 2166 E 2100 North, Layton, UT 84040 (801-547-1753); **ac7cp@arrl.org**
Wyoming	Robert Williams, N7LKH, PO Box 130, Wapiti, WY 82450 (307-527-7758); **n7lkh@arrl.org**

Southeastern Division

Alabama	Bill Cleveland, KR4TZ, 2113 Wildwood Place, Mobile, AL 36609-2583 (334-661-3892); **kr4tz@arrl.org**
Georgia	Sandy Donahue, W4RU, 15010 Briarhill Ln, Atlanta, GA 30324 (404-315-1443); **w4ru@arrl.org**
Northern Florida	Rudy Hubbard, WA4PUP, PO Box 843, Milton, FL 32572-0843 (850-626-0620); **wa4pup@arrl.org**
Southern Florida	Phyllisan West, KA4FZI, 1410 Shelby Parkway, Cape Coral, FL 33904 (941-574-3467); **ka4fzi@arrl.org**
Puerto Rico	Victor Madera, KP4PQ, PO Box 191917, San Juan, PR 00919-1917 (787-789-4998); **kp4pq@arrl.org**
Virgin Islands	John Ellis, NP2B, PO Box 24492, Christiansted, St Croix, VI 00824 (340-773-9643); **np2b@arrl.org**
West Central Florida	Dave Armbrust, AE4MR, 3024 Salem Ave, Sarasota, FL 34232 (941-378-1701); **ae4mr@arrl.org**

Southwestern Division

Arizona	Clifford Hauser, KD6XH, 8741 N Hollybrook Ave, Tucson, AZ 85742 (520-744-9095); **kd6xh@arrl.org**
Los Angeles	Phineas J. Icenbice Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186); **w6bf@arrl.org**
Orange	Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (909-687-8394); **w6ubq@arrl.org**
San Diego	Tuck Miller, NZ6T, 3122 E 2nd St, National City, CA 91950 (619-475-7333); **nz6t@arrl.org**
Santa Barbara	Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

West Gulf Division

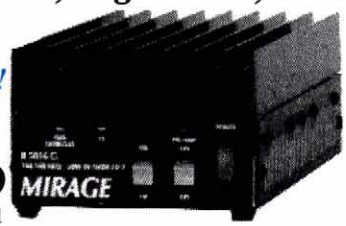
North Texas	Donald L. Mathis, KB5YAM, 1190 Emerald Sound Blvd, Oak Point, TX 75068-2236 (972-292-1203); **kb5yam@arrl.org**
Oklahoma	Charlie Calhoun, K5TTT, 16101 E 98th St N, Owasso, OK 74055 (918-272-9872); **k5ttt@arrl.org**
South Texas	E. Ray Taylor, N5NAV, 688 Comal Ave, New Braunfels, TX 78130 (830-625-1683); **n5nav@arrl.org**
West Texas	Charles C. Royall, WB5T, 2063 Putter Dr, San Angelo, TX 76904 (915-944-0469); **wb5t@arrl.org**

MIRAGE . . . 160 Watts on 2 Meters!

Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

MIRAGE RUGGED!

B-5016-G
$299
Suggested Retail



The MIRAGE B-5016-G gives you 160 Watts of brute power for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 20 to 60 Watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

Draws 17-22 Amps at 13.8 VDC. 12x3x5½ in.

RC-1B, $45. Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 18 foot cable.

Power Curve -- typical B-5016-G output power

Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 Watt mobile or base stations. 160 Watts out for 25 Watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.2-15 Watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 Watts out with 2 watts in; 160 watts out with 3½ Watts in. For 0.25 to 5 Watt handhelds radios.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
MIRAGE RUGGED!

Power Curve -- typical B-310-G output power

Watts Out	25	50	75	95	100	100	100	100
Watts In	¼	½	1	2	4	6	7	8

- ***100 Watts out with all handhelds up to 8 Watts***
- ***All modes: FM, SSB, CW***
- ***Great for ICOM IC-706***
- ***15 dB low noise GaAsFET preamp***
- ***Reverse polarity protection***
- ***SWR Protection***
- ***FREE mobile bracket***
- ***Auto T/R Switch***
- ***FREE handheld BNC to B-310-G patch cable***
- ***Ultra-compact 4¾x1¾x7¾ inches, 2½ pounds***
- ***One year MIRAGE warranty***

***Boost** your 2 Meter handheld to 100 Watts!* Ultra-compact all mode B-310-G amp is perfect for all handhelds up to 8 Watts and multimode SSB/CW /FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

Power Curve -- typical B-34-G output power

Watts Out	18	30	33	35	35	35	35+
Watts In	1	2	3	4	5	6	8

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 Watts***
- ***One year MIRAGE warranty***

MIRAGE RUGGED!

35 Watts, FM only . . . $69.95

B-34, $69.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

Power Curve -- typical BD-35 output power

Watts Out 2 Meters	30	40	45	45	45	45	45+
Watts Out 440 MHz	16	26	32	35	35	35	35+
Watts In	1	2	3	4	5	6	7

- ***45 Watts on 2 Meters/35 Watts on 440 MHz***
- ***Auto Band Selection***
- ***Auto T/R Switch***
- ***Full Duplex Operation***
- ***5x1¾x5 inches***
- ***FREE mobile bracket***
- ***"On Air" LEDs***
- ***Single Connector for dual band radios and antennas***
- ***Reverse polarity protection***
- ***Works with all FM handhelds to 7 Watts***
- ***One year MIRAGE warranty***

Add this Mirage dual band amp and boost your handheld to a powerful mobile or base -- 45 Watts on 2 Meters or 35 Watts on 440 MHz! Mirage's exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- just like a telephone conversation. *(Requires compatible HT).*

6 Meter Amplifier

FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 Watts out for 10 in. For 1 to 15 Watt transceivers.

70 cm Amplifiers (420-450 MHz)

D-3010-N, $365 -- 100 W out/30 in. For 5 to 45 Watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 Watts PEP out / 10 in.
D-100-ATVN, $414, 82 Watts PEP out/2 in. (without sync compression).

Remote Control Head for Amps

RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all mode FM/SSB/CW repeater amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz, ATV.

Low noise GaAsFET preamps

KP-1

KP-2

High gain ultra low noise GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 100 Watts.

Choose *In-Shack* model or *Mast Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 Watts out for 2 to 50 Watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial Amps for 150-174, 450-470 MHz and VHF marine bands, 70-130 Watts out.

Accurate SWR/Wattmeters

Read SWR directly and Forward/Reverse, Peak/Average power. Remote coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

One Year Mirage Warranty

Call your dealer for your best price!
Nearest Dealer/Free Catalog: 800-647-1800

http://www.mirageamp.com

Technical: 662-323-8287 **Fax:** 662-323-6551

MIRAGE

COMMUNICATIONS EQUIPMENT
300 Industrial Park Road
Starkville, MS 39759, USA

Prices and specifications subject to change

MIRAGE . . . the world's most rugged VHF/UHF amplifiers!

JUPITER

The Power and Flexibility of IF-DSP

JUPITER: A revolution in price versus performance for HF transceivers. Never has such a powerful HF transceiver been so easy to operate - simple, logical layout of front panel controls allows operation of the rig without the instruction manual tied to your wrist. A large, multi-function LCD graphics panel displays all radio functions and metering with a clean, uncluttered appearance. Take a look at what JUPITER brings to your shack. 34 built-in IF-DSP receive filters. No extra filters to purchase or install! Tailor the sound of your SSB transmit audio with 18 DSP-generated transmit bandwidths. Software is the heart of JUPITER, and it's all stored in Flash ROM. This may be the last HF rig you ever need to buy. To add new features, simply visit our website, download the latest, and it's as if your rig rolled off the production line a few minutes earlier. Fully PC-controllable using provided graphical user interface software. That's right, run the entire radio from your personal computer, not just a few functions. Connect it to a serial port, and you're on the air. (Front panel operation is disabled and independent from PC GUI operation.) 100 watts output on all 9 HF ham bands, general coverage receiver, dual VFO's, RIT/XIT, passband tuning, adjustable AGC. Full QSK for CW and fast switching digital modes! Jupiter measures HWD 5" x 12 1/8" x 13" and weighs 12 lbs.

Visit our Online Store at www.tentec.com

$1189 Factory Direct

JUDGE FOR YOURSELF!

	JUPITER	FT920	TS570SG	IC746
IF-DSP	YES	NO	NO	YES
# of stock RX filters	34	2	11	4
Variable SSB transmit B/W	YES	NO	YES	NO
Band sweep scope	YES	NO	NO	YES
Entire radio PC-controllable	YES	NO	NO	NO
Logic updates via Internet	YES	NO	NO	NO
Remote knob available	YES	NO	NO	NO
1 Hz frequency display	YES	NO	NO	YES
QSK amp keying loop	YES	YES	NO	NO
30-day, risk-free trial	YES	NO	NO	NO
Retail price*	1189	1389	1319	1369

302J Remote Encoder/Keypad
$139.00

705 Desk Microphone
$89.95

963 Switching Power Supply
$169.00

1-800-833-7373
Monday - Friday 9:00 am - 5:30 pm EST

*Competitor prices determined from dealer survey conducted 8/16/00.

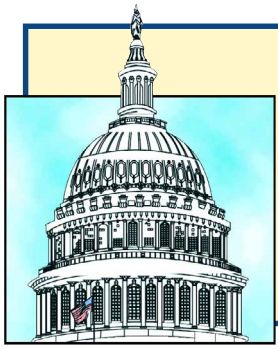
You can reach us at:

1185 Dolly Parton Parkway
Sevierville, TN 37862

Office: (865) 453-7172
FAX: (865) 428-4483
Repair Dept.: (865) 428-0364 (8 - 4 EST)
Sales Dept. e-mail: sales@tentec.com
Visit out website at www.tentec.com

TEN-TEC

MADE IN USA



DC Currents

By Steve Mansfield, N1MZA
Manager, Legislative and Public Affairs

Just as radio waves aren't constrained by artificial boundaries, neither is ARRL's government relations effort. "DC Currents" covers behind-the-scenes activity you need to know about in Congress, at the FCC and other regulatory agencies, as well as at worldwide bodies such as the International Telecommunication Union.

CB Enforcement Bill Passes

In a legislative session marked more by inaction than action, at least one telecommunications-related bill finally worked its way through the system to the President's desk. That piece of legislation was a measure that permits enforcement of certain FCC Citizens Band regulations by state and local governments. Lawmakers saw the measure as a way to give a voice to those experiencing radio frequency interference resulting from *illegal* CB radio operation. Traditionally, of course, when it comes to laws governing radio transmissions, the FCC has had a corner on the market. It won't be giving up this primacy when this legislation becomes law either.

In short, this bill would authorize states and localities to pass and enforce laws that prohibit the use of *unauthorized* CB equipment—consistent with FCC regulations. This would include the use of high-power linear amplifiers or equipment that was not FCC-certificated.

Lest you think that hams inadvertently could be caught in its web, the measure contains safeguards that exclude licensed services such as Amateur Radio. In fact, as already reported on these pages, Rep Vernon Ehlers (R-MI-3rd) said Amateur Radio operators encouraged him to introduce the bill into the US House last year. Ehlers maintained that the local hams asked him to support the bill because of the bad rap they were getting from illegal CBers using high-power linear amplifiers that resulted in TV and telephone interference while they hid behind federal preemption.

Ehlers says that when he was contacted initially by a frustrated constituent who had been experiencing TV, radio and cordless telephone interference, he thought the problem was an isolated incident. The CBer in question was using an illegal 100-W amplifier, he said, and the FCC told his constituent that it did not have the personnel to enforce CB lawbreakers around the country. Ehlers says he introduced his bill as a result.

The bill—HR.2346 is the House version; it was S.2767 in the Senate—actually is the old Senate "Feingold bill" from several sessions ago. After introducing his original version a few years back, Wisconsin Sen Russell Feingold (D-WI) requested assistance from the ARRL to rewrite the measure to ensure that licensed hams could not be affected, that the bill featured a wealth of "due process" provisions, and that the concept of federal preemption over telecommunication activities wouldn't be compromised.

Ehlers, the House bill's sponsor, asked the League to review his measure on the same grounds, in particular to ensure that it would not unintentionally harm Amateur Radio. Ehler's measure was identical to the Feingold bill. The final version of the bill was amended in the Senate.

Simply put, the bill authorizes state and local governments to prohibit "use of Citizens Band radio equipment not authorized by the Commission" and "the unauthorized operation of Citizens Band radio equipment" between 24 and 35 MHz. FCC-licensed stations in any radio service—including the Amateur Service—are excluded from such state or local enforcement, and state or local laws enacted under this legislation must identify this exemption.

Someone affected by the enforcement of such legislation may appeal to the FCC if they believe the state or local government overstepped its authority under the new measure. An applicable state or local law would not preclude the FCC from enforcing regulations in a given case at the same time.

The Senate made a specific change requested by the American Trucking Association. The final measure contains language with respect to CB gear aboard a "commercial motor vehicle" (as defined in Title 49, §31101 of the US Code) requiring that state or local authorities would have to have probable cause that the vehicle or its operator was in violation of the regulations before attempting to enforce such a statute. On the House floor, Ehlers said truckers were "worried about perhaps being harassed by improper use of the law."

Discussion of the bill on the House floor—at least as it was reported in *The Federal Register*—reflected a certain level of emotionality. One House member spoke of "rogue operators" whose routine CB radio operation at excessive power levels left victims "helpless" to defend themselves. "When these operators boost their CB power levels, it often causes bleeding into nearby frequencies," the congressman said.

The bill passed the House under suspension in September, and passed the Senate at the end of October under unanimous consent. The measure went to President Clinton for his signature on November 14. It was signed on November 22.

For some additional background, see August 1999 *QST*, page 15, "Michigan Hams Request New Bill Targeting Illegal CBers" and September 1999 *QST* page 15, "More on CB Enforcement."

Amateur Radio's Disaster Role Recognized in Geneva

The role of Amateur Radio in disaster mitigation and relief operations has been formally recognized by an important International Telecommunication Union (ITU) body.

Meeting in Geneva the week of September 18, 2000, Study Group 2 of the ITU Development Sector (ITU-D) adopted a Recommendation on the effective utilization of the amateur services in disaster mitigation and relief operations. Specifically, ITU-D Study Group 2 recommends:

- that administrations include the amateur services in their national disaster plans and telecommunication assistance information inventories;
- that administrations are invited to reduce and, where possible, remove, barriers to the effective utilization of the amateur services for disaster communications;
- that amateur and disaster relief organizations are invited to develop memoranda of

understanding (MoU) between themselves and with Administrations as well as to co-operate, together with other concerned parties, in developing and making available model agreements and best practices in disaster telecommunications.

The International Amateur Radio Union (IARU) is a member of and active participant in the work of ITU-D. IARU President Larry E. Price, W4RA, attended the September meeting.

The meeting also approved the publication of a *Disaster Communications Handbook for Developing Countries*. The IARU is the principal contributor to the *Handbook*, which consists of three parts: One for policy makers, a second dealing with operational matters, and the third a technical annex. The role of the amateur service in disaster communications is one of the main focal points of the *Handbook*. It is hoped that the *Handbook* will be published in 2001 in three languages, English, French, and Spanish.

NEW RECOMMENDATION (ADOPTED 18 SEPT 2000): EFFECTIVE UTILISATION OF THE AMATEUR SERVICES IN DISASTER MITIGATION AND RELIEF OPERATIONS (ITU-D.../2000)

ITU-D Study Group 2,

considering,

a) that the amateur services continue to provide communications for disaster mitigation and relief operations in some countries;

b) that some countries having natural calamities may not take advantage of disaster communications capabilities of the amateur services;

c) that effective amateur services disaster communications depend largely on the availability of amateur operators located throughout a country;

d) that after the occurrence of a natural disaster it has been necessary to bring amateur operators and equipment into a country from other countries;

e) that barriers to operating permission and to movement of equipment have occurred;

f) that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations adopted by the Intergovernmental Conference on Emergency Telecommunications (Tampere, 1998) established a framework for the reduction and/or removal of these barriers;

g) that some countries do not have a national framework for the effective utilization of the amateur services for provision of disaster mitigation and relief operations;

h) that some countries have restrictions applied to the amateur services that impede disaster preparedness, such as prohibitions against transmission of message traffic for a third party during training exercises;

j) Resolution 19 of the World Telecommunication Development Conference (Valletta, 1998), Telecommunication Resources for Disaster Mitigation and Relief Operations, resolves to invite the ITU-D to ensure that proper consideration be given to emergency telecommunications as an element of telecommunication development, including, in close co-ordination and collaboration with the ITU-R, by facilitating and encouraging the use of decentralised means of communications that are appropriate and generally available, including those provided by the amateur radio services;

k) Resolution 644 of the World Radiocommunication Conference (Geneva, 1997), Telecommunication Resources for Disaster Mitigation and Relief Operations, resolves to invite the ITU-R to continue to study, as a matter of urgency, those aspects of radiocommunications that are relevant to disaster mitigation and relief operations, such as decentralised means of communications that are appropriate and generally available, including amateur radio facilities;

Recommendation ITU-R M.1042-1 (1998), Disaster Communications in the Amateur and Amateur-Satellite Services encourages the development of such services and of making such networks robust, flexible and independent of other telecommunication services and capable of operating from emergency power;

Resolution 36 of the ITU Plenipotentiary Conference (Minneapolis, 1998) "Telecommunication in the service of humanitarian assistance" urges Member States to take all practical steps for the application of the Tampere Convention,

recommends

1 that administrations include the amateur services in their national disaster plans and telecommunication assistance information inventories;

2 that administrations are invited to reduce and, where possible, remove, barriers to the effective utilization of the amateur services for disaster communications;

3 that amateur and disaster relief organizations are invited to develop memoranda of understanding (MoU) between themselves and with Administrations as well as to co-operate, together with other concerned parties, in developing and making available model agreements and best practices in disaster telecommunications.

Media Hits

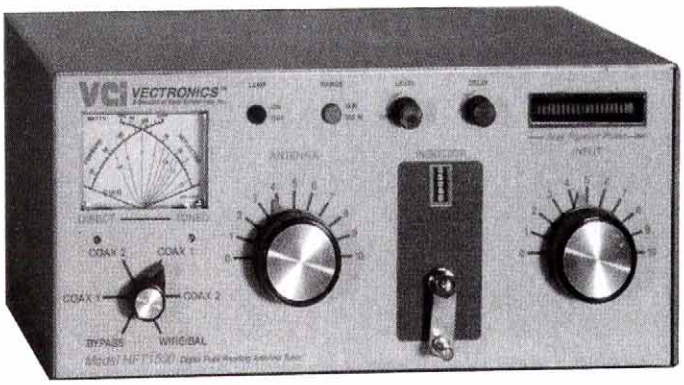
- A nice article about the Wheaton Amateurs Inc, a club based in Wheaton, Illinois, appeared in the *Addison Press*. The feature story spotlighted several club members and offered some background on how they got interested in ham radio and what particular Amateur Radio activities they are involved in. Club member George Henry, KA3HSW, was pictured in his shack. The Wheaton group does a great job when it comes to promoting ham radio. The club took fourth place in this year's *Frequency* movie promotion competition.
- "Scouts Surf Ham Instead of Net" was the title of an article on JOTA—Jamboree On The Air—that ran in *The Advocate* out of Baton Rouge, Louisiana. Karl Sandstrom, K5MAN, was shown with an eight-year-old scout who was clearly enjoying his QSO with a ham in Texas. The article also featured information about becoming a ham and what Amateur Radio operators do during times of emergency.
- According to an article in *The Napa (California) Valley Register*, "QST Napa" was set to premiere on a local cable access channel. The program's primary goal was to recruit more people into the ham radio ranks. The show is hosted by Melody Morisoli, KC6OYA. Retired NBC News science reporter Roy Neal, K6DUE, was recruited to introduce the program.
- AO-40 and AMSAT got a nice plug on the **CNN.com** news site. The article's main focus was on the commercial satellites that went up into orbit with AMSAT OSCAR-40, but even a small paragraph on the amateur satellite is enough to make readers more aware of the kinds of technologies Amateur Radio operators are involved in.
- Another great media hit on **CNN.com** was a story about ham radio operations aboard the International Space Station. During some initial "down time," the crew hooked up the Amateur Radio equipment and made the first of several expected contacts from space. The feature article reported that the crew would eventually be making ham radio contacts with school children and other hams around the world.
- Jim Bremer, KE6OUA, of Redding, California, sent in a videotape of "North State Profile"—the half-hour television show he hosts on the area's local PBS affiliate. On one recent edition, Jim interviewed ARRL Sacramento Valley Section Manager Jerry Boyd, K6BZ, and local high school student Amy Morris, KF6YNT. Jim reports that "North State Profile" is viewed by the general public in 10 counties, so ham radio definitely got some nice exposure out of this one!

THE VECTRONICS HFT-1500 . . .
THE FINEST HIGH POWER ANTENNA TUNER MADE!

- *High current Roller Inductor*
- *SSB*Analyzer Bargraph™*
- **Cross-Needle Meter**
- *6 position Antenna Switch*
- *Built-in 4:1 Balun*
- *Gear driven Turns Counter*

VC-300DLP

$459.95



The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a durable baked-on paint that won't scratch or chip.

The attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the HFT-1500 front panel as much as you want. You won't leave a mark!

Arc-Free Operation

Two heavy duty 4.5 kV transmitting variable capacitors and a massive high current roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly fly from band to band. A precision 5-digit gear driven turns counter lets you accurately return to your previous settings.

Large comfortable knobs and smooth vernier drives on the variable capacitors make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to the absolute minimum!

Why? Because all three matching network components, the roller inductor and both variable capacitors are fully adjustable.

Tune any Antenna

You can tune any *real* antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc . . .

*SSB*Analyzer Bargraph™*

VECTRONICS' exclusive 21 segment bargraph display lets you visually follow your instantaneous voice peaks. Has level and delay controls.

Accurate SWR/Power Meter

A shielded directional coupler and backlit Cross-Needle meter displays accurate SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Position Ceramic Antenna Switch

Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

Built-in Balun

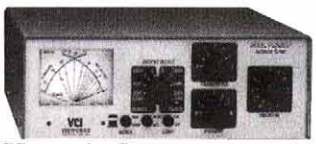
A 4:1 Ruthroff voltage balun feeds dual high voltage Delrin terminal posts for balanced lines. HFT-1500 is 5.5x12.5x12 inches. Has *VECTRONICS'* splendid one year limited warranty.

Try any product for 30 days

Call toll-free 800-363-2922 and order any product from VECTRONICS. Try it for 30 days. If you're not completely satisfied return it for a full refund, less shipping and handling -- no hassles. All VECTRONICS products come with a one year warranty.

300 Watt Antenna Tuner

VC-300DLP
$159.95



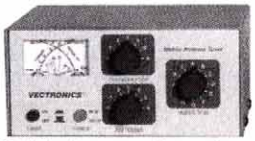
VECTRONICS uses the finest components available to build the highest quality 300 Watt antenna tuner ever made.

You can tune any *real* antenna 1.8-30 MHz. Custom 48 position switched inductor and continuous rotation 1000 Volt capacitors provide arc-free operation. Handles 300 Watts PEP SSB, (150 Watts on 1.8 MHz).

8 position antenna switch, built-in 50 Ohm dummy load, peak reading backlit cross-needle SWR Power meter, 4:1 balun for balanced line antenna. Scratch-proof Lexan front panel. 10.2x9.4x3.5 inches. Weighs 3.4 pounds.

300 Watt Mobile Tuner

VC-300M
$109.95



The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

It's compatible with *any* mobile antenna and any mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8 to 30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz). 7.25x8.75x3.6 inches. Weighs 3.4 lbs.

SWR/Power Meters

PM-30
$79.95
PM-30UV
$89.95

PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle meter. True shielded directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.

For 144/220/440 MHz, 30/300 Watt ranges: PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

DL-650M, $74.95. Handles 100 Watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $84.95** has N connector.

Low Pass TVI Filter

LP-30, $55.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 Watts.

High Pass TVI Filter

HPF-2, $34.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

VECTRONICS®

. . . the finest amateur radio products made!

VECTRONICS 300 Industrial Pk, Starkville, MS 39759 USA **VOICE:** (662) 323-5800 **FAX:** (662) 323-6551 **WEB:** *http://wwwvectronics.com*

Free catalog, nearest dealer or to order call 800-363-2922

TH-D7A(G) / TM-D700A

Throughout the years, Kenwood has engineered many significant feature and hardware advancements that earned us the nickname "Pacesetter in Amateur Radio". Kenwood continues to show this leadership in advanced design and technology with the TH-D7A(G) handheld and the TM-D700A mobile dual-banders. Not only do our radios perform all the functions of any other radio, but you can also explore the exciting digital world of APRS™, which has become the fastest growing and most dynamic part of the hobby. Most Disaster Communication organizations use APRS™. Identifying someone's location with APRS™ can save a life.

The TH-D7A(G) and the TM-D700A are the only radios ever produced that have both built-in TNC and APRS™ operating software, allowing you to send and receive exact GPS positions. You can even send text messages over 144.390 MHz, an international APRS™ frequency. Position reports and two-way messaging can also be achieved over the Internet, across the country or around the world. Street level mapping can also be employed using a PC, palm device or GPS. And yes, the TM-D700A is great for receiving satellite packet!

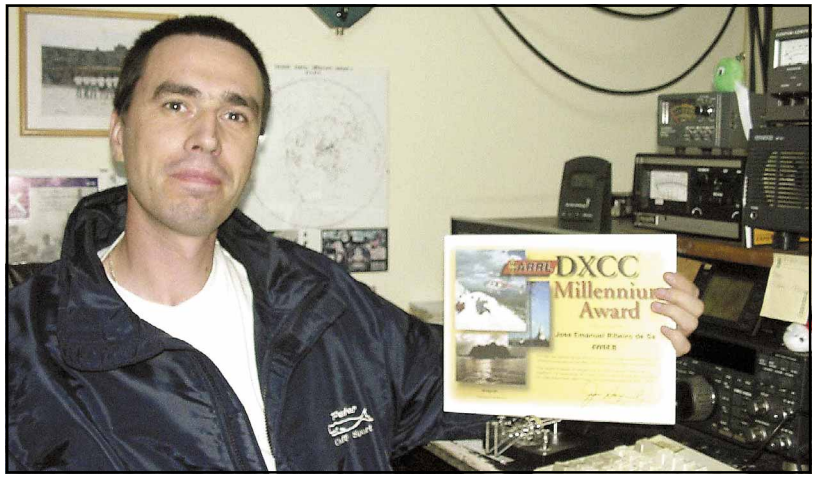
Venture into the future of Ham radio today and experience Kenwood's "Dynamic Digital Duo". They may just be the excitement and enjoyment you have been waiting for!

KENWOOD
COMMUNICATIONS CORPORATION

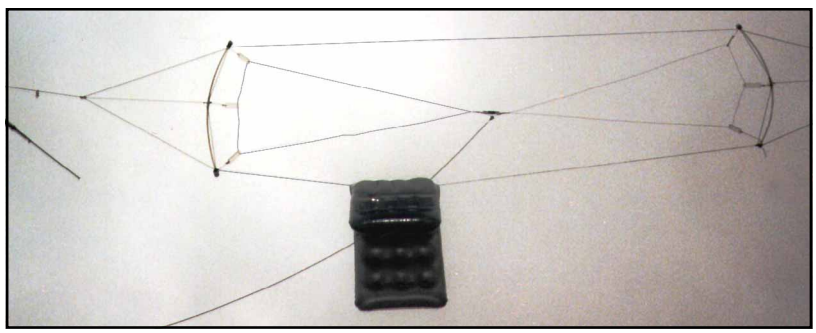
AMATEUR RADIO PRODUCTS GROUP
3975 Johns Creek Court, Suwanee, GA 30024
P.O. Box 22745, Long Beach, CA 90801-5745, U.S.A.
Customer Support: (310) 639-5300 Fax: (310) 537-8235
Y2ARD-2016 #080200

ISO 9001
JQA-1205
Communications Equipment Division
Kenwood Corporation
ISO 9001 certification

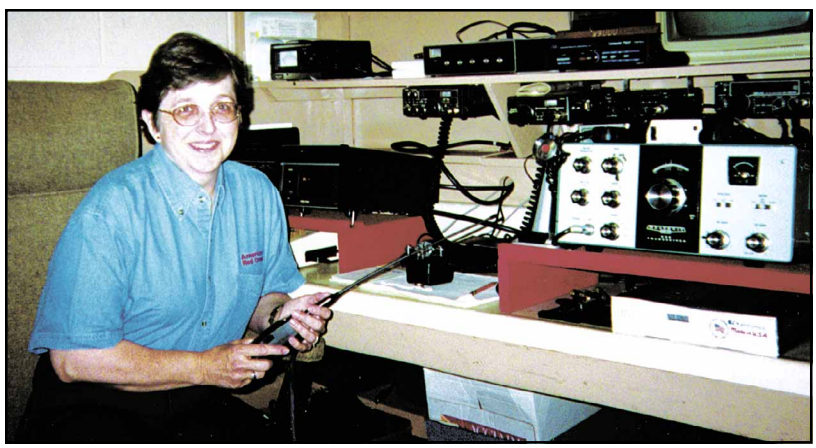
INTERNET
Kenwood Website
http://www.kenwood.net
Kenwood Information
*ftp://ftp.kenwood.net

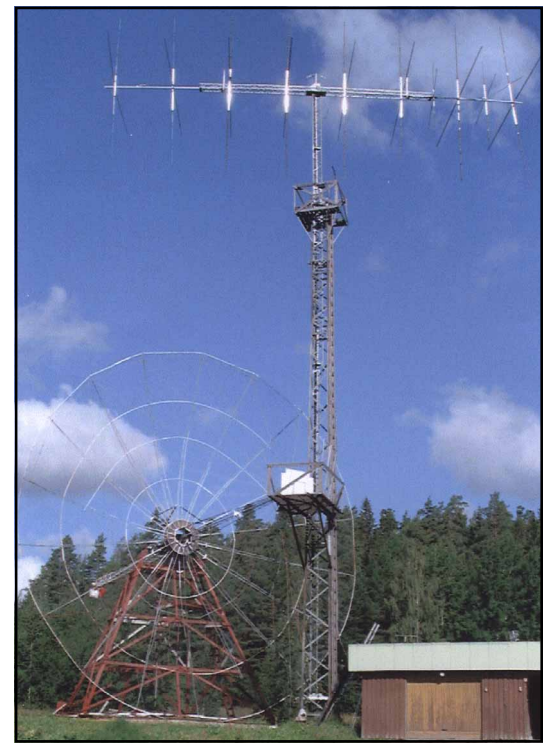


Time is running out! You only have a couple of weeks left in 2000 to work 100 DXCC entities for your DXCC Millennium Award. Jose de Sa, 4W6EB (CT1EEB) proudly shows off the DXCC Millennium Award that he earned while operating from East Timor. You'll find complete details and an application on the Web at **www.arrl.org/awards/dxcc/00rules.html**. Although you have to complete your contacts by 2359Z December 31, 2000, you may apply for the award during 2001.



"The wind in the wires made a tattletale sound as the raft flew over the coax." (Our apologies to Gordon Lightfoot and *The Wreck of the Edmund Fitzgerald*.) Denny Simmons, N8XLS, has an impressive 17-meter bow tie antenna in his yard in Sandusky, Ohio. Unfortunately, an inflatable pool raft was swept aloft in a storm and traveled more than 200 yards—only to be snagged by his antenna!

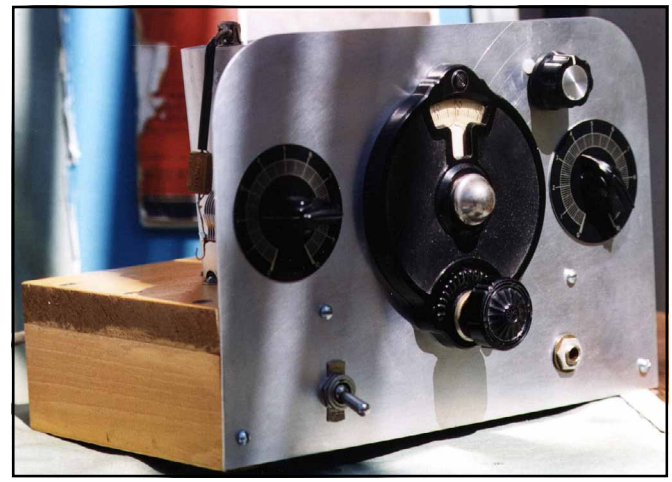




Big signals on HF and moonbounce! The 10, 15 and 20 meter quad antenna and 50-foot diameter dish belong to Matti Rouhiainen, OH2PO, in Lohja, Finland.

KC0DZB isn't...*bluffing*. Sometimes a pun is impossible to resist. Actually, Bruce Steele *is* operating from atop Scotts Bluff National Monument in Nebraska. With this elevation, not to mention the view, can you blame him?

Last October Natalie Andrews, K9CAT, received the John K. Lamb Award (sponsored by the Greater Terre Haute [Indiana] Chamber of Commerce and the Terre Haute *Tribune Star*) for her outstanding public service work. Natalie has been actively assisting Red Cross disaster communication efforts throughout her area, most notably during an outbreak of severe storms in May 2000. She is shown here at the Wabash Valley Amateur Radio Association club station, W9UUU.

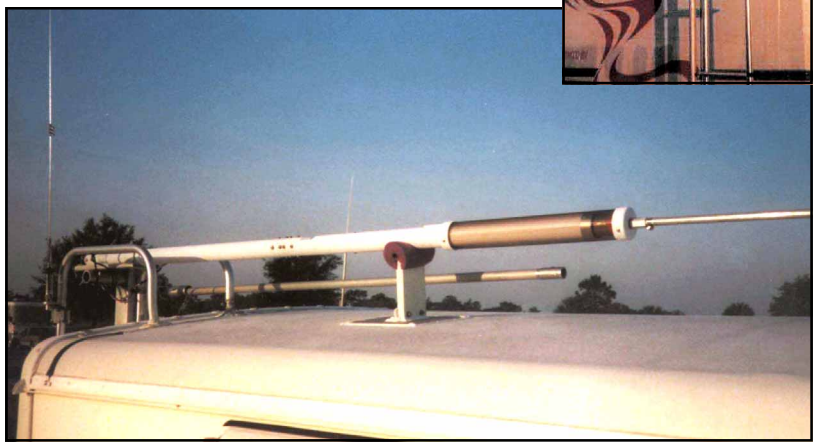


A special day for a ham family at the Pentagon. The Skochs of Lothian, Maryland, celebrated two significant moments at the Pentagon last summer. Bernie Skoch, K5XS (top, center) was promoted to the rank of US Air Force Brigadier General. Presiding at the ceremony was Lt General Robert Ludwig, shown here congratulating Bernie on his new rank. His father Larry, WD5EPX, also accompanied Bernie at the ceremony. Moments later, son Warner Skoch, KH7DN (above) was awarded his Eagle Scout rank by his mother and father.

Rebuilding a memory. Ernie Bosselman, W1DO, saw a 2-tube regenerative receiver at the ARRL booth at the 1939 New York World's Fair. The radio was featured in the ARRL's *How to Become a Radio Amateur*. Ernie picked up the book and built the radio. He used it to copy W1AW and earn his ham license, but discarded the rig after purchasing a commercial receiver. Sixty-one years later, Ernie decided to re-build the regen (top) using parts saved from the original. He finds that it works remarkably well (above)!

Leaving his mark in the "forest." Sandy Cole, K1SC, visited the "Signpost Forest" in Watson Lake, Yukon, as part of a tour last summer in his recreational vehicle. The Forest was started in 1942 when a homesick soldier at work on the Alaska/Canada Highway tacked a sign bearing the name of his hometown on a post. Others continued the tradition and now there are more than 40,000 signs in the Signpost Forest. Sandy temporarily removed his K1SC license plate for this photo, but his Sierra Vista (Arizona) hometown sign stayed behind.

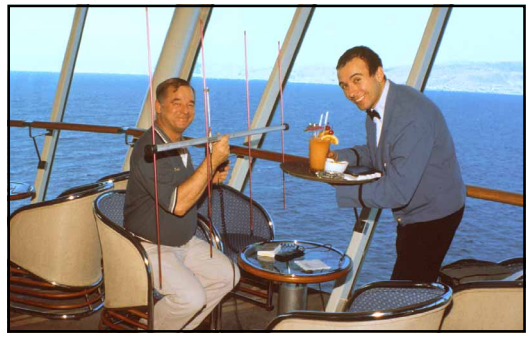
A serious RV antenna system! Temp Titus, W4HZV, designed and built this HF mobile antenna system for use on Anne, K5TYG, and Howard, K5TY, Anderson's Southwind motorhome. The High Sierra screwdriver antenna lays flat while the RV is in motion (below). When it's time to operate, a retractable tube/rope system (above) deploys the antenna in a matter of minutes (right).



Plates 'o plenty. Ron Allen, W3OR, collects Amateur Radio license plates from throughout the United States, but one of his recent achievements was completing his collection of plates from every Canadian province and most of the territories.

David Rosenthal, N6TST, operates 2-meter marine mobile in style aboard a luxury cruise ship off the coast of Baja California. Bringing his H-T and portable beam on a four-day outing down the California coast, N6TST made dozens of contacts using both repeaters and simplex, easily working stations with a single watt. He and his wife Donna, KF6ZVE, used California and Mexico-based repeaters to keep in touch while she went ashore to shop and he stayed on board to enjoy the obvious good life!

KF6ZVE



Where did they find such bright yellow paint? The Tri-State Amateur Radio Club of Cresco, Iowa, is the proud owner of this impressive communications van.

FT-1000MP
The radio of choice for world-class contest operators, the FT-1000MP provides 100 Watts of power, Enhanced DSP,™ Dual In-band Receive, Cascaded IF filters, General Coverage RX, and 160-10 M TX. (DC-only version also available.)

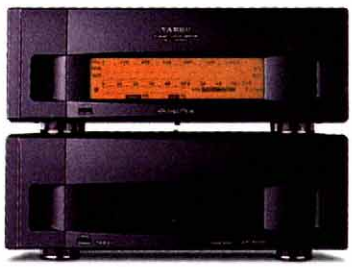
FT-920
The FT-920 HF/6M Transceiver is designed for today's active Ham. It features high-speed DSP in all modes, 127 memory channels, AFSK or FSK Digital operation, new-technology MOSFET PA finals, high-speed Automatic Antenna Tuner, and high-resolution LCD display.

FT-1000D
Truly an elite-class HF masterpiece, the 200 Watt FT-1000D provides Dual Receive (in-band or cross-band), Cascaded IF Filters, extraordinary Dynamic Range, DDS, high-speed Automatic Antenna Tuner, and 100 memory channels.

FT-100
This ultra-compact HF/VHF/UHF 100 Watt Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.

FT-840
Affordable yet feature filled, the FT-840 is an ideal traveling companion. It offers 160-10M TX with general coverage RX, 100 memory channels, DDS, CTCSS, Twin Band Stacking VFOs, and excellent receiver dynamic range.

FT-600
This compact 100 Watt HF Transceiver offers the utmost in operating simplicity. The MIL-STD rated FT-600 covers the 160-10M Amateur bands with General Coverage Receive, 100 memory channels, Direct Keypad Frequency Entry, and a front-mounted speaker.



VL-1000/VP-1000
The VL-1000 Quadra System is a Solid-State Linear Amplifier featuring four twin-MOSFET PA modules to produce 1000 Watts of clean power output on 160-15 Meters (500 Watts on 6M, modifiable for 12/10 meters). Included are an Automatic Antenna tuner, 2 Input and 4 Output Antenna Jacks, and extensive status displays on the multi-function LCD.

FT-847
The introduction of the FT-847 completely redefines base station operation by offering three radios in one—HF, VHF/UHF and Satellite. A full power multi-mode transceiver, the appropriately named Earth Station covers the HF, 50 MHz, 144 MHz and 430 MHz bands, and it includes crossband Full Duplex operating capability for satellite work. Its exceptional receiver performance is ready for all aspects of DX work thanks to the DSP filtering. And for local FM work both CTCSS and DCS encode/decode are built in. The FT-847 is an engineering breakthrough offering you the earth, the sky, and the moon in one compact package.

THE TASK MASTERS.

They're out there. Those elusive DX signals that can't poke through the QRM regardless of the late-night hours you put in trying to find them. But when a Yaesu HF enters the picture, weak signals suddenly jump into your headphones. Yaesu's High Frequency transceiver technology uniquely combines years of RF and AF design know-how with cutting edge advancements in IF filtering, noise reduction, and dynamic range. Whether you're on high bands or low, at home or away, the high frequency technology of Yaesu's task masters quickly fills up your log with contacts. Learn more about Yaesu products on the web at www.yaesu.com

YAESU **Choice of the world's top DX'ers.**

"Brick-Wall" Selectivity

Today's elite-class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics save you seconds in a pile-up or a contest "run," and Yaesu's HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. IDBT: Interlocked Digital Bandwidth Tracking System

The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches the analog IF bandwidth.

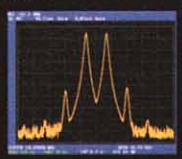
IDBT: A Breakthrough in Selectivity!

II. VRF: Variable RF Front-End Filter

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

III. 200 Watts of Transmitter Power Output

Utilizing two Philips® BLF147 Power MOSFETs in a 30-Volt, push-pull configuration, the MARK-V's transmitter puts out up to 200 Watts of clean output power, thanks to the conservative design of the PA section.



Class A 75 W PEP IMD

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!

V. Multi-Function Shuttle Jog Tuning/ Control Ring

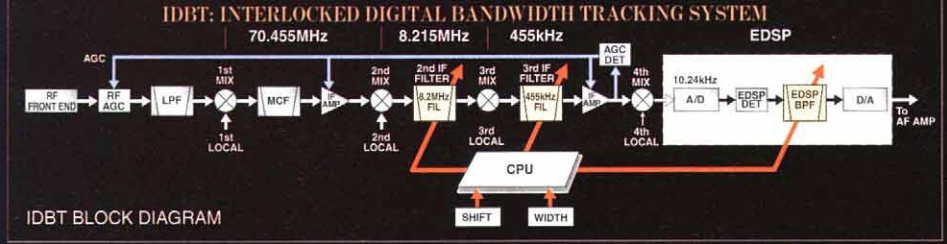
The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

YAESU
Choice of the World's top DXers™

For the latest news, hottest products:
Visit us on the Internet! http://www.yaesu.com

CORRESPONDENCE

Your opinions count! Send your letters to "Correspondence," ARRL, 225 Main St, Newington, CT 06111.
You can also submit letters by fax at 860-594-0259, or via e-mail to: **qst@arrl.org.**
We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Of course, the publishers of *QST* assume no responsibility for statements made by correspondents.

MISSING THE POINT

♦ It seems to me that the two correspondents (K6KV and WN6Q) in the November "Correspondence" who commented on Thomas Schiller's article, "Everything Works," (July *QST*) have missed the point. I didn't understand Schiller (N6BT) to be denigrating ordinary hams and their shacks, dependent as they are on traditional antennas, nor did I understand him to be shilling (pardon the pun) his Force 12 products.

I understood Schiller to be saying, in a very entertaining way to be sure, that the usual ham shack antenna array produces results that are markedly inferior to known antenna systems that have been used successfully by commercial and military interests for many years. In addition, his article illustrated (and embarrassingly so) that the gain of a typical ham antenna is not all that far removed from what a bare bulb on a fence post produces (with or without a radiating feed line). The corollary is that the better the antenna, the more stations an operator will hear and work. Granted, a truly superior antenna system is large and expensive, well beyond the reach of any one amateur (even though a few well-heeled individual hams continue tearing up mountain tops and/or seashores in an attempt to reach their particular version of antenna nirvana).

So, where does Schiller's article leave the reader? It left this one with the thought that it is high time that radio amateurs in the US began pooling their resources. No one ham can build a world-class array, such as described in Schiller's article, but a club or consortium of clubs local, regional, statewide could come close. *QST* publishes from time to time pictures of club stations in foreign countries where it is obvious the overseas hams have in fact pooled their resources in order to put up antenna systems superior to any that individual club members could have put up on their own. Why not do the same thing in the States?

As it is, we have, as N6BT so ably demonstrated, hundreds of thousands of mediocre-to-passable "Lone Ranger" antenna installations. Are we in the hobby so addicted to a go-it-alone mentality that we cannot bring ourselves to consider organizing on a cooperative basis to put up much more gain-full antennas?

In this ham's opinion, *that* is the implicit point of N6BT's groundbreaking article. It deserves to be enshrined in any *QST* Hall of Fame.—*John Rippey, W3ULS, Montross, Virginia*

CW REALLY DOES GET THROUGH

♦ In light of the recent move to eliminate the CW requirement for licensing in the future, I thought I would relate a recent experience I had on the air.

I was talking on lower sideband to friend of mine in Denver (KE0MT) on 40 meters one evening and suddenly his signal went below the noise level. I could not hear any part of his signal on voice so I thought our conversation was over for the evening. After a minute or so I heard a CW signal calling me and repeating "3990." I acknowledged, changed bands and there he was on 3990 kHz, lower sideband, and we finished our contact with good signal conditions.

I had heard through the years that a CW signal would get through after everything else had faded, but this was the first time I had experienced it for myself. Natural disasters do not wait for good signal conditions. I believe there will come a time when the maritime service will regret having dropped the CW operations. I know that the present systems they have for communications are very good and very reliable, but no system is perfect. When it fails, and there is a ship in trouble, and conditions are not favorable for voice transmission, perhaps a CW signal could save lives. I can see not using CW on a routine basis for the commercial services, but there should be operators who are able to at least copy 5 WPM.

One of the primary missions of amateurs in the US is to provide communication in times of emergency. To "cover all the bases" I believe operators should be able to copy CW. If not, what happens years from now when some operator, somewhere, desperately attempts an SOS in very bad propagation conditions by touching two wires together and there is nobody listening who can read the message?—*Charles J. Mishler Jr, W3PRR, Mitchell, Nebraska*

BEEF UP THE EXAMS

♦ The FCC has finally abandoned the Morse code test at any speed that would qualify amateurs to be useful CW operators. This makes perfect sense; one original justification for the Morse requirement was to build a reserve of Morse-trained operators for use in wartime. Indeed, we were useful as late as the Gulf War, but those days are over.

Now, we have a minimal Morse test for all classes of license. That's well and good, but perhaps we need to adjust the Amateur Extra written exam to reflect modern national needs.

I propose overhauling the Extra written exam to make it the "expert" exam that the Morse test used to be. I suggest lengthening the exam and adding questions in the following areas:

- circuit analysis to include dc, ac and transient analysis.
- applications of Norton's and Thevenin's theorems and the superposition theorem.
- two port linear network analysis.
- transistor amplifier design including biasing and frequency response.
- a thorough treatment of the use of operational amplifiers.
- a thorough treatment of DSP and digital transmission modes.
- an expansion of the antenna theory section of the exam to include the theory of radiation and efficiency.
- an expanded inquiry into digital control techniques.
- technical calculus and analytic geometry.

My idea is that the Amateur Extra license is more than the "standard" ham ticket and should require mastery of radio and electronics theory far beyond that required for the General license, or even the General Radiotelephone license.—*Norman Osborne, AA7NP, Las Cruces, New Mexico*

20-METER DX WINDOW?

♦ While chatting on 14.195 MHz the other day with a few stations stateside, I was the victim of rude behavior on the part of a few ops who seem to think the rules are meant for everyone but them.

I was informed by a station (he would not give his call sign) that I was operating in a DX call window located on 14.195 MHz and that this was *not* a chit-chat frequency. This was news to me. I asked the station to ID, but he did not (he simply repeated his statement).

First, the station who blasted me vio-

lated FCC Rules requiring all stations to identify their transmissions. Second, his totally rude behavior indicates there is a continued need for amateurs to clean up their act. Third, and you'll love this one, 14.195 MHz is *not* a DX window, at least according to the ARRL "Considerate Operator's Frequency Guide," a copy of which can be viewed on line at **www.arrl.org/field/regulations/conop.html**. [The Guide can also be found in"The Help Desk" section in this issue.—*Ed*] If such a window exists, I'd like to know. If it's not published, then there's no way people can know this stuff.

Please, folks, ID your stations, be kind to others and make sure you have the facts before you make a transmission.—*Rick Tressler, K8SV, Columbus, Ohio*

[Editor's note: 14.195 MHz is often used by DXpeditions that a ragchewer may not be able to hear, but that is no excuse for an unidentified transmission.]

AMATEUR RADIO IS NOT A PERSONAL RADIO SERVICE

♦ In the October 2000 "Correspondence," the letter from John Powell, KF6EOJ, highlights an attitude that I believe is detrimental to the amateur radio service. While on a hiking trip, John relates meeting another hiker who expressed interest in Amateur Radio. The second hiker was not interested in the art and science of radio, but was only looking for a means of communicating in an emergency situation. John then opines that we may be missing an opportunity to expand our ranks by "…not allying with the outdoor recreation folks."

Amateur Radio should not be seen as an alternative to the several other radio systems available for this purpose (GMRS, FRS, CB, etc). Promoting Amateur Radio to people who have no real interest in the foundation of our hobby contravenes its spirit and will only serve to add "communicators," not Amateur Radio operators, to the ham bands.

I'm not opposed to promoting Amateur Radio. It's apparent that we need strength in numbers to hold onto our spectrum. Nevertheless, let's make sure the people we recruit want more out of the Amateur Radio service than just an alternative to the cell phone.—*Wayne Hoffman, W6WLR, Anaheim, California*

OVERLOAD

♦ One auspicious Friday afternoon I picked up an Alinco 2-meter FM transceiver. I programmed it the next morning, just trying to see what repeaters I could hit. I noticed that the radio had three fuses in the power cable, which I thought unusual. I have a 10-A power supply, but the radio is rated at about 11 A on the high-power setting. So, I naturally kept it on low power for testing.

Everything was going fine, but I could not reach one repeater that was rather distant. Maybe I needed a little more power. No problem. I just moved the power setting to **MEDIUM**, pressed the mike button, identified and…nothing happened. The repeater did not respond. Okay, maybe a bit more RF is the key. I toggled the power setting to **HIGH**, pressed the mike button again and …instantly the lights in the house dimmed and I heard a tremendous explosion from somewhere outside.

My son Eric came running and told me that a transformer had blown on a nearby utility pole. Oh no! What had I done?

A while later the house lights returned and my Alinco came back to life as well. Eric and I walked outside and found an electrician from the local power company. He informed us that a squirrel had inadvertently sacrificed itself on an open fuse. I was relieved to hear it. I had expected my radio to pull some respectable current in the high-power mode, but not that much!—*William J. Andress Sr, AC5WT, Orange, Texas*

NO GRANDFATHERING

♦ I must take exception to the comments by K6ERQ in the September 2000 *QST* concerning the grandfathering of the old General licensees to Amateur Extra. He wants to be grandfathered because, under Restructuring, Technicians who were licensed before March 21, 1987, are now eligible to become Generals.

I think Bill has forgotten some critical facts. When he was licensed in 1953, there were Advanced and Amateur Extra class licenses, both of which had some exclusive privileges on 75 meters and 20 meters. Why didn't he upgrade back then? He was denied some privileges when he was first licensed, but he was grandfathered into those privileges a few years later, without earning them. I guess he wants history to repeat itself.

The Technician and General licenses both required the same written exams prior to March 21, 1987; only the CW test speed was different. The code speed requirements are now the same. The old Technician licensees have already passed the requirements of the current General class. They've earned their upgrades; nothing was given away.

Should any General class amateurs want their "old privileges" back, all they have to do is take a current Amateur Extra class written test and *earn it*—no code needed. Privileges are fluid; the FCC gives, and it takes away.—*Bob Seydler, K5GNA, Humble, Texas* QST

hy-gain® Rotators

. . . the first choice of hams around the world!

Hy-Gain rotators are the first choice of hams around the world!

Hy-Gain's world famous Bell Shaped Rotator™ design is the standard that other rotators are measured against.

Its bell construction gives you total weather protection for super reliable operation. Its super heavy duty steel gear drive gives you years of superior and trouble-free performance. Many Hy-Gain rotators still provide excellent service after over 25 years of outstanding performance.

The last thing you want to fall apart is your rotator that's mounted on the top of your tower. You won't make any compromises when you buy and install high quality Hy-Gain rotators.

And we're the only manufacturer to offer a full line of rotators that are completely MADE IN THE USA.

HAM-IV, $529.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $13^{1}/_{2}$Hx8D inches.

T-2X, $619.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $369.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $269.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

HAM IV

$529.95
Suggested Retail

T-2X

$619.95
Suggested Retail

CD-45II

$369.95
Suggested Retail

AR-40

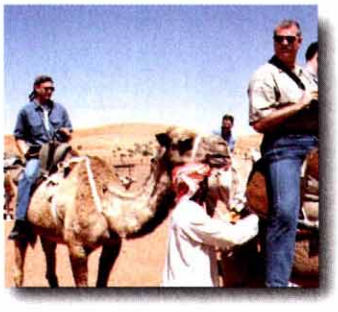
$269.95
Suggested Retail

Free Hy-Gain Catalog
Nearest Dealer/Free Catalog . . . 800-973-6572

hy-gain®

Antennas, Rotators & Towers

308 Industrial Park Road, Starkville, MS 39759 USA
Toll-free Customer Sales Hotline: 800-973-6572
• **TECH:** 662-323-9538 • **FAX:** 662-323-6551
http://www.hy-gain.com



"Now I can say I have a job and a life..."

"Taking hold of my life means finding challenging work with great pay and benefits. It also means taking time for travel and adventure. At Military Sealift Command you'll find all of these things and more. You'll travel to Europe, Asia, Australia and the Caribbean while earning excellent pay. Your seagoing skills will help to supply our military men and women around the world."

Learn new skills and advance quickly in our growing organization. Your professionalism and readiness for challenge will be rewarded. You'll get top pay and excellent leave, health and retirement benefits. You'll experience the highest quality of life aboard ship, including excellent accommodations, great food, and amazing ports of call.

If you have experience in deck, engineering, medical, supply, food service, communications, electronics, or are a search and rescue swimmer, or underway replenishment specialist, MSC can put your professional skills to work immediately.

Get a life. **Call 1-877-292-5821** today.

MSC

MILITARY SEALIFT COMMAND

www.msc.navy.mil

MSC is an equal opportunity employer and drug-free workplace.

By Robert Johns, W3JIP

A Ground-Coupled Portable Antenna

As the saying goes, "Imitation is the sincerest form of flattery." Here's a home-brewed antenna that proves the point.

This homebrew portable antenna for 40 through 6 meters is patterned after the ground-coupled design pioneered by Alpha Delta Communications, Inc.[1] Instead of using radials, this antenna employs a simple and very small grounding system that needs no tuning.

The antenna described here is a quarter-wave vertical sitting on a tripod base. The vertical mast and the tripod are each made of 2-foot-long telescoping sections of 3/4- and 5/8-inch-diameter aluminum tubing.[2] The mast itself resonates on 10 meters; lightweight aluminum tubing sections are added to the top of the mast to tune the antenna to 12, 15 and 17 meters.[3] These added tubing lengths can be installed vertically or horizontally. The antenna is fed at the top of the tripod, making the base a part of the radiating system. A bungee cord stretched from the top of the tripod to a stake in the ground keeps the structure stable.

Beneath the foot of each tripod leg is a grounding strip 2 1/2 inches wide and about 3 1/2 feet long, made of aluminum tape.[4] These strips are simply laid on the ground and form one plate of a capacitor coupling RF from the antenna to the ground. That's the whole grounding system! When I read about this in *QST* (see Note 1), I was skeptical, but intrigued. The arrangement is similar to that of a mobile antenna system in which the car body acts as one plate of a capacitor coupling RF to the road and ground. This grounding system works: The antenna radiates well and the SWR is reasonably low on all bands. (The tripod and grounding strips can also be used with any vertical element or mobile whip you have.) A loading coil added between the aluminum tubing mast and the flattop permits operation on 20, 30 and 40 meters. With the coil positioned this far up the antenna, the entire 10 feet of tripod and mast are unloaded radiators on all HF bands.

[1]Notes appear on page 32.

Building the Tripod

The top of the tripod, Figures 1 and 2, makes it easy to set up. The three 5/8-inch-diameter × 0.058-inch-wall aluminum tubes extending from the 1 1/2-inch PVC cap are permanently attached to it. To assemble the tripod, the legs slide over these tubes. A 3-inch-long, 3/8-inch carriage bolt passes through a hole in the top of the PVC cap to support the vertical element. This bolt also grips the 4-inch-long aluminum tubes inside the cap to form the three sloping legs of the tripod. See Figure 2 and its caption for details on how to make this top cap.

A 50-Ω coaxial feed line attaches to the antenna via an SO-239 chassis connector mounted on an aluminum angle bracket at the top of the PVC cap (see Figure 1). Make a 5/8-inch-diameter hole in the bracket to accept the coax connector body; you'll also need to drill four small holes for the connector's mounting hardware. The 3/8-inch bolt through the top of the cap keeps the aluminum bracket in place.

Figure 1—The top of the tripod with the bottom section of the mast connected to it. A bolt holds the three leg supports in the PVC cap slots. This bolt also passes through the 1 1/2 × 1 1/2-inch aluminum-angle piece that supports an SO-239 chassis connector for feed-line connection. A 1/4-inch hole in the cap top accepts the bungee-cord hook.

To assemble the tripod top, invert the cap so that you are looking down at the open end. Insert the carriage bolt through the 3/8-inch hole in the cap, through the mounting hole in the aluminum angle and add a lock washer and nut to the bolt. Initially, thread the nut about an inch onto the bolt so that the bolt is still loose and its head is out of the cap. Insert the three aluminum tubes into the slots in the wall of the cap and down against the carriage bolt where it passes through the hole in the cap. Tighten the nut so that the carriage-bolt head squeezes the tubes outward and into the slots. Once the nut is hand tight, wriggle each tube to seat it snugly with its tip into the countersunk hole with the bolt. Tighten the nut until the round wall of the cap is slightly deformed into a triangular shape.

Each tripod leg consists of a 0.058-inch-wall, 3/4-inch-diameter tube and a 0.058-inch-wall, 5/8-inch-diameter tube that fits inside the 3/4-inch tube. Each tube is two feet long; three can be made from 6-foot tubing lengths. Dimple each 3/4-inch tube about one inch from each end. The dimple acts as a stop and prevents the smaller tube from penetrating any

farther. Form the dimples using a couple of firm hammer taps on a center punch placed against the tube. When joining the tubes, push a bit when inserting the smaller tube so that the side of the dimple holds the smaller tube in place.

Ground Strips

Although mating two strips of aluminum tape with their sticky sides together might seem like a routine job, it's probably the most difficult part of building this antenna! The adhesive is quite sticky and unforgiving, and handling the long strips can be messy. Get an assistant to help you with this task. You'll need three strips.

See Figure 3. Cut a 7-foot length of tape from the roll and lay it down, sticky side up, on the floor or a large table. Have your helper press a piece of heavy (#12) solid wire or a thin dowel across the width of the strip at the 3 1/2-foot midpoint and hold it in place. Pick up one end of the strip and carry it over the midpoint, keeping it tight so that it doesn't sag and touch the lower half. Keep both ends of the strip aligned while your helper at the midpoint presses the top piece of tape against the lower, working their way toward you. Trim (or remove) the excess wire or rod and the ground strip is done. Don't worry if the strips aren't aligned perfectly.

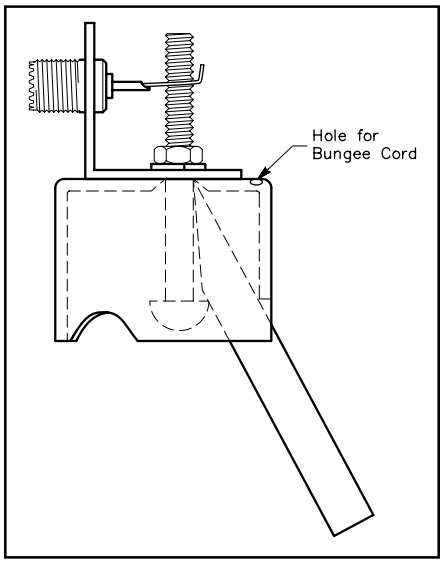


Figure 2—The tripod top cap. The three 5/8-inch-diameter aluminum tubes are 4 inches long, cut at a 30° angle at the end within the cap. From inside the cap, countersink a 3/8-inch hole in the cap top. This forms a trap that holds the ends of the aluminum tubes. Although only one of these leg supports is shown, all three are held between the bolt head, the three slots (either carved or filed in the wall of the cap) and the countersunk hole in the cap top. The slots in the cap are about 3/8-inch deep and wide enough to receive the aluminum tubes. An easy way to lay out the slots is to use the fluted handle from an outdoor water faucet as a template. The handle fits nicely against the cap and has six flutes about the circumference allowing you to mark three equally spaced locations.

The Mast

The 8-foot mast is made from two telescoping 3/4- and two 5/8-diameter × 0.058-inch-wall aluminum-tubing sections. Slot the ends of the 3/4-inch tubes so that they can be tightened around the smaller tubes with hose clamps.[5] To insulate the bottom 3/4-inch section from the 3/8-inch bolt in the tripod that supports the mast, its lower end is equipped with a plastic insulator. As shown in Figure 4, the insulator is a 2-inch length of acrylic tubing. The lower end of the acrylic tube extends about a quarter inch below the aluminum tube and is slotted so that the mast can be tightened around the bolt. Drill a 5/32-inch hole through the upper end of this insulator and the aluminum tube to pass a #6-32 bolt and nut to hold the insulator in place.

After mounting the SO-239 coax connector on the aluminum angle strip, solder a 2-inch length of #14 bare solid copper wire to the connector's center terminal and bend it close to the 3/8-inch bolt in the tripod top. Then bend the wire up and parallel to the bolt and about a quarter inch from it. When the bottom section of the mast is placed over the bolt, place this wire between the aluminum tube and a hose clamp. As you tighten the clamp, it makes the electrical connection from the coax to the mast and squeezes the slotted aluminum tube and insulator tightly against the bolt.

With the mast on the tripod, an easy way to make frequency adjustments is to separate the mast from its bottom section and lower it to the ground. You can then reach the flattop and coil without tilting the mast. For this reason, I don't tighten this joint. I place a #6-32 bolt through the 5/8-inch tube which is the second section of the mast, about one inch from its lower end so that it doesn't slide very far in. I still use a hose clamp over the 3/4-inch tube, adjusting it to make a snug sliding fit for the upper mast.

For the top antenna sections, I use 5/8-inch-diameter thin-walled aluminum tubing used for aluminum clothes poles. This material is lighter and cheaper than the 0.058-inch-wall tubing used for the tripod and mast, but is strong enough. Short tubing sections can be joined together using 2-inch-long sleeves made from the 3/4-inch-diameter × 0.058-inch-wall aluminum tubing. You need two 2-foot, two 1 1/2-foot and two 1-foot lengths of the 5/8-inch thin-walled tubing, three couplings and a **T** joint to connect the

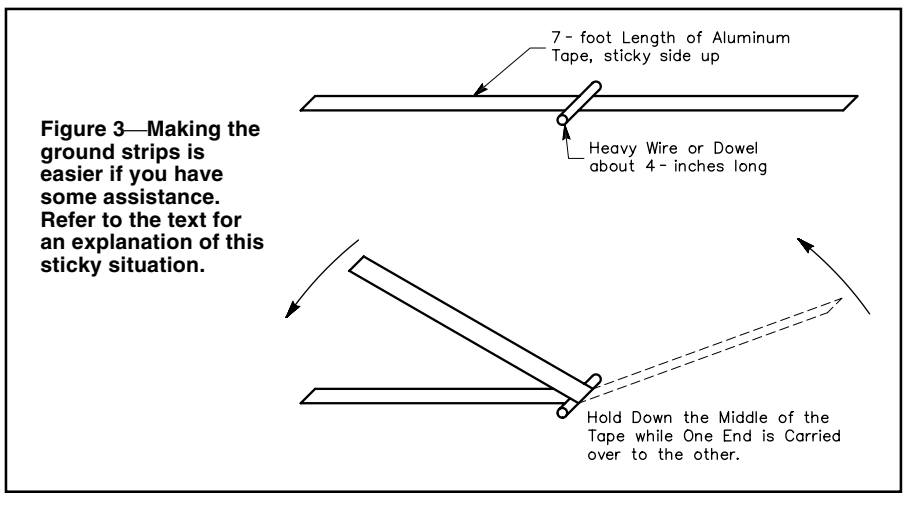


Figure 3—Making the ground strips is easier if you have some assistance. Refer to the text for an explanation of this sticky situation.

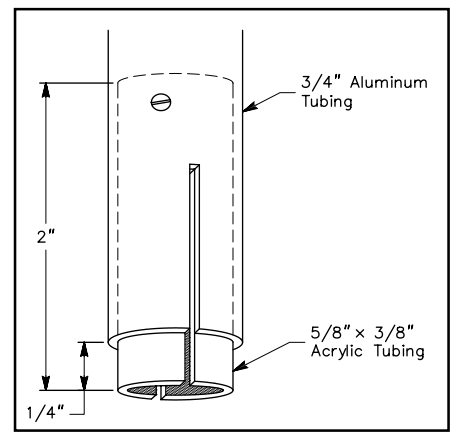


Figure 4—An acrylic (Plexiglas) tube insulates the antenna mast from the 3/8×3-inch bolt that supports it. The tube has a 3/8-inch ID and 5/8-inch OD so that it slips over the supporting bolt and telescopes inside the lower 3/4-inch mast section. Both the aluminum tube and the insulator tube are slotted using a hacksaw so they can be tightened around the bolt with a hose clamp. To mount a mobile antenna on the tripod, cut a 2-inch length of 1-inch-diameter acrylic rod and drill and tap one end to accept the 3/8×16 coarse-thread bolt of the tripod and 3/8×24 fine threads at the other end for the base of a mobile whip.

flattop to the mast or the top of the coil. See Figure 5.

Bungee Tie-Down

The antenna is quite light, and even with the wide base of the tripod it needs to be stabilized against wind gusts or someone tripping over the coax feed line. A bungee cord and a ground stake do an excellent job. The top of the tripod is about 3 feet high, so a 1/2- to 3/8-inch-diameter, 24-inch-long bungee cord works well. Any tent stake will do; drive it into the ground at an angle so it doesn't pull out easily. A special stake shaped like a large screw is ideal for this application.[6] It threads into the ground by hand and has a very low profile. (I leave the stake in the ground and my lawn mower doesn't even come close to striking it.) The stake won't go into hard, baked soil, however. For stability in such locales, or on pavement, hang some bricks, a rock or a jug of water beneath the tripod on the bungee cord.

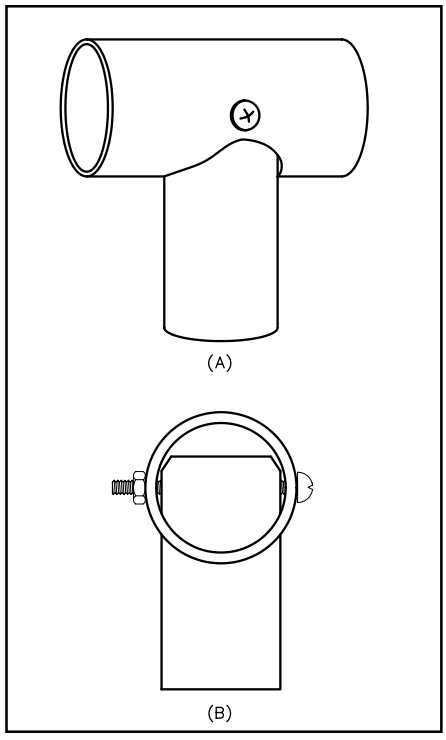


Figure 5—A T is needed to make the flattop. The 3/4-inch-diameter horizontal tubing has a 0.058-inch wall and accepts the 5/8-inch-diameter thin-wall tubes. The 5/8-inch-diameter vertical piece has a 0.058-inch wall and fits into the 3/4-inch tube at the top of the coil form. To make a 5/8-inch hole in the 3/4-inch tube, drill a hole then expand it with a 5/8-inch-diameter or larger countersink. (This process is heavy work for a countersink, so use a little lubricating oil.) Before drilling a 7/64-inch hole for a #6-32 bolt through the T, assemble the two pieces and squeeze them together tightly in a vise, making them perpendicular. To mount a flattop on the mast without the coil, first place a 3/4-inch-diameter coupling sleeve over the 5/8-inch-diameter top of the mast and fit the T into that coupling.

Table 1
Length of thin-wall tubes needed for operation on 10 through 17 meters.

Band (Meters)	*Length of Flattop (ft) and Number of Sections*	*Length of Vertical Top (ft)*
10	0	0
12	1 × 2	1.5
15	2.5 × 2	3.5
17	3.5 × 2	5.5

Antenna Operation on 10 through 17 Meters

For 10-meter operation, set up the tripod and place one end of a ground strip under each tripod foot. The ground strips may be laid in any direction. Adjust the mast to a length of about 7.4 feet. This length is quite a bit less than a quarter wavelength and I believe it's because of its closeness to the ground and the thickness of the tripod. No top hat is used on 10 meters. Adjust the mast length to resonate the antenna at your desired 10-meter frequency.

Table 1 provides lengths for the thin-wall tubes that you add to the antenna, either as a flattop or a vertical, for operation on 12, 15 or 17 meters. No change to the ground system is needed when changing bands. Table 1 assumes that you will leave the mast set for 10-meter operation. This simplifies band changing, such as moving from 10 meters to 15 meters and returning to 10 meters. These changes are quickly made by just adding the tubing lengths for 15 meters and removing them to return to 10 meters—no measurements, no tools.

6-Meter Antenna Operation

For 6-meter operation, the tripod must be insulated from ground and the mast reduced to a length of 52 inches from tripod to tip; see Figure 6. No ground-coupling strips are needed. Simple insulators can be made from 1/2-inch CPVC pipe and couplings. Cut three lengths of pipe about 4 to 6 inches long and hammer each into a coupling. Cementing them isn't necessary; they will be a tight fit. The other side of the coupling fits well over the 5/8-inch-diameter aluminum-tubing leg. Adding these insulators to the tripod resonates the antenna in the 6-meter band with good SWR. You can change the operating frequency by adjusting the length of the mast only—you don't need to adjust the size of the tripod.

Building the Loading Coil

For operation on the 20, 30 and 40-meter bands, a loading coil must be added to the antenna. A large tapped coil is shown in Figure 7; it tunes the antenna to 20, 30, or 40 meters and permits you to tune to the higher-frequency bands without changing the lengths of the top hat. The coil has 13 turns of #8 aluminum wire wound on a 4-inch styrene pipe coupling.[7,8] This coil form is secured to a 7-inch-long, 1/2-inch-diameter CPVC pipe using 1 1/4-inch-long, #6-32 brass or stainless steel machine screws and nuts. I like to reinforce the 1/2-inch pipe by hammering a 2-inch length of 1/2-inch wood dowel into each end. This allows me to tighten the nuts and bolts without flattening the pipe. These bolts also secure the ends of the 13-turn coil. Using a marking pen, I made black marks on the coil to identify the fifth and tenth turns. The marks serve to locate the proper tap points without having to count coil turns each time.

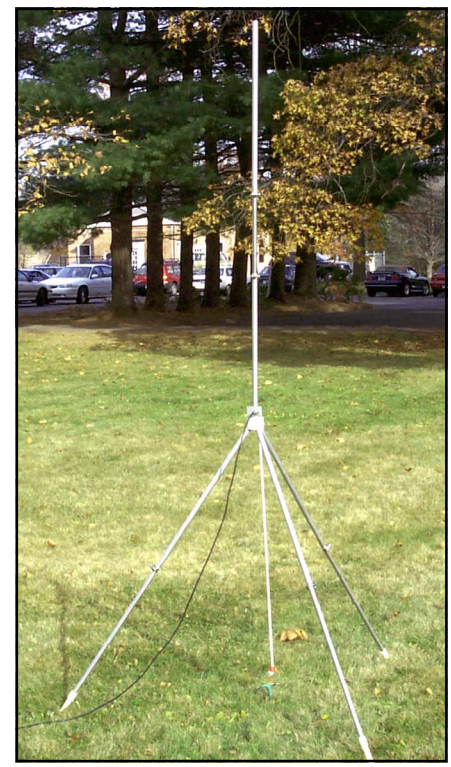


Figure 6—Here, the antenna is set up for use on 6 meters. The tripod construction remains the same, using legs approximately 4 feet long, but the mast has been shortened. No ground strips are needed and the legs are insulated from ground by 1/2-inch CPVC pipe extensions at their feet.

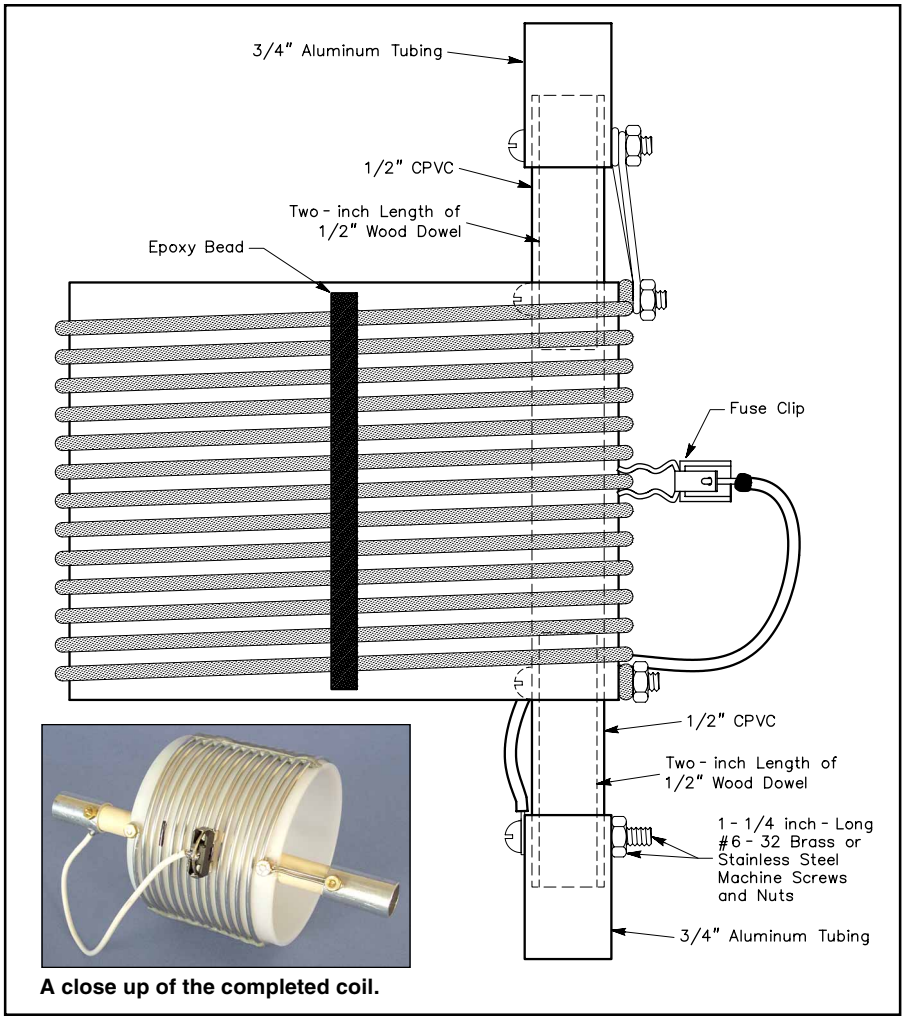


Figure 7—To make the loading coil, 13 turns of heavy aluminum wire are spaced to fill the form. Secure the coil ends using the same bolts that hold the plastic pipe inside the 4-inch styrene coil form. Mount the coil on the mast with a 3/4-inch-diameter aluminum sleeve at the bottom of the plastic pipe; the tap wire is also connected here. An identical sleeve at the top of this plastic pipe connects to the thin tubing for the top vertical section, or to an aluminum T to hold the flattop.

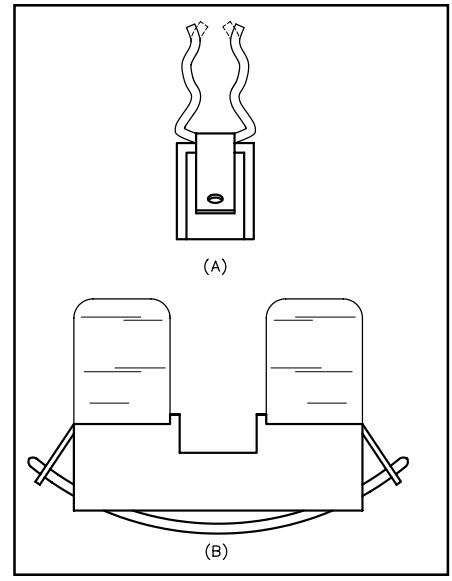


Figure 8—Making the tap connection to the coil. At A, the ends of the jaws of a 5-mm cartridge-fuse holder are bent inward (dotted lines) to grip the heavy wire of the coil. A side view of the fuse holder is shown at B. Bend the solder lugs at the ends of the fuse holder to accept a wire passing through them and beneath the fuse-holder base. When this wire is in place, bend the lugs farther up against the ends of the holder and solder them. Strip a 1/4 inch of insulation from the tap wire and solder it to the wire joining the lugs beneath the fuse holder. Round off any sharp points or rough edges with a file, because you'll be gripping this connector tightly for attachment to and removal from the coil.

Inside the styrene coil form is a ridge. Use a chisel or file to remove about a 1-inch-long section of this ridge to allow the CPVC pipe to lie flat against the inside of the form. Drill 7/64-inch holes at the ends of the styrene coil form and through the 1/2-inch pipe, then bolt them together as shown in Figure 7. Take a 16-foot length of aluminum wire, bend a loop at one end of it, attach the loop to one of the bolts and wrap the form as neatly as possible with 13 turns of wire, without bends, spacing the turns to fill the form. Wrap the end of the 13th turn around the bolt at the other end of the coil form and cut off the excess wire.

To tighten the wire on the form, clamp the form in a vise, grab the coil turns between both hands and progressively rotate the coil from one end to the other several times. This makes the turns tight enough to stay in place as you even out their spacing. To hold the turns in place permanently, run three ribs of epoxy the length of the coil. Use metal/concrete epoxy which has black resin and white hardener, making a dark gray mix that is easy to see against the white background of the coil form. One of these ribs is visible in Figure 7. To make nice straight ribs, first place strips of tape on each side of an intended rib location, apply the epoxy and remove the tape before the epoxy hardens.

Several types of alligator-clips will fit between the coil turns without touching neighboring turns, but I prefer to use a tap connection made from a fuse holder; see Figure 8.[9] After bending the fuse-holder-jaw tips, bend the jaws themselves to make them fit the wire tightly, but remain easy to attach and remove. Suit yourself as to how tight a grip they should have. Join the tap connector to the sleeve at the bottom of the coil form using a 9-inch length of stranded, insulated #14 copper wire, with a solder lug at the end. Use a similar piece of wire to join the top of the coil to the sleeve at the top of the coil form.

The sleeve at the coil bottom joins the coil to the mast. It is a 1 1/2-inch-long, 3/4-inch-diameter, 0.058-inch-wall aluminum-tubing piece. Insert the bottom of the 1/2-inch CPVC pipe halfway into this sleeve and drill a 7/64-inch hole through the sleeve and pipe. Fasten them together with a 1-inch-long, #6-32 brass or stainless steel machine screw and nut. The wire to the tap connector is attached with this same screw.

Antenna Operation with the Coil

To use the antenna on 40 through 10 meters, shorten the mast to 6 feet 2 inches and connect the coil to the mast. Atop the coil, add an element consisting of two horizontal 3 1/2-foot lengths of 5/8-inch-diameter tubing, or a single 7-foot vertical piece of tubing. With the full 13 turns of the coil, and part of an extra turn supplied by the tap wire, the antenna will likely resonate in the middle of the 40-meter band. To operate at the low end of the band, add a 1-foot length of tubing to one side of the flattop or the vertical tubing section. See Figure 9 for approximate dimensions of the assembled antenna.

It may seem as though Table 2 has some errors because it lists a greater

Table 2

This table identifies the number of coil turns (counted from the top of the coil) required to resonate the antenna on the 40- through 10-meter bands. These coil-tap settings are provided as a starting point only because installation conditions vary. To raise the antenna's operating frequency, reduce the number of turns used; to lower the operating frequency, increase the number of turns.

Band (Meters)	*Number of Coil Turns*
40	13
30	7.1
20	3.1
17	2
15	5
12	7
10	13

number of coil turns for operation on 15, 12 and 10 meters than for 17 meters! You're right—something strange is going on. It's because there are *two resonant frequencies* for each setting of the coil tap. Figure 10 shows the two paths that RF can take in the antenna. The upper part of the coil and the top hat provide the lower frequencies; the lower half of the coil provides the higher frequencies. A coil this large has considerable capacitance to free space, so it's not just an end-loading inductor at the higher frequencies. The antenna bandwidth is good, the SWR low and the antenna performs well on these bands. The charm of this coil system is that you can change bands by just moving the tap on the coil, without any adjustments to the mast length or the flattop. And a bonus: With 13 turns on the coil, the antenna works on 40 and 10 meters simultaneously.

The coil settings of Table 2 may need some minor adjustments if a vertical top section is used instead of the flattop. In general, the SWR is lower with the flattop and the antenna is easier to handle.

Power-Handling Capability and Safety

Because of the large coil and tubing used, you might be tempted to run high power with this antenna. I suggest you don't. The antenna may take it, but people can't. At high-power levels, dangerous RF voltages on the antenna are within range of physical contact. I have used the antenna at a 100-W level, but even that requires care and supervision.

Other Possibilities

With the tapped coil, this antenna can be tuned to any frequency from 7 to 40 MHz when operated on the ground-coupled tripod, and up to 110 MHz with the tripod insulated from ground.

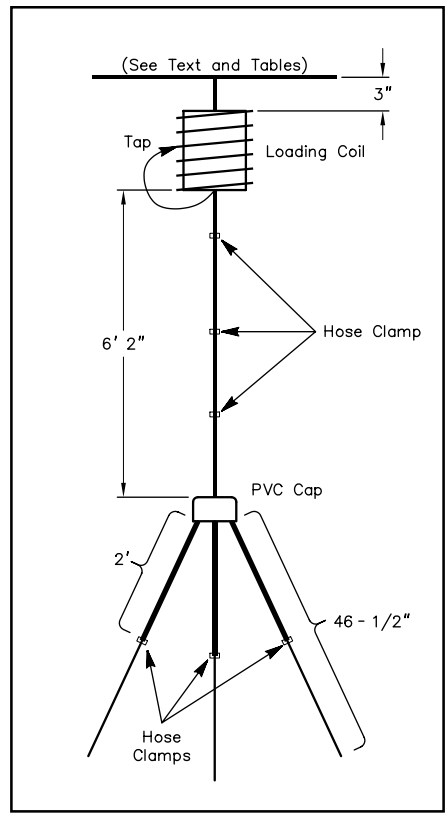


Figure 9—Approximate dimensions of the assembled antenna with the tripod, mast, loading coil and top hat.

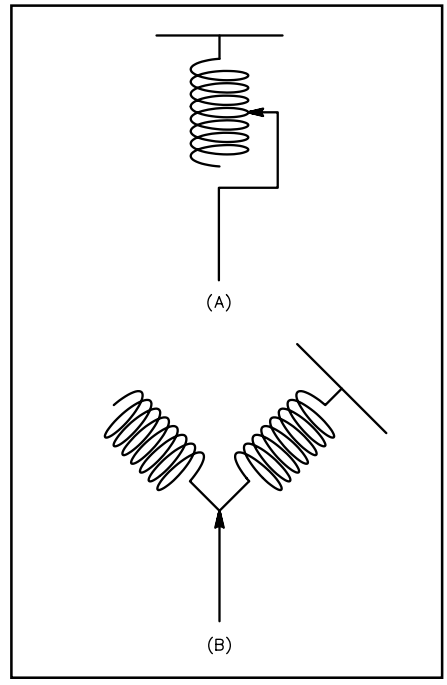


Figure 10—At A, the upper part of the antenna includes the coil, the adjustable tap and the top hat. The bottom of the coil is free and not connected to anything else. At B, this has been redrawn to show the two antenna circuits with the two resonant frequencies that are present. The upper half of the coil has a lower resonant frequency because of the length of the top hat above it.

The antenna also may be used with a longer mast for greater efficiency, or with a shorter mast when space is restricted. Even though the short version is only about 6 feet high, you can't use it indoors because it must be coupled to earth ground. The taller antenna gets out better, but band changing is more complicated. If operation on 75 and/or 80 meters is a must, you can add another coil to the antenna just below the 40-meter coil and change antenna frequencies with the 40-meter tap. Adding a coil made of 20 close-wound turns of #12 enameled wire wound on a 4-inch styrene form similar to the one in Figure 7 will allow you to tune the antenna from about 3.5 to 3.8 MHz, and from about 3.8 to 4.1 MHz with the top hat reduced to one 3.5-foot section and one 2-foot section. Six ground-coupling strips will provide a lower SWR on 80. A small vertical like this is not very effective for short-skip ragchewing, however. A λ/4-wire draped over bushes, flower beds or low tree branches offers more high-angle radiation.

Notes

[1]Rick Lindquist, N1RL, and Steve Ford, WB8IMY, "Compact and Portable Antennas Roundup," 'Alpha Delta Outreach/Outpost System,' Product Review, *QST,* Mar 1998, pp 72-73.

[2]Twelve feet of each tubing size is needed. The aluminum tubing is available from Texas Towers and Metal and Cable Corp. See their ads elsewhere in this issue.

[3]The thin-walled 5/8-inch-diameter aluminum tubing is available from Home Depot and hardware stores as aluminum clothes poles, each about seven feet long.

[4]Adhesive-backed aluminum tape 2 1/2 inches wide is available from Home Depot stores in the heating-vent section.

[5]You may want to consider using an antioxidant at the tubing joints. Antioxidant compounds available from electrical wholesale supply houses, Home Depot and hardware stores include Noalox (Ideal Industries Inc, Becker Pl, Sycamore, IL 60178; tel 800-435-0705, 815-895-5181, fax 800-533-4483) and OX-GARD (GB Electrical, 6101 N Baker Rd, Milwaukee, WI 53209; tel 800-558-4311). Use either sparingly; a thin coat is sufficient.—*Ed.*

[6]Aluminum angle 1 1/2 × 1 1/2 × 1/16-inch thick is available from hardware and Home Depot stores. The green plastic ground stake that threads into the ground has the name "Twizelpeg" stamped into it, and is available at camping supply stores.

[7]The #8 aluminum wire is RadioShack #15-035.

[8]The coupling is available from Home Depot in the drainage pipe section, and also from large plumbing or swimming pool distributors. The couplings are actually 4 1/2 inches in diameter and made from polystyrene, a very low-loss insulator.

[9]RadioShack #270-738.

Bob Johns, W3JIP, is an old gadgeteer who likes to play with antennas and coils. You can contact Bob at PO Box 662, Bryn Athyn, PA 19009; **ksjohns@email.msn.com**.

Photos by Joe Bottiglieri

By Murray Greenman, ZL1BPU

MFSK for the New Millennium

Following in the wide wake of digital-mode revolutionary PSK31, MFSK (in its myriad flavors) is raising the digital performance bar ever higher. And, like PSK31, all you need to get into the action is a computer, a sound card and a free download. Try the newest super-RTTY for yourself!

Over the past two years, digi-mode DXers have had access to "designer" digital modes that offer greatly improved HF performance when compared to "classic" RTTY. The best-known "RTTY replacement" is probably PSK31, which is a great DX performer with high and low power alike. Several landmark PC programs for PSK31 are now available and have recently been reviewed in many Amateur Radio magazines.[1,2]

Unfortunately, none of these digital modes—PSK31 included—has been able to counter *all* of the problems prevalent on HF. The list of troubling phenomena includes multi-path reception, Doppler flutter and severe lightning and man-made noise (common on 160 to 40 meters). To counter these effects, some hams have resorted to "fuzzy" image modes such as Feld-Hell and PSK-Hell.[3] I can now report that major progress has been made in solving *all* of these problems with a true digital mode.

The new mode is MFSK16, and it uses techniques from the '60s and the latest advances in digital signal processing to provide truly remarkable results. MFSK16 won't replace PSK31 completely, although it provides a viable alternative when other modes won't get through. It could replace RTTY, however, and by the time you read this you may have already heard its distinctive sound on the bands.

History

The first multi-tone data mode wasn't digital—it was "fuzzy." The LMT Seven Tone Radio Mode[4] dates from 1937 and was used to portray text as images, rather like Hellschreiber. The best known examples of digital MFSK (Multi-tone Frequency-Shift Keyed) modes are Piccolo[5] and Coquelet[6], which both date from the early 1960s.

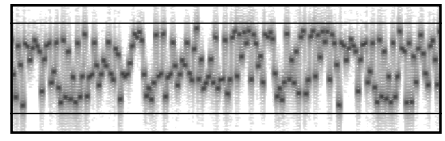


Figure 1—An MFSK16 spectrogram (the horizontal lines are 300 Hz apart).

MFSK is really a type of super-RTTY, and it's difficult to understand why hams didn't adopt it (or adapt it) years ago. The MFSK technique was developed during the heyday of HF teleprinter communications as a way to combat multi-path propagation problems and provide reliable point-to-point communications with relatively simple equipment. Piccolo, for example, was used on diplomatic links between England and Singapore, and typically provided good copy for an hour after RTTY links had faded out. The technology was then electromechanical, but several key principles were recognized and exploited at the time:

- Performance (reduced error rate) improved as the number of tones used increased.
- Performance was best when the least number of symbols[7] was used to represent each transmitted text element.[8]
- In systems that used special integrating detectors, tones spaced as closely as the baud rate could be uniquely detected without cross-talk.

Piccolo and Coquelet both used two symbols per text character—compared to 7.5 for RTTY and 3 to 12 for PSK31. MFSK16 uses only *one* symbol per signaling element! With MFSK, the baud rate (the rate at which symbols are transmitted) is quite a bit lower than the text rate because each symbol carries more information in its frequency properties than RTTY or PSK. Although it is somewhat confusing, this technique has an advantage because "longer" symbols are easier to detect in the presence of noise, they have a narrower bandwidth and are much less affected by multi-path timing errors.

Piccolo originally used as many as 32 tones, but the most common form used six. Coquelet generally used 12 tones. MFSK has recently been tested with as many as 64 tones, although the released version, MFSK16, uses 16 tones and the weak-signal variant, MFSK8, uses 32.

The integrating detector used in Piccolo was a milestone in FSK detection techniques in its day.[9] Without going into great detail, narrow active filters with very high gain were used to detect each tone. By carefully choosing the baud rate and tone-channel spacing and resetting the filters at the start of each symbol period it was possible to reliably detect very weak tones without cross-talk. In fact, the response of the adjacent channels produced a null at the sampling point. This helped with noise rejection and prevented energy resulting from ionospheric effects on one tone from appearing in the next channel.

With the advent of satellite communications and high-speed ALE (Automatic Link Establishment) systems, these older commercial MFSK modes have largely fallen into disuse. The concepts and the

[1]Notes appear on page 36.

technology are still viable, however, and should be of great interest to radio amateurs faced with the age-old problems of multi-path, Doppler instability and interference.

The New Approach

In searching for a better way to hold reliable long-path QSOs, I looked at what made copy difficult with existing modes and what could be done about it. It was obvious that phase-shift keying (PSK), unless relatively high speed, wasn't practical. The incidental phase errors introduced by an unstable ionosphere (particularly in polar regions) typically exceed the phase modulation of the signal. Frequency-shift keying (FSK) and on-off keying also perform poorly, but principally because the arrival time of signals vary, often by as much as five to 10 ms, depending on the path, and perhaps by as much as 30 ms between long and short paths. This interval is longer than the signaling duration of a 22-ms RTTY symbol—and multi-path reception is the reason why so many RTTY signals, even strong signals, don't print reliably.

While casting around for a better method, I revisited the MFSK techniques mentioned previously. At the same time I also reviewed the advances made in modern PC and sound card DSP technology, which were light years ahead of 1960's hardware, especially in compactness and simplicity. Putting these together, I had all the necessary building blocks to replicate and enhance the old MFSK modes using nothing more than a PC with a sound card!

I decided to kick things off by sending a specification for the new mode to a bunch of DSP, coding and software experts, and a remarkable collection of ideas and offers of assistance resulted. Nino Porcino, IZ8BLY, of Hellschreiber and MT63 fame, quickly turned the specification into reality. The result has been tested thoroughly in real and simulated conditions. The first QSO using this new mode (between Nino and myself) was over an 11,000-mile long-path connection on 17 meters. We had 100% copy using 25 W and dipole antennas—so the specification can't be too far off the mark!

That amazing day was June 18, 2000, and since then we have been in communication using this mode almost every day. Most days we work 20 or 17 meters using as little as 5 W.

As with the popular PSK31, all you need to run this amazing new mode is a Pentium-class PC with a sound card and a couple of simple cables. You could even use it with the QRP transceiver designed by Dave, NN1G.[10] The first software for MFSK16 is called *Stream* and is available from the MFSK Web site[11] or from IZ8BLY.[12]

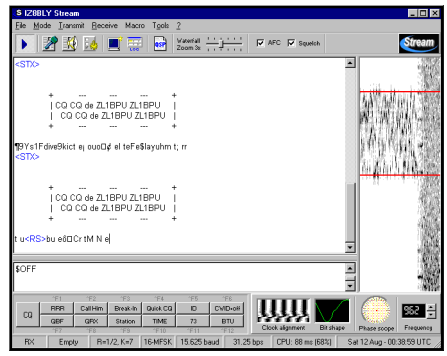


Figure 2—*Stream* in the MFSK16 mode.

The Signal

What does this new mode consist of? Well, there are 16 tones—sent one at a time—at 15.625 baud and spaced 15.625-Hz apart. Each tone represents four binary data bits. The transmission is 316-Hz wide and has a ITU-R specification of *316HJ2B*.[13] It's exactly like RTTY, but with 16 closely spaced tones instead of two wider-spaced tones. With a bandwidth of 316 Hz, the signal easily fits through a narrow CW filter.

The tones are continuous phase keyed, which eliminates keying noise, and the phase information can be used to determine tuning and symbol phase. Figure 1 shows an MFSK16 spectrogram (the horizontal lines are 300-Hz apart).

Unlike Piccolo or PSK31, no special arrangements are made to transmit symbol timing, which can be recovered from the inherent properties of the signal. One critical factor, like RTTY, is that the signal is of constant amplitude and does *not* require a linear transmitter to maintain signal purity.[14] Unlike SSB and PSK31, overdriving the transmitter will *not* make an MFSK16 signal any wider.

To ensure that text is received with an absolute minimum of errors, the new mode incorporates an excellent forward error-correction (FEC) technique using *Viterbi* decoder routines developed by Phil Karn, KA9Q, and a clever self-synchronizing interleaver developed for MFSK by IZ8BLY. The typing rate, even with FEC, tops 40 WPM. This speed is achieved by efficient coding techniques, including a varicode similar to PSK31, which provides an extended ASCII character set.

Finally, the receiver detector uses a synchronous Fast-Fourier-Transform (FFT) routine, a DSP technique that exactly models the original Piccolo integrating detector. The FFT also provides phase information, automatic frequency control (AFC) and a "waterfall" tuning display. The filter provides 4-Hz channels and is easily able to separate the 16 closely spaced tones.

The signal has an amusing musical sound, is quite narrow, is clean to tune across and not unpleasant to listen to. The sound is certainly better and the bandwidth narrower than many HF modes in use today.

First Impressions

Downloading the software and installing it is very simple. The "help file" is also available as separate download, so you can read that before you install the software. Figure 2 shows *Stream* in MFSK16 mode.

At first glance the software is well laid out and similar in appearance to *IZ8BLY Hellschreiber* or *MT63*, which isn't surprising, considering its origin. It has a generous collection of tools along the top of the screen, separate transmit and receive windows, a good collection of definable "macro" buttons and an excellent "waterfall" tuning display. Along the bottom is a list of settings and parameters, plus the date and time. There is also a drop-down log window for automatic logging and insertion of QSO information and a useful "QSP" window for relaying incoming text.

Nino's software actually includes *three* new modes! The default mode is MFSK16 (16-tone, 16-baud MFSK with FEC). Next is a slower, but more sensitive, variant called MFSK8 (32-tone, 8-baud MFSK with FEC). Both modes share the same 300-Hz bandwidth, but sound quite different. The other new mode is Nino's PSK63F, which is a 63-baud PSK mode that's similar to PSK31, but faster and with full-time FEC. PSK63F has about a 100-Hz bandwidth.

The MFSK and PSK modes are complementary, as Nino's new mode is great for short-path DX and local QSOs. You'll have no trouble telling them apart, and no trouble telling Nino's PSK63F from PSK31 because it is twice as wide. As a standard of comparison [and perhaps the ultimate in convenience—*Ed.*], the software includes PSK31 as well!

Stream is quite simple to use—start typing and it transmits; press F12 to end the transmission. The challenge comes in getting a signal lock. It takes some skill and a certain amount of patience to learn how to properly and efficiently tune an MFSK signal. I'm confident you'll agree that the results are worth the effort.

Because the tones are closely spaced and the filters quite narrow, you *must* have a stable transceiver and you *must* use software tuning—not transceiver tuning and certainly not the RIT! The software tunes up and down in 1-Hz steps. Click on the waterfall, with its zoom

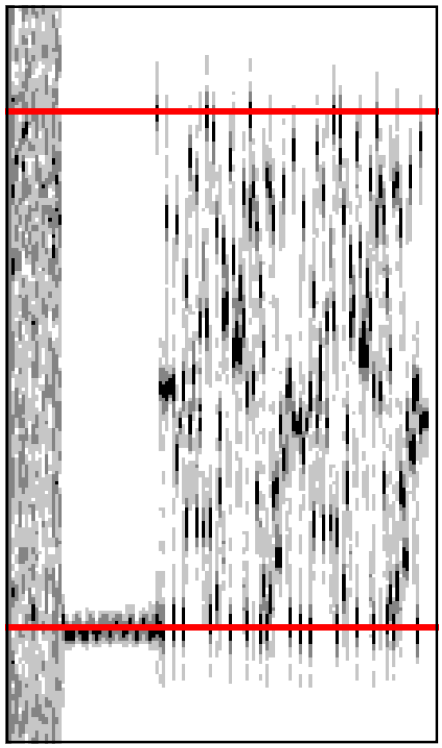


Figure 3—The *Stream* waterfall display in 3X zoom.

function, for exact tuning.

The software's AFC is good, but you need to be within about 5 Hz of dead center to get a good response. The AFC works on the idle tone, which appears at the start of every over and also during transmission. Whenever the AFC is active, the Phase Scope comes alive. You can also manually tune by clicking on the waterfall display in just the right spot or by using the Up/Down frequency buttons to tweak the tuning.

There's an interesting display alongside the Phase Scope that shows the Symbol Clock Alignment. This display is a great indication of ionospheric stability! The Bit Shape display is a small oscilloscope that shows what the symbol sync is working with (this is a type of correlator).

Tuning is done using an excellent waterfall display. Figure 3 shows this display in 3X zoom mode. Under the lower horizontal line (red on the screen) you'll see a broad band towards the left. This is the idle carrier, the lowest of the 16 tones. This carrier is transmitted briefly at the start of each over and returns at the end, or whenever the operator stops to think. To tune the signal correctly, center the red line on this carrier and the AFC will keep it there. During the over you'll see little black vertical stripes all over the waterfall, with gray "side-lobes" above and below. These are the transmitted symbols, and once again, you can adjust the software tuning so the red line centers on the lowest of these symbols. Unfortunately, while this is easy when the signal is already tuned, finding the correct spot on a weak signal during a transmission isn't so simple and takes a little practice.

Once you've found the right spot, almost-perfect text will start to appear on the screen, delayed by three to four seconds as the data trickles through the error-correction system and appears one or two words at a time. You'll soon get used to that.

The mode is a delight to use once you learn to tune it. The typing speed is fast and, while transmit-receive changeover isn't as fast as RTTY or Hellschreiber, it's fine for conversing and net operations.

Performance

Well, this *is* the telling factor, isn't it? For short-path QSOs out to 8000 miles (with no polar propagation), MFSK16 works fine but you may find PSK31 easier to use. If you're interested in QRP, MFSK16 appears to be the hands-down winner. Over long-path and polar routes—and when conditions are really nasty—MFSK16 stands alone. It keeps giving almost perfect copy when signals are barely audible, have bad fades, noticeable Doppler, multi-path distortion and even QRM. High power *isn't* necessary.

MFSK16 is also probably the best mode yet for digital work on the lower bands. If you are into traffic handling or sending bulletins on 80 or 40 meters, give this mode a try. It just doesn't give up! 80 meters is especially prone to multipath, as RTTY and Feld-Hell users know. On nighttime 80-meter QRP circuits, MFSK16 will work over thousands of miles with 90% perfect copy! As a bonus, lightning effects are largely ignored.

Although not noticeably better on the low bands, MFSK8 is great to have when the band starts to die. It's definitely more sensitive than MFSK16 and, although tuning is very tight and typing speeds are down to 25 WPM, it will allow you to complete that difficult QSO with almost perfect copy.

PSK63F, on the other hand, is quite the reverse. Although not very good on long path, it's sensitive (almost as good as PSK31) and fast (40 WPM). Thanks to FEC, it provides error-free copy most of the time. It's also very easy to tune, as it's wider than PSK31 and has excellent AFC performance. PSK63F is also minimally affected by Doppler and drift problems. It's good for short-haul DX and would be great on VHF.

Stream has been tested on an ionospheric simulator by Johan Forrer, KC7WW, and the results bear out the practical experience. Moe Wheatley, AE4JY, has run sensitivity tests that place MFSK16 on an equal footing with PSK31 in white noise. As testing proceeds, speed and tone tweaks may produce improved performance or even new modes.

Feedback from users shows that sensitivity and the ability to cope with poor conditions are unsurpassed. MFSK16 is also useful on VHF—it's not affected by aircraft reflections and is great for DX because of its inherent sensitivity. Karl Schneidhoffer, HA5CAR, is even using it on 23 cm. Here are some quotes from users:

"Great—just great!"—*Iván, LU3OK*

"Bob, K4CY, appeared out of the noise. A good QSO followed. Band propagation not ideal at this time"—*Victor, G3GK*

"It's got one strong receiver/decoder, doesn't it? I was getting 70%+ copy on signals that wouldn't even change the shade of gray on the waterfall!" —*Gordon, N5AJF*

"Hey guys—great mode! Works well down into the noise for me. Andy (KB0EOQ) and I went to the 5-W area for a bit last night and I still pulled him in when QSB took him below my QRN level and audibility"—*Gary, AG0N*

"Conditions were slow QSB and aircraft reflections. Tuning stability not too much of a problem. Signals were about

Is it Legal?

MFSK16 uses publicly available software, and the source code, algorithms and codes are all public domain.[15]

In that sense the mode is open, unencrypted and publicly available. In fact, users with the ability could write their own versions. I hope that other versions will appear, including a *Linux* version.

According to Chris Imlay, W3KD, ARRL General Counsel,[16] the legality of new modes in the USA should be determined by reviewing FCC Part 97, section 97.3(c), to determine which emission type applies (based on the emission designator, in this case F1B). This is the same emission designator as RTTY. According to both Chris Imlay and Paul Rinaldo, W4RI (ARRL Technical Relations Manager), MFSK16 meets the FCC requirements for a legal HF digital mode.

Of course, *where* to operate the new mode also depends on its emission type. MFSK16 calling frequencies on DX bands are 10.147 MHz USB (indicated dial frequency—that's 10.148 MHz idle carrier), 14.080 MHz USB, 18.105 MHz USB and 21.063 MHz USB.—*ZL1BPU*

S1 or below"—*Terry, G0EZY (100 mile path on 2 meters)*

"I worked RTTY since about 1978, but gave it away. Copy not very good except when signals are strong. It's the same with PSK—no good at all on really long DX contacts. This mode is much, much better."—*Frank, ZL2BR*

Try It Yourself!

At press time the only publicly released software available for MFSK16 is *Stream* by IZ8BLY. It's completely free and fully functional, and can be downloaded from numerous places on the internet.[17] *Stream* requires at least a Pentium 100 PC with a 16-bit sound card and *Windows 9x* or newer. Other versions will hopefully follow. You can subscribe to the MFSK16 support group by sending an e-mail to **MFSK-subscribe@egroups.com**.

If you're already set up for PSK31, you only need to download *Stream* and you're ready to go. Even if you've never tried sound-card-based digital communication software before, you'll be surprised at how easy it can be. The *Stream* help files will tell you how to connect the necessary audio and keying cables between your computer and your radio. You'll find these files in the "Help" folder that is created when you install *Stream*.

This month you'll have a chance to test the performance of MFSK16 during the W1AW HF Digital Run. See the announcement elsewhere in this issue for details.

Notes

[1]Steve Ford, WB8IMY, "PSK31 2000," *QST,* May 2000.

[2]Jack Heller, KB7NO, "Inside MIXW32," *73 Amateur Radio Today*, Jul 2000.

[3]Murray Greenman, ZL1BPU, "Let's See you in Hellschreiber," Jan 2000.

[4]See **www.qsl.net/zl1bpu/Fuzzy/LMT.html**.

[5]Developed by H. K. Robin and J. D. Ralphs, et al, for the British Foreign and Commonwealth Office.

[6]Developed in Belgium by ACEC and used by French and Belgian police.

[7]The smallest signaling entity of a digital mode.

[8]Article (in French) in *ACEC-Revue, No. 3.4*, 1970.

[9]H.K. Robin, OBE, et al, "Paper 204E," published in *Proc IEE, Vol 110, No. 9*, Sep 1963.

[10]Skip Teller, KH6TY, and Dave Benson, NN1G, "A Panoramic Transceiving System for PSK31," *QST,* Jun 2000.

[11]**www.qsl.net/zl1bpu/MFSK/**

[12]**space.tin.it/computer/aporcino**

[13]See FCC Part 47, paragraphs 2.201 and 2.202.

[14]Distortion in sound card or transmitter audio stages can still lead to undesirable images of the signal above and below the correct one.

[15]**www.qsl.net/zl1bpu/MFSK/Documents.html**

[16]See "Is Hellschreiber Permissible Under Part 97?" *QST,* Jan 2000, p 54.

[17]For example, from **www.qsl.net/zl1bpu/MFSK/software** or **www.egroups.com/files/MFSK**. At time of writing the latest version is *StreamSetup085.EXE*, **www.qsl.net/zl1bpu/MFSK/software/StreamSetup083.EXE**.

You can contact the author at 94 Sim Rd, Karaka, RD1, Papakura, New Zealand; **as149@detroit.freenet.org**.

NEW BOOKS

A FAMILY AFFAIR: THE R. L. DRAKE STORY

By John Loughmiller, KB9AT

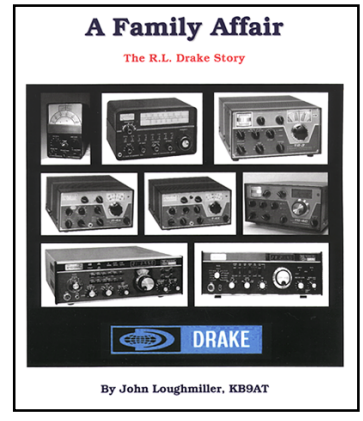
Published by Technical Support Group, 15 Saddle Ridge Trail, Alexandria, KY 41001-9105; tel 859-635-6487; **home.fuse.net/tsg/**

First edition, softcover, 305 pages, 8½ × 11 inches with black and white illustrations. $29.95 plus shipping and handling.

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

I must confess at the beginning that I bring a special bias to this review of *A Family Affair: The R. L. Drake Story*. I was an employee of the R. L. Drake Company in the mid-1980s. So, when I received a copy of the book by John Loughmiller, KB9AT, I approached it with some trepidation. Would Loughmiller accurately portray the Drake Company that I knew?

As it turns out, Loughmiller's chronicle of Drake's history is honest and on target. He has carefully researched his subject, spinning a fascinating story that rises above a mere collection of historical facts. At the heart of *A Family Affair: The R. L. Drake Story* are the recollections culled from a number of former employees who have since retired or otherwise moved on. At times the tone of the book is almost gossipy, but not in a negative sense. It treats the reader to inside glimpses of life at the company that would otherwise have vanished into the mists of time. You feel like the proverbial "fly on the wall," privy to private conversations and "unusual" episodes (failed designs, labor union bickering, interpersonal conflicts—it's all there). Because none of the juicier items come from my time with the company, I can't vouch for their accuracy first hand, but I knew the individuals involved and the stories certainly have a strong ring of truth.



I found only one of the anecdotes to be a little off target. On page 27 there is the story of a "Hint & Kink" item published in the February 1969 *QST* concerning a method for cleaning a badly contaminated radio by flushing it with water and baking out the residual moisture in an oven. A teenage TR-3 owner attempted this, but used too much heat. The results were disastrous. When the boy's mother complained to Bob Drake, he fixed the radio free of charge. According to the book, the advice was an early *QST* April Fool joke. In reality, it wasn't, but it is true that Bob Drake carried a grudge for *QST* for a long time thereafter.

Like many good historical works, *A Family Affair: The R. L. Drake Story* has a tragic rise-and-fall structure, beginning with the company's birth under the direction of Bob Drake, along with the birth of receivers and transmitters that were destined to become legendary. You witness the ascension of Drake's Amateur Radio line up to and including the development of the famous TR-7 transceiver. You also witness Drake's exit from the Amateur Radio stage as the rig that was to become the TR-8 is crated and sent to storage, never to exist beyond a prototype.

Loughmiller's writing is outstanding, a cut above most of the material you find in the Amateur Radio press. Thanks to his compelling narrative, *A Family Affair: The R. L. Drake Story* is quite a page-turner. The story pulls you along like a well-crafted fiction novel.

The Drake story itself comprises about half of the book. The remaining half is devoted to technical information about various Drake products. It is an invaluable encyclopedia of modifications, hints and tips.

A Family Affair: The R. L. Drake Story is a must-have for Drake aficionados, but it has an appeal that reaches beyond die-hard devotees. The story that unfolds in the book is a microcosm of the history of Amateur Radio itself. It is a somewhat cautionary tale that John Loughmiller has woven in an entertaining, informative style.

Next New Books

By David Newkirk, W9VES

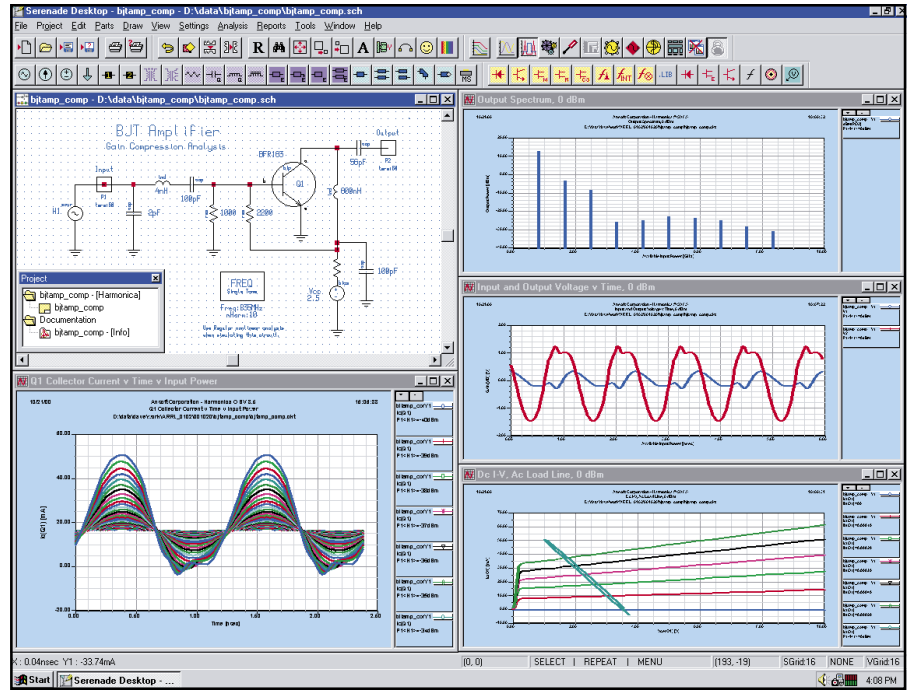
Simulating Circuits and Systems with *Serenade SV*

Teaming linear and harmonic-balance nonlinear circuit simulation of amplifiers, mixers and oscillators with system-level analysis of digital communication systems, *Serenade SV* is like having an RF/microwave communications lab in your computer—and it's free!

As L. B. Cebik's recent series reflects, computer-aided antenna modeling is well-established as a popular Amateur Radio activity, fueled by the free availability of core programs (*NEC* and *MININEC*) capable of realistic antenna modeling.[1] Radio amateurs interested in using their computers for realistic radio and electronic *circuit* simulation have similarly benefited from the free availability of *SPICE*, developed at the University of California at Berkeley. Proprietary alternatives to *NEC*, *MININEC* and *SPICE* are available, of course—at costs that generally put them well beyond the reach of students and hobbyists. *ARRL Radio Designer*, a feature-limited version of one such product (*Super-COMPACT*, a linear circuit simulator) brought realistic, affordable modeling of RF circuits to the market in 1994—if you didn't mind its netlist circuit entry, its lack of even the most basic distributed circuit components (microstrip and stripline structures, essential to useful UHF/microwave circuit modeling), and its inability to simulate any of the nonlinear effects without which a radio can't radio. What radio amateurs and electronics students really need is a free *nonlinear* circuit simulator that, unlike free versions of *SPICE*, incorporates essential *radio*-modeling components and capabilities because it has been designed for RF/microwave/wireless use from its beginning.

This article introduces that simulator, *Serenade SV*. A feature-limited version of Ansoft Corporation's industry-standard *Serenade Design Environment*, *Serenade SV* runs on *Windows 95*, *98*, *2000*, *ME* and *NT 4.0* and includes:[2]

- A harmonic-balance nonlinear circuit simulator (*Harmonica SV*)
- A discrete-time system simulator (*Symphony SV*)
- Graphical circuit entry (schematic capture)
- Linear and nonlinear circuit tuning
- Linear circuit optimization
- Nonlinear oscillator design and analysis
- Two-tone nonlinear analysis, including mixing and intermodulation distortion (IMD)
- Small-signal ac nonlinear analysis
- Stability analysis
- Waveform, modulation, sweep, bit-error rate, and statistical properties analysis
- Interactive, graphical matching-network synthesis
- A transmission-line calculator
- RF-critical circuit components, including black boxes (up to four ports), distributed elements (ideal, coaxial, microstrip and stripline transmission lines, coupled lines and bends), controlled sources, transformers, filters



Notes appear on page 43.

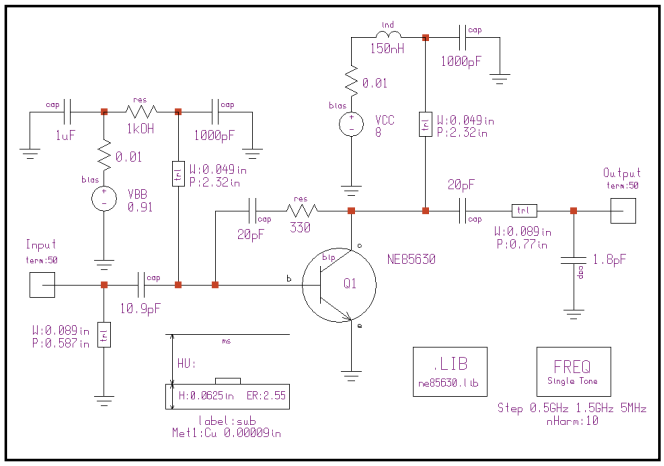


Figure 1—*Serenade SV*'s inclusion of *distributed* circuit elements (ideal, coaxial, microstrip and stripline transmission lines and couplers) allows the realistic simulation of circuits like this 903-MHz preamplifier.

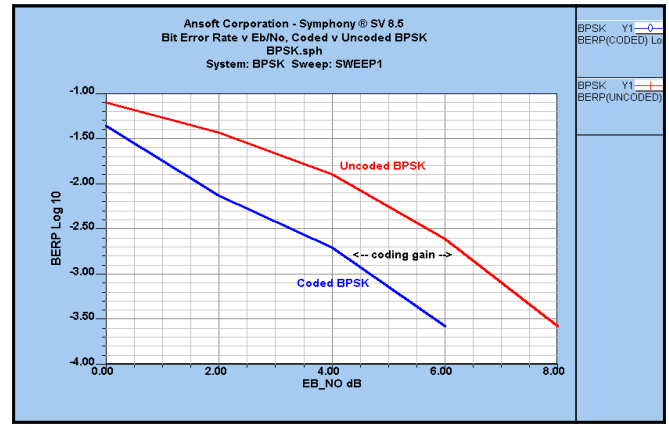


Figure 2—I used *Serenade SV*'s interactive *Smith Tool* to synthesize input and output matching networks for the Figure 1 preamp. After each network-synthesis session, clicking the Circuit button automatically creates a schematic you can copy into the circuit you want to match. *Smith Tool* can help solve antenna-matching problems, too.

(Bessel-Thompson, Butterworth, Chebyshev), and current and voltage probes
- Circuit evaluation in terms of *S*, *Y* and *Z* parameters and other RF-relevant responses[3]
- A set of vendor-supplied device *S* parameters, and selected nonlinear diode and transistor models (*Serenade SV* can also use vendor-supplied *SPICE* parameters for transistors and diodes)
- Signal-processing models, including modulators, coders, filters, and propagation channels, for modeling analog and digital transmitters, receivers, and end-to-end systems
- Complete online documentation in *Windows Help* and Adobe PDF form, including circuit and system examples

All of this functionality is available *for free* via the Ansoft Web site.[4] You'll also find complete *Serenade SV* specifications and system requirements there. Since *Serenade SV* is a feature-limited version of the industrial-strength *Serenade Design Environment*, what are its limitations? Again, Ansoft's *Serenade SV* pages carry complete details, but for many of us interested in circuit simulation, the key limitations are that *Harmonica SV* analyses are constrained to:
- 25 circuit elements, maximum
- Four device ports, maximum (a diode has one device port; a FET or BJT has two)
- 31 spectral components, maximum (enough to simulate 5th-order intermodulation)
- Four probes (voltage or current), maximum
- 1001 sweep points, maximum

What can you simulate inside that 25-component limitation? Enough to support a college-level education about electronics and radio, as we'll see by turning *Serenade SV* loose on several popular circuits many ham experimenters use every day. First, though, let's overview the roles played by key *Serenade SV* features (schematic capture, *Smith Tool*, and the *TRL* transmission-line utility) in a 903-MHz preamplifier design.

Serenade SV Onscreen

Figure 1 shows an example *Serenade SV* schematic: a 903-MHz preamplifier that uses transmission-line segments in its input and output matching networks, and as RF chokes. Schematic capture—that is, graphical, interactive electronic circuit entry as opposed to a character-based netlist interface—is standard in *Serenade SV*'s circuit and system simulators. (Netlist-based circuit entry is still there if you want to use it, and *Serenade SV* can even analyze your *ARRL Radio Designer* netlists if they contain 25 or fewer components.)

In creating the Figure 1 circuit, I used two *Serenade SV* utilities of high interest to hams: *Smith Tool* (Figure 2), a graphical, interactive, Smith-C2hart-based subprogram that communicates with the *Harmonica* simulator's report generator and schematic editor to help you design matching networks to a goal, and *TRL* (Figure 3), a transmission-line calculator you can use to determine physical length and width values that correspond to the ideal-line values *Smith Tool* exports. Working with a linearized version of the circuit, I also used *Serenade SV*'s linear optimization feature to tweak the input and output networks for best results. The final circuit's predicted performance at 903 MHz (Figure 4) is within a few hundreths of a decibel of the goal noise figure (NF) and gain values I originally chose when plotting NF and gain circles in *Smith Tool*.

So much for our high-spots tour of how *Serenade SV* looks as it captures, synthesizes, analyzes and characterizes circuits. Now let's see what *Serenade SV* can do with some of the tried-and-true circuits many of us have already built and used on the air.

Simulating an Amplifier

As I wrote in *QST*'s March 1995 "Exploring RF" column, a good way to get acquainted with a new circuit-modeling tool is to use it to simulate known circuits for which trustworthy measurements are available.[5] So, for our first *Serenade SV* example, we'll simulate the behavior of a bipolar-junction transistor (BJT) amplifier circuit introduced to amateurs by Wes Hayward, W7ZOI, and John Lawson, K5IRK, and well-known to *ARRL Handbook* readers and those who build their own MF/HF amateur gear (Figure 5).[6] Based on a 2N5109-class broadband linear-amplifier transistor, the circuit provides about 16 dB of gain across the HF range while presenting a broadband resistive termination to the passive mixer that precedes it.

Characterizing active devices with RF-accurate model parameters is critical to successful circuit simulation, particularly for nonlinear analyses, and so far I haven't found 2N5109 *SPICE* parameters I can trust. NEC makes a transistor suitable for this application—the NE46134—but publishes no *SPICE* parameters for

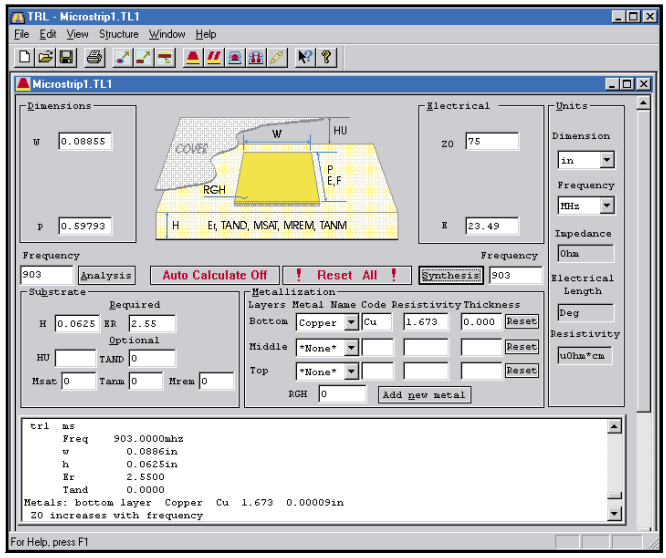


Figure 3—Meet *TRL*, *Serenade SV*'s distributed-transmission-line calculator. After using *Serenade SV*'s *Smith Tool* to determine the electrical values for the preamp's ideal matching-network elements, I used *TRL* to determine the *actual* line lengths and widths necessary to construct the circuit on glass-Teflon board.

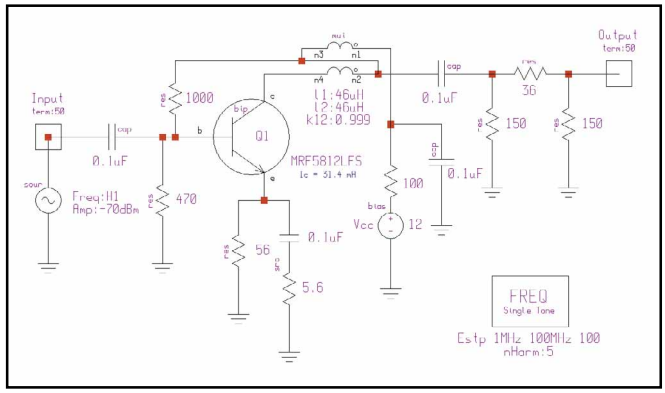


Figure 5—Our BJT amplifier example, a strong post-mixer amplifier, uses RF feedback to lower its input and output impedances, and make its characteristics more broadband and less dependent on the particular transistor used. According to the authors who introduced us to it, its gain, including the 6-dB loss of the attenuator pad, is "about 16 dB"; its output intercept, "approximately +30 dBm." This is how the amplifier looks in *Serenade SV*'s schematic editor.

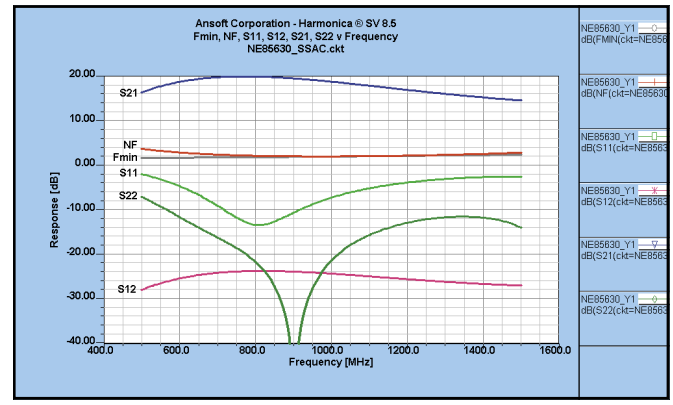


Figure 4—The 903-MHz preamplifier's predicted forward transmission gain (S_{21}), minimum possible noise figure (F_{min}), noise figure (NF), input reflection gain (S_{11}), output reflection gain (S_{22}) and reverse transmission gain (S_{12}). This S_{21} and NF performance duplicates what I set out to achieve in doing the circuit's input and output matching in *Smith Tool*.

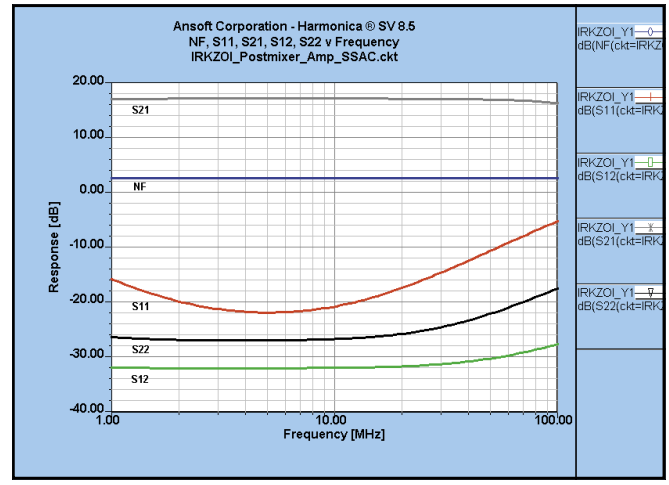


Figure 6—The amplifier's calculated small-signal, ac (SSAC) behavior. In doing an SSAC simulation, *Serenade SV* first does a nonlinear analysis to determine the circuit's dc operating conditions and then does a linear analysis based on that operating point. (*Serenade* predicts a collector current of just over 30 mA, which dovetails exactly with the behavior of the versions of this circuit I've built.) The circuit's predicted gain (the *S* parameter S_{21}) agrees closely with the value published by Hayward and Lawson; its S_{11} and S_{22} responses (which reflect how closely the circuit's input and output impedances approach 50 Ω, resistive) indicate a reasonably good match to 50 Ω across the HF range. The predicted noise figure is also entirely realistic.

it. Luckily, Motorola still includes in its slimmed-down RF-BJT line a surface-mount-technology (SMT) version (MRF5812) of its long-established MRF581, a transistor intended for exactly this sort of application, *and* publishes *SPICE* parameters for it on the Internet.[7] So we'll run with the MRF5812, keeping in mind that we can get away with using an SMT equivalent's parameters to model the non-SMT MRF581 only because we're analyzing the circuit at frequencies where differences in the parasitic inductances and capacitances contributed by device packaging are relatively unimportant. Figure 6 shows the circuit's simulated frequency-dependent gain, noise-figure and I/O matching behavior. Figure 7 shows its two-tone, third-order IMD performance versus input-signal level, and Figure 8 shows its calculated third-order input and output intercept points. These results duplicate the measured and published performance of this well-characterized circuit.

Simulating an Oscillator

It's hard for me to decide which of *Serenade SV*'s simulation capabilities excites me the most as an Amateur Radio experimenter, but if I had to, I'd say "oscillator analysis"—not only because the study of oscillators can be a pursuit in itself, but because oscillators are as temperamental and mysterious as they are essential.[8]

To explore *Serenade SV*'s oscillator analysis capability, we'll simulate the behavior of a Hartley crystal oscillator long familiar to Amateur Radio builders.[9] Figures 9 and 10 show how it looks in *Serenade SV*'s schematic editor. But will

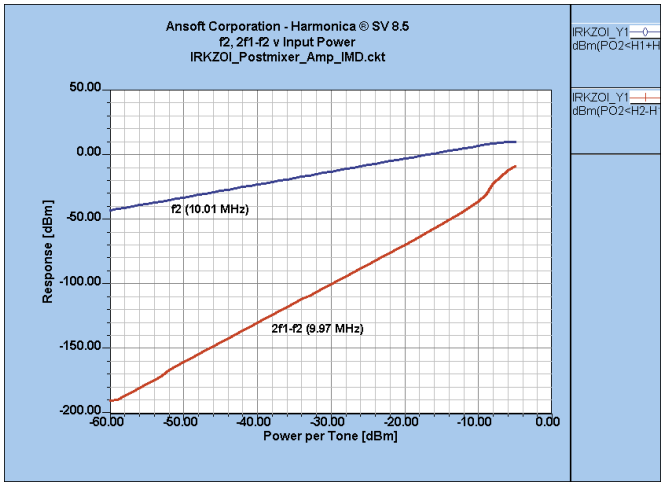


Figure 7—*Serenade SV*'s prediction of the amplifier's behavior in the presence of two equal-amplitude test signals that are increased from -60 to -5 dBm in 1-dB steps. The blue trace shows the output that results from the amplifier's linear amplification of one of the tones; the red trace shows one of the outputs that results as the tones *intermodulate* as a result of nonlinearities in the amplifier. The point at which these responses would meet if extrapolated—the *third-order intercept point* (IP_3)—is a figure of merit of high interest to radio designers. Although we could determine IP_3 by printing out the graph and cutting loose with a pen and ruler, Figure 8 shows how *Serenade SV* can do it for you.

IP3in, IP3out at -40 dBm Per Tone

	1
Power [dBm]	-40.00
(3*(dBm(PO2<H1+H0>))-dBm(PO2<H2-H1>))/2-dB(TG21<H1+H0,H1+H0>)	13.39
(3*(dBm(PO2<H1+H0>))-dBm(PO2<H2-H1>))/2	30.51

Figure 8—Telling *Serenade SV* to calculate the amplifier's IP_3 is straightforward: We just enter the appropriate formulas into *Serenade*'s Report Editor, select an input-signal level (–40 dBm in this case), and let the reporter crunch the numbers. Hayward and Lawson reported an output IP_3 of "approximately +30 dBm" for the circuit; *Serenade SV* predicts +30.5 dBm—close agreement with the measured value. A circuit's input and output IPs differ by its gain—in this case, 17.12 dB.

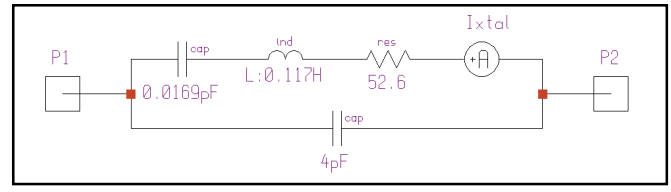


Figure 10—We model the crystal with series-connected capacitor, inductor and resistor elements, specifying a resistance that equates to a crystal *Q* of 50,000 at 3.579 MHz. The 4-pF capacitor models the capacitance between the crystal's electrodes; the current probe element (Ixtal) lets us examine the crystal's drive level, as we'll soon see.

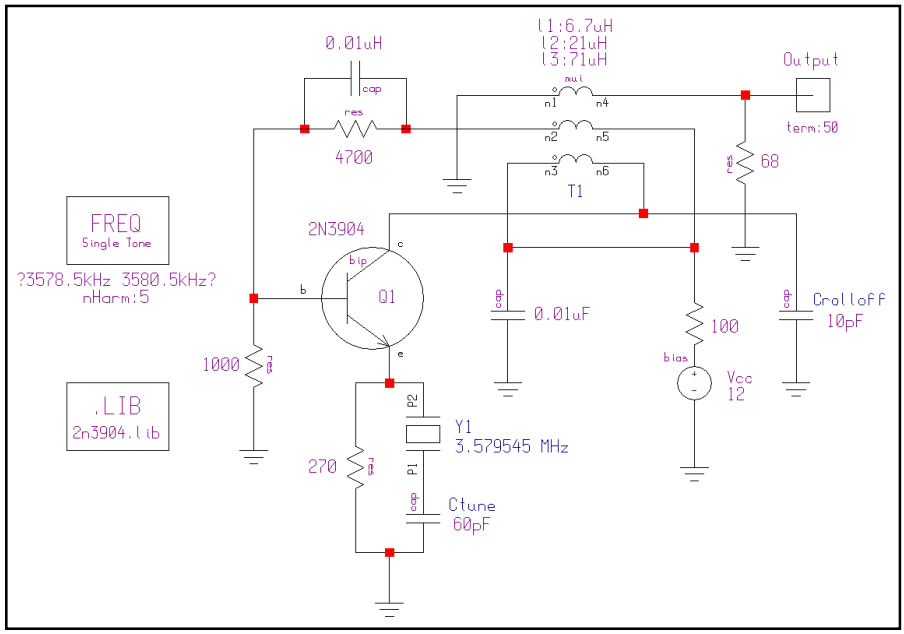


Figure 9—Our example oscillator uses the Hartley configuration, in which the positive feedback necessary for oscillation is achieved via a tapped transformer, T1. In a classical Hartley, capacitance would resonate T1 to set the frequency of oscillation; in this version, the transformer is untuned, and the selectivity contributed by a piezoelectric crystal, Y1, in the feedback path (from the tap through Y1 and "ground" to the transistor emitter) determines the oscillation frequency. The 10-pF capacitor, $C_{rolloff}$, encourages oscillation at the crystal's fundamental series resonance (rather than at an overtone) by reducing the circuit's gain with increasing frequency. The crystal symbol represents a subcircuit (Figure 10) that models the crystal's fundamental resonance at 3.579 MHz. (Because our crystal subcircuit doesn't model overtone responses, we really don't need $C_{rolloff}$ to avoid overtone oscillation, but I've kept it in the circuit to model its effect on the oscillator's frequency and power output.) Adding a 60-pF capacitor (C_{tune}) in series with the crystal lets us use *Serenade SV*'s Tune feature to evaluate the circuit's ability to function as a variable crystal oscillator (VXO). Practical versions of this circuit often include a resistor across the OUTPUT port (68 Ω in this case) to ensure that a low-impedance load is always present; the increased feedback that results from light loading can instantly destroy the crystal. (The 2N3904 *SPICE* parameters I used were published on the Internet by Fairchild Semiconductor.[10])

it oscillate? Instead of just starting an oscillator analysis and crossing our fingers, we can use *Serenade*'s Oscillator Design Aid to confirm that the circuit is ready to go (Figure 11). In seconds, Oscillator Design Aid confirms that we're in business: Conditions suitable for oscillation exist at 3579.6 kHz.

Figure 12 shows the circuit's output spectrum. At just below 9 dBm, its fundamental output power is right in the zone for properly driving a "level 7" (7 dBm local oscillator) diode double-balanced mixer (DBM).

How Hard Are We Hitting the Crystal?

In *Introduction to Radio Frequency Design*, Wes Hayward writes,

> Quartz crystals must operate with a limited amount of drive energy. One milliwatt is a typical upper limit. This is essentially the maximum power to be dissipated in the series resistance, R_S.

Wes goes on to describe a crystal-drive measurement method that involves connecting a current transformer in series with one of the crystal's leads. This is a bit different from measuring the current through R_S proper in that current passing through the crystal's parallel (holder) capacitance will also factor into the measurement. In our modeled crystal, built with discrete components, we can look at the current through only the series-resonant portion of the crystal with the

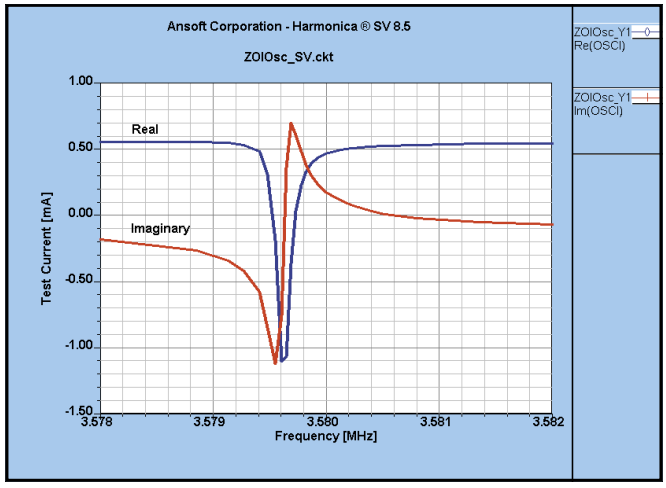


Figure 11—*Serenade SV*'s Oscillator Design Aid probes the circuit under test with a test signal to determine if the conditions for oscillator are present within the analysis frequency range. After concluding its search, the Design Aid graphs the real and imaginary components of its test-signal current to help you confirm the circuit's readiness to oscillate. Conditions favorable for oscillation exist wherever the test signal's real component (blue trace) is negative and its imaginary component (red trace) equals zero—in this case, at 3579.6 kHz.

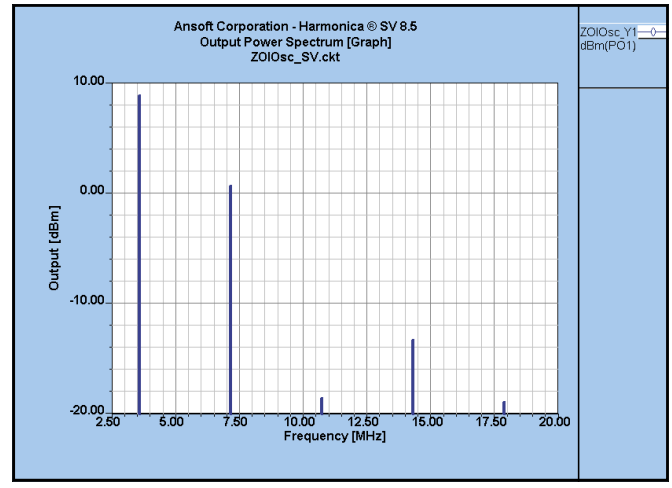


Figure 12—The crystal oscillator's output spectrum as simulated by *Serenade SV*. The power of the fundamental is just what we expect from this circuit operating at this collector voltage.

help of a S*erenade SV* current probe. We obtain the numbers we're after by using *SV's* Report Editor to generate a table showing the RMS value of the probe's time-domain output and that RMS output, squared, multiplied by the crystal's series resistance, as in $P = I^2R$. Figure 13 shows the results: The current through R_S is 6.36 mA, which equates to a crystal dissipation of 2.1 mW. If our crystal is rated for 1 mW of drive, we're hitting it too hard.

The Oscillator as a VXO

What happens when we use the Figure 9 oscillator as a VXO by varying C_{tune}, the 60-pF capacitor in series with the crystal? To explore this, I used *Serenade SV*'s Tune capability to adjust C_{tune}'s value from 10 to 60 pF in 5-pF steps. Figure 14 shows the result: Decreasing C_{tune} to 10 pF results in a frequency increase of about 1.7 kHz and an output-power decrease of about 1.5 dB. It's also apparent that the rate of frequency and power shift per unit of C_{tune} capacitance change is nonlinear.

Simulating a Mixer

Radiocommunication couldn't happen if we couldn't translate information into radio form and back again. We use mixers, modulators and demodulators to do that job—a function so important that the *ARRL Handbook* devotes an entire chapter to it.[11] *Serenade SV*'s ability to handle two input signals—two *tones*—and up to four nonlinear device ports provides sufficient horsepower for the realistic analysis of mixers based on one or two transistors or up to four diodes. This lets us simulate the performance of the four-diode DBMs so many of us have used for frequency conversion in our home-built projects.

Figure 15 shows the schematic of our example mixer: a DBM that converts a 903-MHz signal to 51 MHz with the help of a 954-MHz local-oscillator signal. Although the device libraries that ship with *Serenade SV* include suitable diodes, I wanted to demonstrate (again) that manufacturer-supplied *SPICE* parameters play well in *Serenade*, so I used SMS1546 parameters from Alpha Industries.[12] Figure 16 shows *Serenade SV*'s simulation of the circuit's output spectrum. Because we're often interested in how well a mixer suppresses leakage of its (relatively strong) LO signal into its IF port, I configured another analysis to simulate this behavior. Figure 17 shows the results, including the calculated return loss of the circuit's LO and RF ports.

Simulating a BPSK Communication System

To illustrate *Serenade SV*'s system-simulation abilities, we'll examine the bit error rate of a binary phase-shift keying communication link in the presence of noise (Figure 18). A BPSK communication system applies the absence or presence of a 180° phase shift (relative to the phase of the unphase-shifted state) to transmit logical *1*s and *0*s. One of the methods we use to assess the noise performance of a digital transmission system is known as the *probability of bit error* or *bit error rate* (BER). We measure a system's BER by comparing the ideal transmitted signal with the received signal and computing the error count over the total number of bits. A variety of techniques can be used to decrease a communication system's BER. One technique involves adding redundant data bits to the transmitted data bits, and, in some cases scrambling the order of the original data bits. There are many ways of achieving this; our example system uses convolutional encoding. To evaluate the effectiveness of the coding scheme, we'll simulate the link with and without coding and compare the results in one graph.

The data generation sections of the coded and uncoded links appear at the left in Figure 18. Both begin with a random binary generator (BSRC); in the uncoded link, the BSRC output goes directly to the modulator (PSKMOD). In the coded link, the output of the BSRC feeds a real multiplexer (RMUX), which also receives input from a binary bit generator (BGEN). The real multiplexer switches between the initialization bits and the data bits during each data frame. The multiplexer drives the convolutional coder (CCOD), which is followed by a real demultiplexer (RDMUX), and a phase shift-keying modulator (PSKMOD). The BSRC generates 22800 data bits (57 bits/frame), and the binary generator generates four zeros

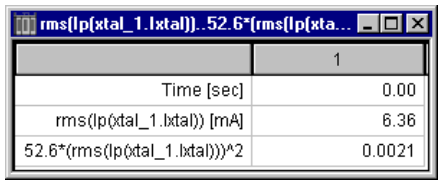


Figure 13—To determine the crystal's drive level, I told *Serenade SV*'s Report Editor to show me the RMS value of the current detected by the Ixtal probe. *SV*'s Report Editor supports manual entry of custom data expressions and equations, so calculating the power dissipated in the crystal's series resistance was just a few more keystrokes away. Calculated as described by Hayward in *Introduction to Radio Frequency Design*, our crystal's dissipation is 2.1 mW.

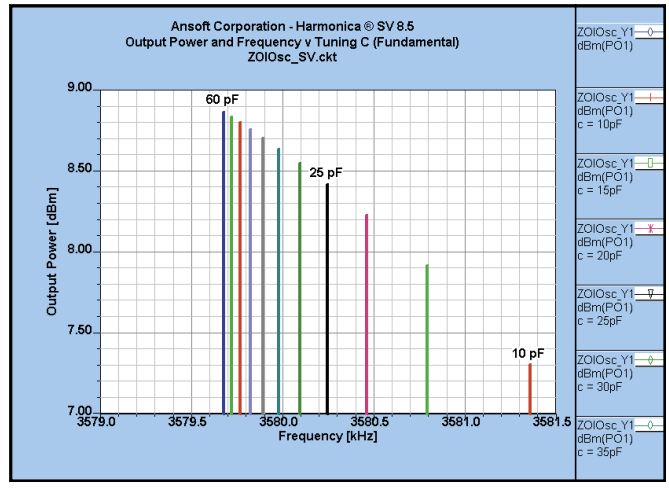


Figure 14—Using *Serenade SV*'s Tune capability to vary the C_{tune}, we discover that we're not getting something for nothing when we use this circuit as a VXO: The oscillator's output power varies as we adjust C_{tune}, and the resulting tuning characteristic is significantly nonlinear.

during each frame to initialize the convolutional coder.

For each bit going in, the convolutional coder outputs 2 bits (n=2). The coded data then goes through a real demultiplexer that discards the 8 initialization bits. The coded data bits are then fed to the PSK modulator. The signal space of the PSK modulator is specified as m=2 to correspond to a BPSK modulator. The modulator then maps each integer input sample into a real and imaginary value. Note that the real multiplexer, demultiplexer and convolutional coder are needed only for coded link model. The transmission rate for both links is 13.5 kbits/s; the difference between them is that the uncoded link transmits raw data and the coded link transmits data that has been systematically modified to reduce the BER-spoiling effects of noise in the communication channel, which is simulated by an additive white Gaussian noise (AWGN) circuit element.

Our *Symphony SV* simulation measures the system's BER for swept values of AWGN signal-to-noise ratio (SNR), which is referred to the signal input power (30 dBm). The two signal probes at the input and the output of the AWGN element allow us to monitor the effect of the channel on the signal (Figure 19).

At the receiving end of both channels, a PSK demodulator (PSKDEM) first maps each received pair of samples back to 0 or 1. The signal space for the PSK demodulator is specified as 2 to simulate a BPSK demodulator. No further processing occurs in the uncoded channel; for the uncoded channel, demodulator output passes through a Viterbi decoder (VDHD) for data recovery. The Viterbi decoder uses the same constraint length and number of input and output bits as those specified for the convolutional coder.

Figure 20 compares the bit error rates achieved by the coded and uncoded systems. The coded system clearly outperforms the uncoded system; the coding helps the receiver do a better job of determining the bits actually transmitted.

Your Turn

Serenade SV represents a powerful expansion of the suite of RF CAD tools available to students of electronics and RF, and lets you experience world-class RF circuit and system simulation for the cost of an Internet download. Whether you're following your own design pursuits (*psst*: The entire Tuna Tin 2 transmitter fits inside *SV*'s 25-component limit) or teaching an RF-design class (now your students can do RF-CAD labs on their laptops) I hope you'll share my

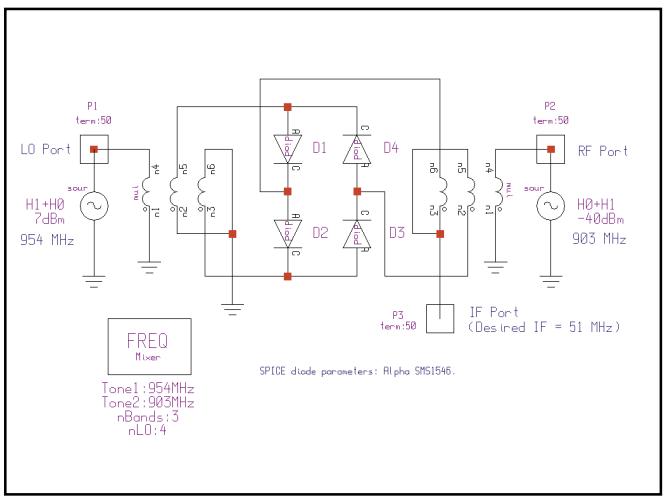


Figure 15—A diode double-balanced mixer in *Serenade SV*. To simulate the less-than-perfect balance of a real mixer, I varied some of the transformers' winding inductances slightly so they're not all identical; to model the diodes, I used parameters published on the Internet by Alpha Industries.

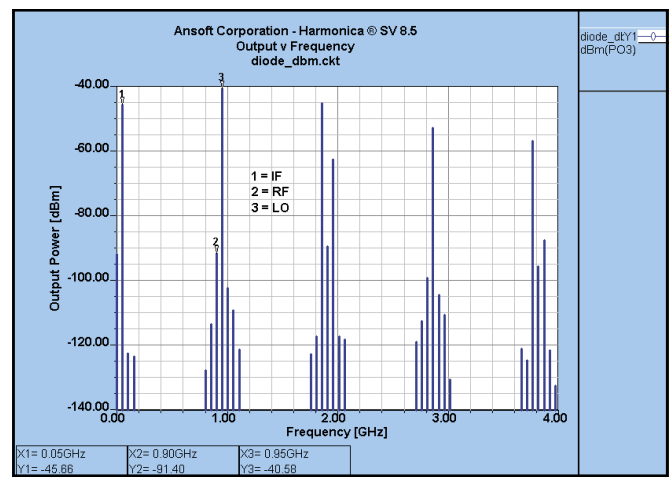


Figure 16—*Serenade SV*'s analysis of the diode DBM confirms what we know about how such a mixer circuit should behave: There should be about 6 dB of loss between the RF and IF ports (we get 5.66 dB) and the LO signal should be highly attenuated at the IF port (this mixer knocks it down by 47 dB). I used the Report Editor's Data Marker function to create those frequency/level markers automatically.

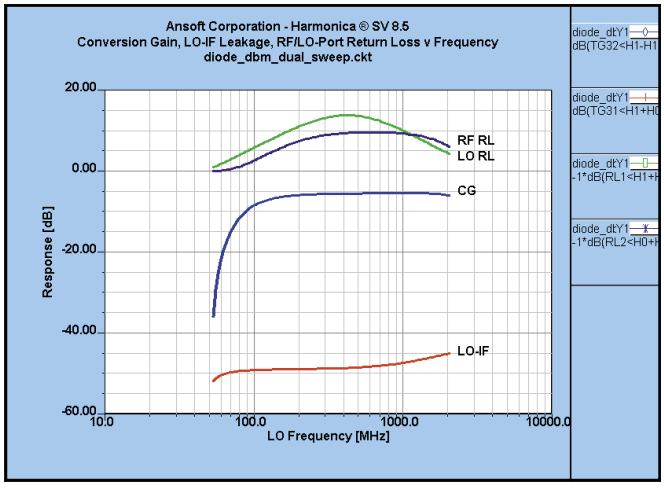


Figure 17—Sweeping the mixer's RF and LO signals with a constant 51-MHz difference lets us evaluate how the circuit's conversion gain and LO-to-IF leakage vary with frequency. As a bonus, I've also plotted the LO and RF ports' return loss (RL), which indicates how well (or how poorly) their impedances approximate 50 Ω. (Generally, we'd like to see an RL of 15 dB or more before calling it "good.")

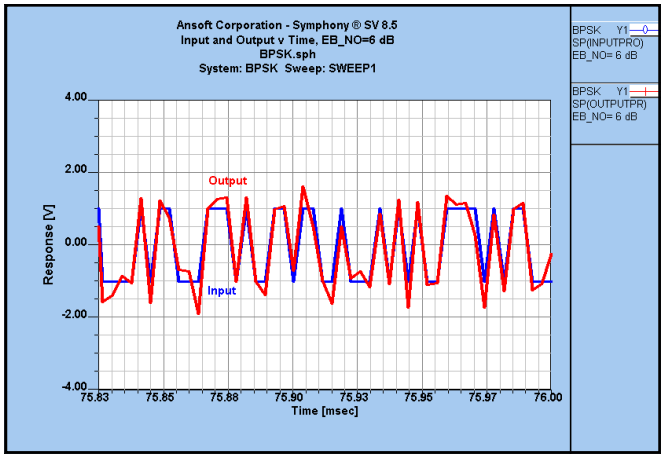


Figure 19—The probes at the input and output of the simulated AWGN communication channel allow us to evaluate the effect of noise on the transmitted signal.

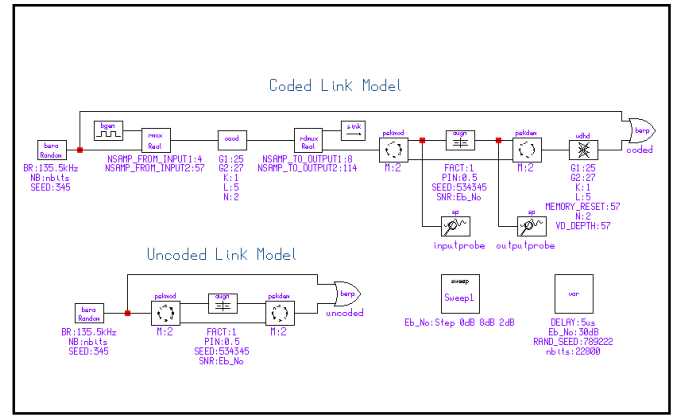


Figure 18—A BPSK system schematic in *Serenade SV*.

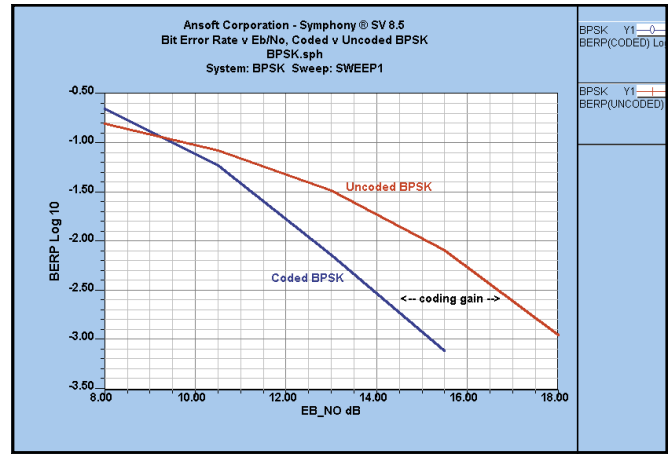


Figure 20—Graphing the bit error rates of both systems shows the *coding gain* achieved by the coded link: The uncoded system generally requires a higher signal-to-noise ratio (SNR) to achieve a given SNR. It's also apparent that the coding gain is greater for higher SNRs. (EB_NO is the *Symphony SV* Report Editor's designation for a digital system's signal-to-noise ratio, which is expressed as energy per bit [E_b] versus noise power spectral density [N_0], or E_b/N_0.)

excitement about *Serenade SV*.

Notes

[1]L. B. Cebik, W4RNL, "A Beginner's Guide to Modeling with *NEC*," Part 1, *QST*, November 2000, pp. 34-38; Part 2, *QST*, December 2000, pp 40-44; Part 3, *QST*, January 2001; Part 4, *QST*, February 2001.

[2]**www.ansoft.com**

[3]*S* parameters are a suite of standardized circuit evaluation criteria used for decades by the RF design community. See "Just What is an *S*-Parameter?" by H. Paul Shuch, N6TX, on pp 6-20 and 6-21 of *The ARRL UHF/Microwave Experimenter's Manual* (Newington: ARRL, 1986).

[4]You can download *Serenade SV* and read its full specifications via the pages that begin at **www.ansoft.com/about/academics/sersv/index.cfm**. The Serenade SV circuits covered in this article are available in SerSV0101.ZIP on the ARRLWeb at **www.arrl.org/files/qst-binaries/**.

[5]David Newkirk, WJ1Z, "Modeling a Direct-Conversion Receiver's Audio Response and Gain with *ARRL Radio Designer*, Exploring RF, *QST*, March 1995, pp 76-78.

[6]Wes Hayward, W7ZOI, and John Lawson, K5IRK, "A Progressive Communications Receiver," *QST*, November 1981, pp 11-21.

[7]**www.mot-sps.com/rf/models/rf3.html**

[8]Larry Wolfgang, WR1B, editor, *The ARRL Handbook for Radio Amateurs*, Chapter 14: AC/RF Sources (Oscillators and Synthesizers).

[9]Wes Hayward, W7ZOI, *Introduction to Radio Frequency Design* (Newington: ARRL, 1994), p 289.

[10]**www.fairchildsemi.com/models/Discretes/bipolar.html**

[11]Larry Wolfgang, WR1B, editor, *The ARRL Handbook for Amateurs* (Newington: ARRL, 2000), Chapter 15: Mixers, Modulators and Demodulators.

[12]**www.alphaind.com**

David Newkirk has been licensed since 1969, worked at ARRL HQ for more than 10 years, and now works as a technical writer for Ansoft Corporation, the home of Serenade SV. *With Ulrich L. Rhode, KA2WEU, he co-authored* RF/Microwave Circuit Design for Wireless Applications *published by John Wiley & Sons last year. You can e-mail him at* **dnewkirk@ansoft.com**.

By L. B. Cebik, W4RNL

A Beginner's Guide to Modeling With NEC

Part 3—Sources, grounds and sweeps

Once we progress beyond the construction of models and the interpretation of plot patterns, our next set of quandaries revolves around obtaining the best possible results from *NEC* modeling. This month we'll work with three clusters of ideas: the placement of sources, the selection of a ground—including making ground-plane radials—and using frequency sweeps productively. My selection of topics stems from the number of questions I receive from new modelers. These notes will not answer all of them, but perhaps they will promote some useful ways of thinking about sources, grounds, and sweeps in models. As always, we'll stick to *NEC-2*, using both *EZNEC* and *NEC-Win Plus* as our sample programs.

Sources: Where and Why?

Finding the source impedance of an antenna is vital. It gives us a good idea of whether to lengthen or shorten an element if we are aiming for resonance or for a specific reactance needed for a matching network. In nonresonant antennas, the source impedance, when combined with the transmission line we propose to use, can tell us something about the conditions our antenna tuners might see at their terminals.[1]

All of the examples in the preceding installments used a single source or feedpoint located at the center of the driven element. Hence, we needed only to use an odd number of segments on the wire containing the source and specify either the 50% mark or the number of the center segment as the source position. Life was easy, as shown by the "Source 1" designations in Figure 1.

However, not all antennas use a center feedpoint, as evidenced by the entire collection of antennas that we call "OCFs" or off-center-feedpoint antennas. Many of these antennas call for a specific distance either from the wire end or from the antenna center for the source position. As the upper portion of Figure 1 shows, if we use only the minimum number of segments per half wavelength for our wire, we do not stand a chance of placing the source close to the desired position.

The solution is simple: use many segments. It is not unreasonable or problematical to use 101 segments for a model of an OCF antenna that is a half-wavelength long. Suppose that a certain OCF design calls for a feedpoint position that is 14% of the distance from the center outward toward the end of the antenna. This is 86% of the distance from the end of the antenna to the center or 43% of the total distance from one end of the wire to the other. If we specify 101 total segments and place the source on segment 44, it will be 43.1% of the distance from the left end of the wire.

Having enough segments in a model to make fine movements of the source position can come in handy. Suppose that

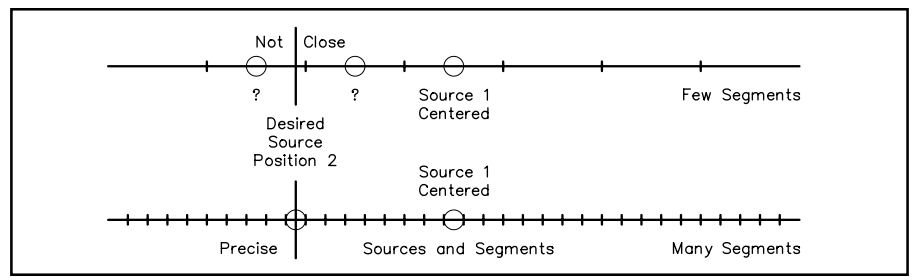


Figure 1—A comparison of low-segment density and high segment density with respect to precisely locating a desired source position.

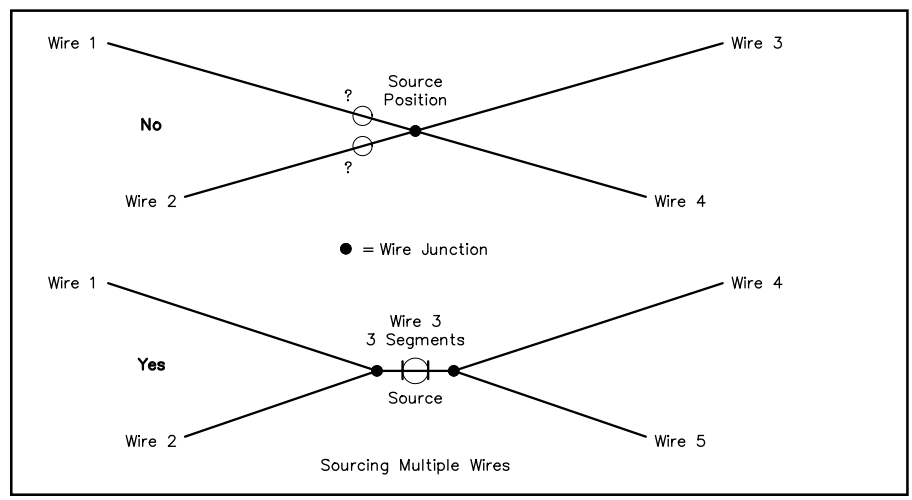


Figure 2—Incorrect and correct ways to model multiple elements with a common feedpoint, using a combined 20-meter and 15-meter dipole.

[1]Notes appear on page 48.

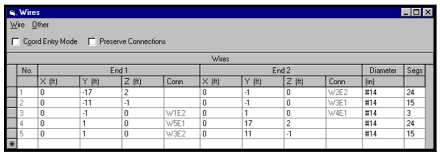


Figure 3—The *EZNEC* wires page for the correct model of the 20-meter and 15-meter combined dipole antenna.

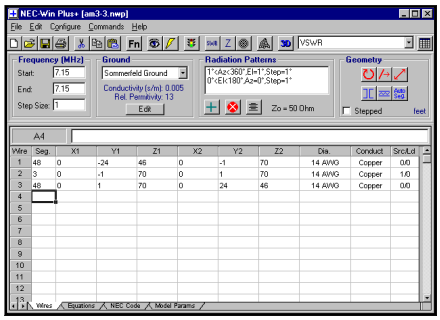


Figure 5—The *NEC-Win Plus* wires page for the 3-wire version of the inverted V.

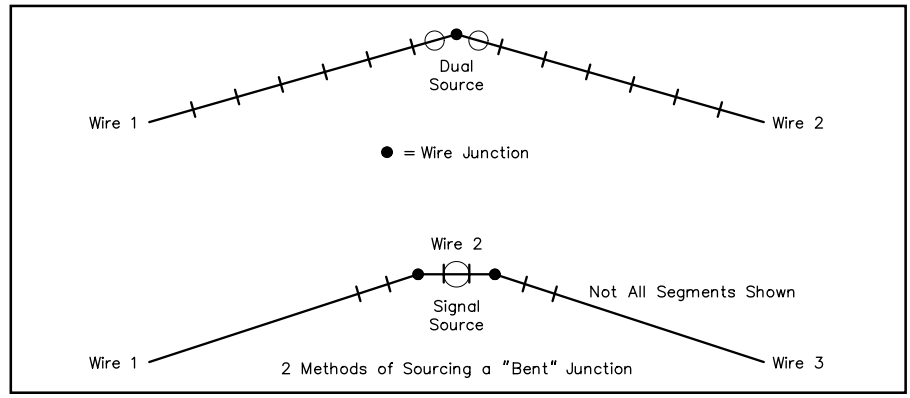


Figure 4—Two methods of modeling an inverted V (and similar elements) in order to obtain a correct source impedance value.

Table 1

Source Impedance Values for Crossing Dipoles Using an Over-Simplified Model and a Model With a Common Center Wire.

Source Placement:	14.175 MHz Impedance R +/– *j*X Ω	21.225 MHz Impedance R +/– *j*X Ω
Simple Crossed Wire Model		
On 20-meter wire	98.9 + *j*18.5	151.4 + *j*268.0
On 15-meter wire	16.8 – *j*346.1	35.9 – *j*102.7
Central Source Wire Model		
Centered on common wire	57.8 + *j*45.9	111.5 – *j*780.2

we are looking for the point along the wire that yields an impedance closest to 300 Ω. As we move out from the center point, we'll discover that the rate of change of source impedance per segment becomes ever greater. However, with enough segments, we can pinpoint quite closely the 300-Ω feedpoint impedance position.

Antennas very often are not quite so electrically simple as they seem to be from their physical appearance. One common type of antenna combines dipoles for two different band with a common feedpoint, for example 20 and 15 meters. The quick way of picturing this kind of antenna appears in the top sketch in Figure 2. We bring 4 wires together and join them at the center. Now we have the significant question: where do we place the source? We have essentially 2 choices: on the first segment adjacent to the junction on the 20-meter wire or on the corresponding position on the 15-meter wire. Table 1 gives us the source impedance values that we get for 14.175 MHz and for 21.225 MHz for each position for the model.

Which set of values is close to correct? We can't tell. In fact, neither set is accurate. Let's reform the model to match the bottom part of Figure 2. We'll bring the left ends of the 20-meter and the 15-meter elements to a common point that is shy of center. Then, we'll create a short, 3-segment wire that is centered. The right sides of each band's element moves from the junction point on the right of the center wire outward toward the ends. Figure 3 shows the model on the *EZNEC* Wires page.

The reason that the center wire (#3) has 3 segments is that we should always keep the current levels on either side of a source segment as equal as possible. The 3-segment source wire provides a simple solution to this need. Since the source wire is 2 feet long, each segment is about 8 inches long. The remainders of the element wires use lengths approximately equivalent to this value. With these precautions, we can now find the source impedances for the two frequencies on which the antenna operates. As Table 1 shows, the 20-meter wires are just a bit long, but the 15-meter wires are well short of resonant length. Try revising the end values for the 20-meter element to 16.0 and for the 15-meter element to 12.45 (both in feet, of course). Note how changes in the 20-meter wire lengths create large changes in the 15-meter source impedance, while changes in the 15-meter wires have smaller effects on the 20-meter source impedance.

Another common antenna, the inverted **V**, lets us demonstrate that sometimes we can use more than one sourcing technique to arrive at the same goal. Figure 4 shows two ways to model an inverted **V**—and by extension, any other antenna where single elements approach the feedpoint at an angle other than 180-degrees. The top version of the **V** shows the use of a dual source on the segments immediately adjacent to the junction. (Note that this example differs from the preceding one by using only a single element for one band.) Since the source impedance changes very slowly in the center area of a resonant $^1/_2$-wavelength antenna, the two sources together will closely approximate the source impedance at the exact center. For example, *NEC-Win Plus* reads each of the two values as 22.1 – *j*8.1 Ω. The actual source impedance is the sum of the two, adding the resistance and reactance separately: 44.2 – 16.2 Ω. (*EZNEC* has a "split" source option that automatically places the second source on the adjacent segment and which also does the addition for us: the result for the same model is a source impedance of 44.3 – *j*16.5 Ω.)

Alternatively, we can use the short 3-segment source wire technique so that we can place a single source. The bottom of Figure 4 shows the principle, which adds one wire to the model. Figure 5 gives us the NEC-Win Plus wires page, which also shows that once more, we have kept the segment length in the sloping wires about the same as in the center source wire. The impedance numbers yielded by this model are 44.2 + *j*3.6 Ω. The very slight difference in reactance is a result of our having added a tiny amount to the overall length of the wire by adding the source wire.

These sourcing techniques should let us handle with ease most of the antenna geometries that we might encounter.[2] So let our eyes drop to the ground for a while.

Grounds and Ground Planes

We have noted two of the types of ground permitted with *NEC* in past episodes: free-space (also referred to as "no ground") and the Sommerfeld-Norton high accuracy ground. Free-space, of course, eliminates the reflecting surface

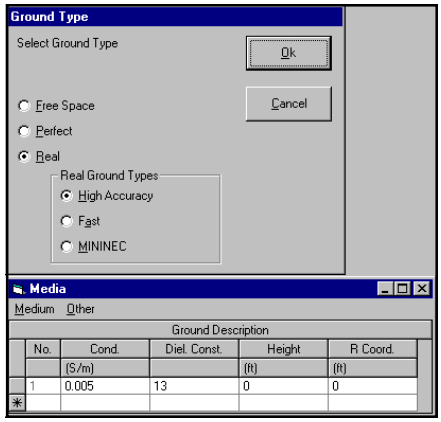


Figure 6—The *EZNEC Windows* boxes for selecting the ground type and for supplying the values for the conductivity and the dielectric constant.

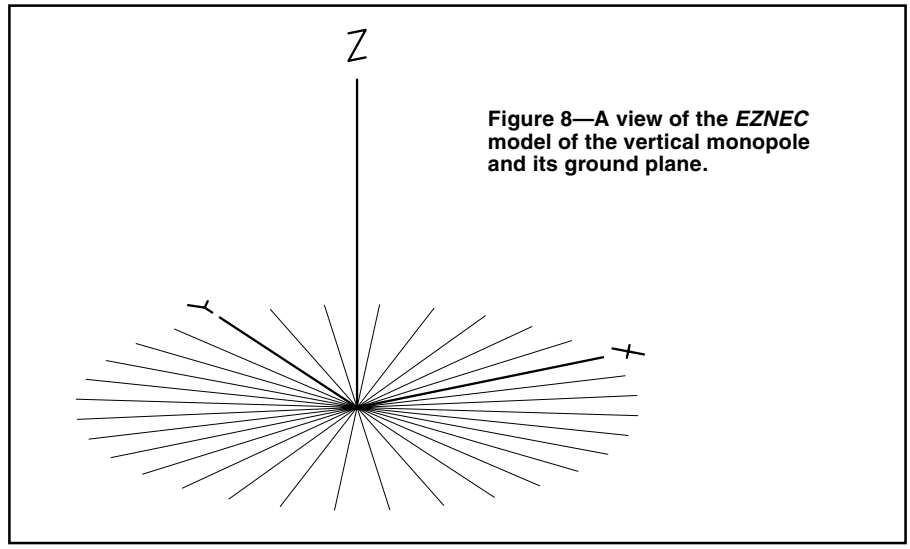


Figure 8—A view of the *EZNEC* model of the vertical monopole and its ground plane.

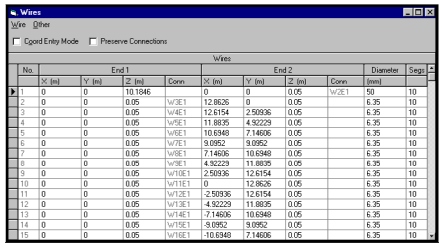


Figure 7—A partial *EZNEC* wires page for a 40-meter vertical monopole with a 32-element ground plane system.

Table 2

Commonly Used Soil Quality Designations and their Corresponding Values of Conductivity and Permittivity

Type	*Conductivity (Siemens/meter)*	*Permittivity (dielectric constant)*
Very Poor	0.001	5
Poor	0.002	12
Average/Good	0.005	13
Very Good	0.0303	20
Salt Water	5.0	81

that we call ground so that antennas have a limitless sphere for their expanding radiation patterns.

Actually, *NEC* provides 3 types of ground, shown in Figure 6, the *EZNEC* boxes for both ground type and value. "Perfect" ground is sometimes useful for preliminary modeling of vertical antennas that touch the ground—akin to using free space for highly elevated antennas. The "real" ground possibilities include the fast or "reflection-coefficient" ground—which is inaccurate below about 0.1 wavelength antenna height—and the preferred Sommerfeld-Norton ground, which is accurate down to about 0.001 wavelength of antenna element height. (*EZNEC* provides the NEC-user with the *MININEC* ground system, but it has limited use for most modelers.) Modern fast computers let us zero in on the high accuracy ground for all of our work that places the antenna over earth.

Since all of our models so far have been horizontal, we have simply used the program default "average" ground values. However, as modeling becomes more serious or if we have a vertical antenna, it becomes increasingly important to select ground values that most closely approximate the conditions for the antenna we propose to build. Table 2 provides a short list of commonly used values, and a listing in *The ARRL Antenna Book* supplies many more.[3] However, looking up local values or testing one's own ground is always more precise than a table of general values. For most hams, measuring conductivity is usually more feasible than measuring the soil dielectric constant.

The two numbers—conductivity in Siemens per meter and the relative dielectric constant (permittivity—no units)—together combine in engineering equations for the calculation of the effects of ground on antenna radiation, both in terms of reflections and of losses. However, *NEC* ground calculations presume a uniform soil beneath the antenna. At lower HF frequencies and below, the stratified nature of the soil beneath the antenna and its more distant area where the fields are reflected may play a role in advanced modeling. For the beginner, selecting one of the standard categories usually suffices for reasonable accuracy.

There is a second type of ground important to modelers, the radial ground plane we establish beneath our vertical antennas. Although we commonly place the radial wires either directly on the ground or slightly beneath the surface, *NEC* cannot model any wire on or under the ground. However, for a close approximation of ground plane action, we can construct a model of a radial system very close to the ground. The normal limit of close approach is about 0.001 wavelength, which amounts to under 2 inches at 40 meters. Some modelers have successfully experimented with ground planes as low as 0.0001 wavelength above the surface, although in every case, we must allow for the radius of the ground plane wire. The surface of the wire should not touch the ground.

Fortunately, both *EZNEC* and *NEC-Win Plus* include automated radial makers. We need only specify the center point, the number of radials, the number of segments per wire, and the wire diameter. (Some programs require that you set up the first radial and then the others become copies spaced the correct number of degrees apart.)

Figure 7 shows the first 14 radials (plus the vertical 40-meter antenna) of a 32-radial system. We could, of course, calculate the end coordinates of each radial with a little sine and cosine work from trigonometry, but the automated radial maker is much faster. In general, one should limit the number of junctions at a single point to about 30, since *NEC* can become less accurate as the angle between wires at a junction becomes too small. However, the rate of error increase is small and *NEC* appears to handle 32-radial systems with ease.

The radials in Figure 7 are dimensioned in meters (with the wire size in millimeters). The height of the radial sys-

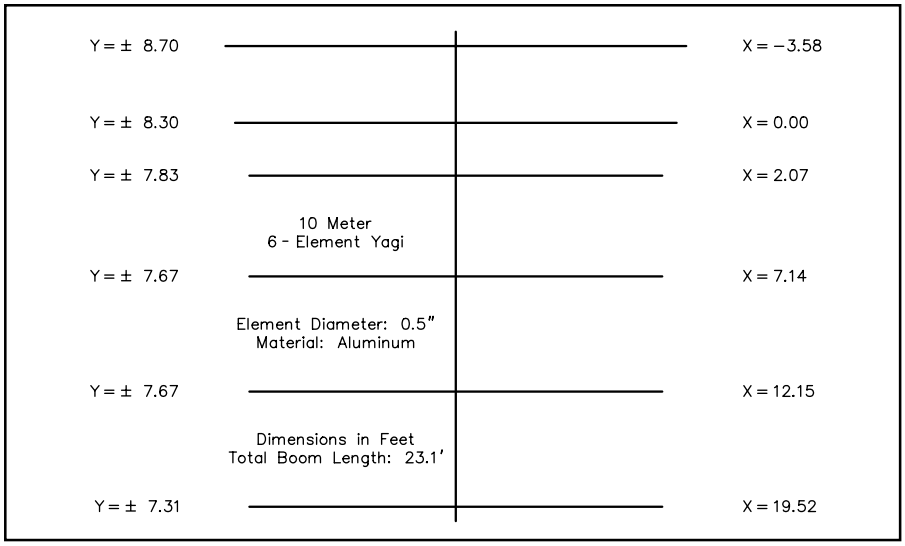


Figure 9—An outline sketch of a 6-element Yagi used in the frequency sweep exercise.

Table 3

A Summary Table of Modeling Results from a 28 to 29 MHz Frequency Sweep of a 6-Element Yagi *NEC* Model

Frequency (MHz)	*Gain (dBi)*	*Front-to-Back Ratio(dB)*	*Source Impedance*	*50-Ω VSWR*
28.0	9.95	18.4	33 – *j* 6	1.54
28.1	9.98	19.9	35 – *j* 4	1.44
28.2	10.01	21.4	37 – *j* 2	1.36
28.3	10.04	22.9	39 – *j* 0	1.30
28.4	10.08	24.5	40 + *j* 2	1.25
28.5	10.11	25.8	42 + *j* 3	1.22
28.6	10.14	26.4	43 + *j* 5	1.19
28.7	10.16	26.1	45 + *j* 6	1.18
28.8	10.19	25.2	46 + *j* 6	1.17
28.9	10.21	23.9	48 + *j* 7	1.15
29.0	10.22	22.7	49 + *j* 6	1.13

tem is 0.05 m or 50 mm, which is just under 2 inches. I have used these dimensions as an alert: you will undoubtedly encounter models in both metric and in English units, so gaining some facility in translating between the two systems is very useful to every modeler.

Figure 8 is a view of the overall antenna model, showing the 1/4-wavelength vertical element along the Z-axis together with all 32 1/4-wavelength radials. Each wire has 10 segments, with the source segment being the lowest one on the antenna wire. The model's 330 total segments may seem large, but on modern PCs, the run time is quite fast. If your program permits the model size, you might wish to increase the number of segments per wire by a factor of 1.5 to 2. The resulting model would place the source a bit closer to the radial junction to improve the precision of the output.

We have chosen a complex radial system as our example, although much modeling will be done with simpler systems. Many upper HF models will use as few as 4 radials elevated far above ground. However, once you master the radial-maker in your program, as well as the limiting conditions that we have noted, then no radial system will be too complex to model.

Frequency Sweeps: Why and How?

One of the initial tendencies of most modelers is to model for perfection at a specific design frequency. For example, if we model a Yagi, we try to arrive at the maximum possible gain, the highest front-to-back ratio and resonance—all on one frequency. We then sometimes mistakenly think that our work is done.

However, amateur antennas only rarely are used at a single frequency. Instead, we normally use them across a band of frequencies, such as all of 20 meters or the first MHz of 10 meters. The modeler's work is not complete until the antenna is checked and analyzed at reasonably close spot frequencies across the band of use. Fortunately, *NEC* is designed for "frequency sweeping."

How we sweep and what a sweep might tell us can be illustrated with a single model, shown in outline form in Figure 9.

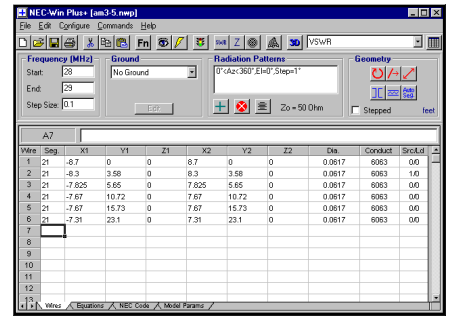


Figure 10—The *NEC-Win Plus* wires page showing the set-up of the 6-element Yagi model along with frequency sweep data.

The 6-element high performance Yagi looks more complex in the sketch than its models looks in Figure 10, a *NEC-Win Plus* main page. Here, we see all 6 elements, their diameter (in feet), their aluminum material, and the source located on the second or driven element. If we look to the top of the page, we see that the model will be run in free space, with only a simply azimuth pattern chosen. *NEC's* output tables will produce all data for each frequency swept, including the source impedance (and the program's calculation of the 50-Ω SWR), the currents on each element segment, and the radiation pattern values used in the output plot.

How we set up the sweep is shown in the upper left corner of Figure 10. We select a start and stop frequency, as well as an increment. In this case, we'll obtain all values for the range of 28 to 29 MHz at 0.1 MHz increments. (Interestingly, this system has resulted from user preference. Raw NEC actually specifies a start frequency, the number of steps to be swept, and the increment of increase for each step. Commercial implementations make the transition from user-input to NEC core invisible.)

If we run the sweep, then we can obtain a truly overwhelming volume of data. Most users reduce the volume to a set of select values. Most commonly gleaned are the gain, the 180° front-to-back ratio, the source impedance, and the SWR relative to a user-preset standard. Occasionally, we might add the –3 dB beamwidth to the collection, and sometimes the currents along the element may be important. However, in the beginning, the data in Table 3 will satisfy most requirements.

Note that in the table, I have recorded values in different levels of precision, some with more operational significance than others. For example, no one can tell the difference on the air between 9.95 and 9.98 dBi free-space gain. However, in making up tables from *NEC* output data, it is often useful to use the level of numerical precision that shows most clearly

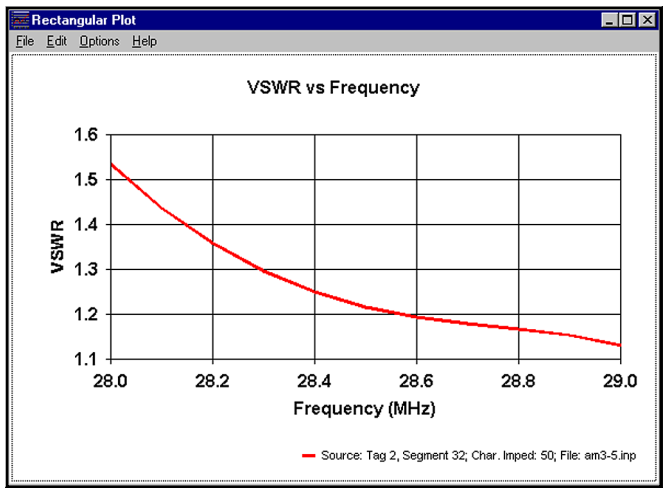


Figure 11—A *NEC-Win Plus* 50-Ω SWR plot from 28 to 29 MHz for the 6-element Yagi.

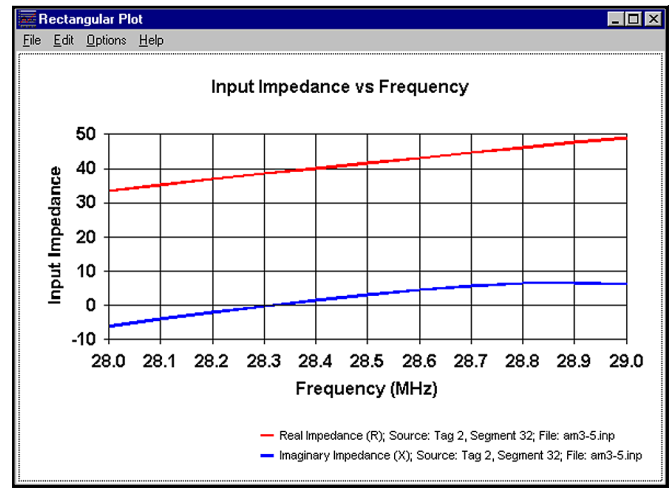


Figure 12—A *NEC-Win Plus* graph of the source resistance and reactance values from 28 to 29 MHz for the 6-element Yagi.

the trends in the figures. For the source impedance data, whole numbers are sufficient. For the front-to-back date, a single decimal place works well, while some of the gain trend might be lost if we used fewer than 2 decimal places. Use the level of precision that coincides with the task at hand. *NEC* will always supply more precision than we can ever use, and our performance requirements may be looser than those we may want to impose on the data for study purposes.

From the table, we can detect certain trends. For example, the peak front-to-back ratio occurs above the mid-band point of 28.5 MHz. (Very often, for the highest front-to-back ratio at the band edges, the peak value for a Yagi should be a little below the band center.) At the same time, the gain increases all across the band, but that is natural to Yagis having one or more directors.

Graphing some of the trends is useful, and some programs have built-in graphing facilities. Figure 11 shows the *NEC-Win Plus* 50-Ω SWR graph, which gives us the same data as Table 3. We begin to see that the peak front-to-back ratio at 28.6 MHz coincides with the fact that the minimum SWR occurs at the upper end of the design range for the model. The *NEC-Win Plus* graph of the source resistance and reactance adds further confirmation. The source resistance only approaches 50 Ω at the high end of the range, although reactance should not be a problem, since it peaks at 7 Ω and then descends again.

The picture we get from the frequency sweep is that our design work is not finished. For optimal operation of the antenna from 28 to 29 MHz, we would like to increase the element lengths just a bit to better center the maxima and peaks in the sweep table. Perhaps moving the peaks downward by about 0.2 MHz might give us a minimum of 10 dBi gain, a minimum front-to-back ratio of 20 dB across the band, and a peak 50-Ω SWR value of about 1.35:1.

The more you get into the habit of frequency sweeping your antenna models, the more insight you will gain into various designs. Trends in performance can be as important as peak performance data in telling us how antennas of various types do their work. Some sweeps may cover wide frequency ranges at greater intervals—for example, when checking the performance of a log periodic dipole array (LPDA) from 14 MHz through 30 MHz. Other sweeps may use very small intervals over restricted frequency ranges—for example, determining at what frequency (or frequencies) the 50-Ω SWR passes the 2:1 point for a 40-meter antenna and deriving from that an operating bandwidth.

In this part of our series, we have covered considerable ground: source placement, grounds and ground planes, and frequency sweeps. Part 4, will cover even more ground, as it corrals a number of topics: loads, transmission lines, model tests, and limitations of *NEC*. However, by the time the last installment appears, you may have already obtained a modeling program, read the manual, practiced a lot, and be way of ahead of me.

Notes

[1]The new *ARRL Antenna Book*, just released in its 19th edition, has an excellent program for using the source impedance along with most kinds of feed lines to show the impedance at the antenna tuner end of the line, whatever length of line we specify. Written by Dean Straw, N6BV, *TLW* also provides a wealth of other data for the antenna system builder.

[2]In our look at sources in this episode, we won't focus on whether we are using a voltage or a current source. However, we'll work though an exercise in the last episode of the series that will show at least one situation in which choosing one type of source over the other makes our work easier.

[3]See Chapter 3 of the 19th Edition of *The ARRL Antenna Book* for a good treatment of the effects of the earth on antennas, and especially pages 3-6 for a picture of ground values applicable to various parts of the US.

You can contact the author at 1434 High Mesa Dr, Knoxville, TN 37938-4443; **cebik@cebik.com**. QST

NEW PRODUCTS

RADIO-ELECTRONIC TRANSMISSION FUNDAMENTALS

◊ Noble Publishing has recently made available reprints of *Radio-Electronic Transmission Fundamentals, Second Edition*, by B. Whitfield Griffith, Jr.

Originally published in 1962—and now offered again for the first time since then—this classic textbook has been hailed by many for its clear and concise explanation of antennas, transmission lines and RF networks from the perspective of electromagnetic field theory.

Although some of the materials in this book have been superseded since its original date of publication, the straightforward discussion of the underlying principles, concepts and components still remains valuable.

The 648-page hardcover textbook is divided into four major sections covering electrical networks, transmission lines, antennas and transmitters. Chapters are kept short to facilitate its use as a reference tool. Knowledge of calculus is not presupposed.

Price, $75; ISBN 1-884932-13-4; order number NP-34. For additional information contact Noble Publishing Corp, 630 Pinnacle Court, Norcross, GA 30071; tel 770-449-6774; fax 770-448-2839; **orders@noblepub.com**; **www.noblepub.com**. QST

Next New Products

By Joe Carcia, NJ1Q

The 2001 W1AW HF Digital Run

Grab some software and participate in this fascinating on-air receiving test!

The ARRL is celebrating 2001 with a new on-air event featuring two new digital modes: PSK31 and MFSK16! On **January 13-14, 2001**, ARRL Headquarters station W1AW, in Newington, Connecticut, will use PSK31 and MFSK16 to send short bulletins on four HF bands (80, 30, 20 and 10 meters) at three different power levels. All you have to do is copy at least 75% of any of these transmissions to become eligible for a handsome certificate. This will be a test of your ability to receive these signals under varying conditions.

W1AW will initiate each transmission at a power level of 100 W. This transmission will run approximately 5 minutes. It will be followed by two additional transmissions at 10 W and 1 W. Because this event promotes the digital modes' ability to facilitate communications at low power levels, amateurs are encouraged to send in only those reports of the lowest power level received. See Table 1 for frequencies and times.

The MFSK16 runs will occur immediately after the PSK31 transmissions. The same schedule and power levels will be used. The difference will be in the bulletin information itself. At each power level and mode, a different bulletin will be sent.

Send Your Reports

To apply for the certificate, mail the received text (either as a printed screen-capture image, or in text form). No e-mails, please. Include a large, self-addressed-stamped envelope for the certificate. Indicate the lowest power level and mode received. Send your reports by **February 12, 2001** to:

W1AW HF Digital Run
225 Main St
Newington, CT 06111

The results will be published in a future issue of *QST*. Good luck!

Table 1
W1AW HF Digital Run Schedule

Note: All dates and times are UTC. Frequencies shown are plus or minus QRM.

Time	*Mode*	*Frequency (MHz)*	*Power (W)*	*Time*	*Mode*	*Frequency (MHz)*	*Power (W)*
January 13							
1500	PSK31	14.071	100	2100	PSK31	10.140	100
1506	PSK31	14.071	10	2106	PSK31	10.140	10
1512	PSK31	14.071	1	2112	PSK31	10.140	1
1518	MFSK16	14.080	100	2118	MFSK16	10.135	100
1524	MFSK16	14.080	10	2124	MFSK16	10.135	10
1530	MFSK16	14.080	1	2130	MFSK16	10.135	1
1600	PSK31	28.121	100	**January 14**			
1606	PSK31	28.121	10	0200	PSK31	3.580	100
1612	PSK31	28.121	1	0206	PSK31	3.580	10
				0212	PSK31	3.580	1
1618	MFSK16	28.130	100				
1624	MFSK16	28.130	10	0218	MFSK16	3.610	100
1630	MFSK16	28.130	1	0224	MFSK16	3.610	10
				0230	MFSK16	3.610	1

Setting up for MFSK16 and PSK31

To participate in the W1AW HF Digital Run, you'll need the following items:
1. An HF transceiver or receiver.
2. A sound-card-equipped computer. PC users will need a Pentium 100 or faster with *Windows 95*, *98* or *ME* to run the PSK31 or MFSK16 software. Mac users will require PowerPCs. All computers must have 16-bit Soundblaster compatible sound cards.
3. Software

PSK31 for PCs:	*DigiPan*	**members.home.net/hteller/digipan/**
	WinPSK	**www.qsl.net/ae4jy/winpsk.htm**
MFSK16 for PCs:	*Stream*	**iz8bly.sysonline.it/**
PSK31 for Macs	*Multimode*	**www.blackcatsystems.com/software/multimode.html**
PSK31 for *Linux*	*DL9RDZ*	**wwwcip.informatik.uni-erlangen.de/user/hsreiser/hamradio/**

(There is no MFSK16 software available for Macs or Linux at this time.)

Simply connect an audio cable between the accessory or external speaker output of your radio and the **LINE** or **MIC INPUT** of your sound card. Install the software, make audio adjustments according to the software help files, and you're good to go!

For more information see "The HF Digital 'Tower of Babel," by Steve Ford, WB8IMY and "MFSK for the new Millennium" by Murray Greenman, ZL1BPU, elsewhere in the issue.

By Steve Ford, WB8IMY

The HF Digital "Tower of Babel"

The world of amateur HF digital communication is growing faster than anyone would have imagined. Let's pause, catch our breath and see where we are today.

And the Lord came down to see the city and the tower, which the children of men built. And the Lord said, "Behold, the people are one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do. Let us go down, and there confound their language, that they may not understand one another's speech." So the Lord scattered them abroad from thence upon the face of all the Earth: and they left off to build the city. Therefore is the name of it called Babel; because the Lord did there confound the language of all the Earth.—Genesis 11:5-9 (King James version)

Life used to be simple for the HF digital operator. Prior to 1982, you had RTTY—period. Then AMTOR hit the scene, coinciding with the birth of the Computer Age. A few years later we began hearing 300-baud packet on HF.

In early '90s, we saw the emergence of Clover, PACTOR and G-TOR. Finally, hams discovered the amazing abilities of their computer sound cards and new modes began popping up like mushrooms after a steady rain. PSK31 is the most famous of these, making a big splash two years ago. More sound-card-based HF digital modes have arrived in the meantime, and more are on the way.

Like the Genesis story, we began with one language and now we are scattered into many camps. What are we doing with all of these modes? What's hot and what's not? Let's take a guided tour through our own Tower of HF digital Babel.

RTTY

Radioteletype, better known as *RTTY*, is the granddaddy of HF digital, although its popularity has been seriously undercut by PSK31. RTTY remains, however, the mode of choice for digital contesting and DXing.

RTTY does not use any form of error detection; what you see on the screen is what you get. Even so, with adequate demodulator sensitivity and sharp filtering, it's possible to enjoy excellent copy under poor conditions.

The traditional road to RTTY has been through an external *terminal unit* or *multimode processor* such as those manufactured by Kantronics, MFJ, Timewave, HAL Communications and others. (The HAL ST-8000A, for example, is considered the *crème de la crème* of terminal units, offering extraordinary RTTY performance.) With a computer and an SSB radio, these devices act like "radio modems," converting receive audio to data, and data to transmit audio (see Figure 1).

In recent years, sound card software for RTTY has made substantial inroads. The majority of these programs are intended for "casual operating." That is, they are not designed for competitive RTTY such as DX pileups or contesting. A few programs, such as *RITTY 4.0* by Brian Beezley, K6STI, *are* written to meet exacting performance requirements. Depending on whom you talk to, *RITTY's* performance approaches that of the venerable ST-8000A.

AMTOR

Amateur Teleprinting Over Radio—AMTOR—enjoyed widespread popularity from about 1983 through 1991. Its distinctive *chirp-chirp* sound was a staple on the HF bands. Hams made ample use of its error-free text capability, even setting up automatic AMTOR mailbox operations (MBOs) where messages could be stored for later retrieval from anywhere in the world. AMTOR has since been superseded by faster, more versa-

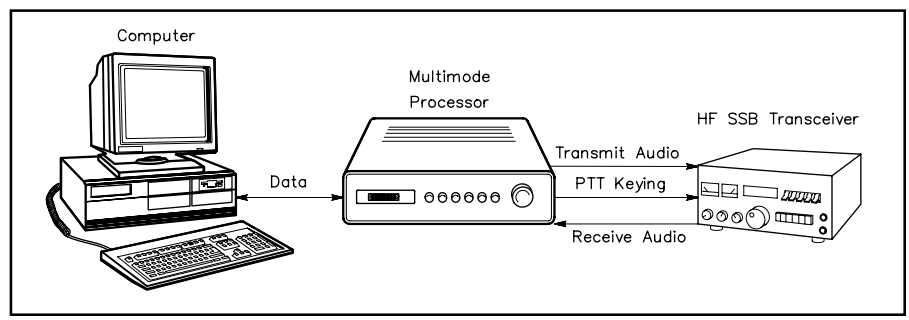


Figure 1—A typical HF digital station using an external multimode processor.

WinLink 2000—Internet E-mail from Anywhere!

The Internet has become the e-mail medium of choice for most hams, but there is a sizeable group of amateurs who often travel beyond the reach of the Internet. This group includes hams at sea, travelers in recreational vehicles (RVs), missionaries, scientists and explorers. No doubt the day will come when wireless, affordable Internet e-mail access will be available from any point on the globe. Until that day arrives, however, Amateur Radio HF digital operators have a very capable substitute!

More than 21 HF digital stations worldwide have formed a remarkably efficient e-mail network known as WinLink 2000. Running *WinLink 2000* software and using primarily PACTOR or PACTOR II, these facilities transfer e-mail between HF stations and the Internet. They also "mirror" (share) messages between themselves using the Internet, allowing amateurs to pick up their e-mail from any WinLink 2000 station.

The network evolved in the 1990s from the original AMTOR-based *APLink* system. APLink was a network of stations that relayed messages to and from the VHF packet network. As PCs became more powerful, and as PACTOR and Clover superceded AMTOR, a new software system was needed. That need brought about the debut of *WinLink*, originally authored by Victor D. Poor, W5SSM, with additions from Peter Schultz, TY1PS. *WinLink* itself evolved with substantial enhancements courtesy of Hans Kessler, N8PGR. To bring the Internet into the picture WinLink stations needed an e-mail "agent" to interface with cyberspace. To meet that requirement Jim Jennings, W5EUT, added *NetLink*. The entire system was integrated and overhauled last year to create Winlink 2000.

Thanks to these advancements, an HF digital operator at sea, for example, can now connect to a WinLink 2000 station and exchange Internet e-mail with nonham friends and family.

WinLink stations scan a variety of HF digital frequencies on a regular basis, listening on each frequency for about two seconds. By scanning through frequencies on several bands, the WinLink stations can be accessed on whichever band is appropriate according to your location and the propagation conditions at the time.

You can access Winlink 2000 stations using just a basic PACTOR setup. However, most users also rely on a piece of software known as *Airmail* to handle uploading and downloading automatically. *Airmail* is a 32-bit program that runs under *Windows 95, 98* or *NT 4.0*. *Airmail* supports the SCS PTC-II and IIe PACTOR-2 processors, as well as the Kantronics KAM+ and KAM-98, AEA/Timewave PK-232 and PK-900 modems, and the MFJ 1276 and 1278B. You can download a copy of *Airmail* online at **www.airmail2000.com**. To learn more about WinLink 2000, see K4CJX's Web site at **www.winlink.org/k4cjx/**.

tile modes. It is rarely heard on the ham bands today.

This doesn't mean that you can't operate AMTOR, but you may have a difficult time finding anyone to chat with. For this reason, there hasn't been a stampede among software programmers to write sound-card-based code to do AMTOR. You'll still find AMTOR on most multimode processors, though.

PACKET

Although packet technology had been in existence since the early '70s, hams embraced it with gusto in the middle '80s. (Personal computers were the driving force.) Packet is an error-detecting mode, which means that it is capable of communicating error-free information, including binary data (for images, software applications, etc). The problem with packet, as far as HF communication is concerned, is that it requires strong, "quiet" signals at both ends of the path to function efficiently. Packet doesn't tolerate signal fading, noise or interference, which makes it a poor choice for the chaotic world of HF.

Despite its poor performance, HF packet remains stubbornly alive. HF packet is still used for long-distance traffic forwarding between some VHF packet networks (although much of this data is now traveling via the Internet). You'll also find HF packet in use as part of the APRS (Automatic Position Reporting System) network. If you hear packet bursts at the upper end of the 30-meter band, it's probably APRS.

PACTOR

PACTOR strolled onto the telecommunications stage in 1991. It combined the best aspects of packet (the ability to pass binary data, for example) and the robust error-free nature of AMTOR. It was eagerly embraced by HF digital equipment manufacturers and became the most widely used HF digital communication mode in a remarkably short period of time. PACTOR was also widely adopted for mailbox operations and other forms of message handling. Today it still remains the most popular of the error-correcting modes.

Most PACTOR is done using standalone multimode processors like the MFJ, Kantronics, HAL or Timewave products I've already mentioned. When this article went to press, there was only one soundcard program capable of transceive operation in PACTOR. It is part of an earlier version of Brian Beezley's *RITTY* and it is still available directly from Brian at a cost of $150 (see the "Learn More!" sidebar).

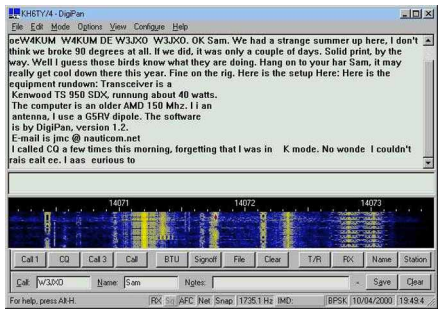
PACTOR II debuted in the mid '90s as a rival to Clover (see below), and the two have been doing battle for the hearts, minds and pocketbooks of HF communicators (commercial and amateur) ever since. Like Clover, PACTOR II uses DSP techniques and innovative data coding to achieve extraordinary error-free performance. PACTOR II is only available in multimode processors manufactured or licensed by Special Communications Systems (SCS), and they tend to be expensive ($800). This has slowed PACTOR II's acceptance in the ham community. In 1999, SCS introduced a pared-down processor (the PTC-IIe) that offered the same performance, but at a somewhat lower cost ($650).

Clover

Clover was unveiled in 1993 by HAL Communications. It was one of the first HF digital modes to use sophisticated data coding, coupled with complex modulation schemes and digital processing technology, in an effort to overcome the vagaries of HF. Clover promised, and delivered, impressive performance even in the face of weak signals and terrible band conditions. This performance initially came at a stiff price—one that few hams could afford. As you'd expect, the high cost of Clover technology dampened enthusiasm in the beginning. Price reductions later in the decade, and the introduction of Clover II, helped the mode retain a small, yet dedicated, following.

If you want to try Clover, you must use a HAL processor; Clover is not available in other units. However, Clover multimode processors are now in the same

The HAL Communications ST-8000A RTTY terminal unit.



***DigiPan*—one of the most popular software packages for PSK31.**

price ballpark as other multimode units (less than $400). The only other hardware requirements are a computer and a reasonably stable SSB transceiver.

G-TOR

G-TOR was the brainchild of Kantronics, a digital communication equipment manufacturer. It is yet another high-performance mode, although not as costly as Clover or PACTOR II. Like both of the former, however, G-TOR is *proprietary*. That means that it is only available in equipment manufactured by Kantronics. Coming several years after the appearance of PACTOR, G-TOR never really captured the attention of HF digital operators. It is somewhat uncommon on the ham bands today as a result.

PSK31

PSK31 could be viewed as a high-octane cousin of RTTY. It is not an error-free digital mode, but it offers excellent weak-signal performance. Peter Martinez, G3PLX, the same person who brought the commercial SITOR mode to the ham bands as AMTOR, invented PSK31. For a few years, PSK31 languished in obscurity because special DSP hardware was necessary to use it. But in 1999, Peter designed a version of PSK31 that needed nothing more than a common computer sound card. It was a simple piece of software that ran under *Windows* and used the sound card as its interface to the transceiver. Peter made the software available at no cost on the Internet. Announce that you are offering free software to the ham community and the reaction will be predictable—PSK31 took off like gangbusters.

The PSK31 community received another jolt in 2000 with the debut of "panoramic" software such as *DigiPan* and *WinPSK*. Both software packages made it outrageously simple to get on the air with PSK31—all you have to do is hook up the necessary cables, then point and click your mouse.

In a span of just two years, PSK31 has become the *Number One* HF digital mode for casual keyboard-to-keyboard operating. It has also been embraced enthusiastically by the QRP (low power) community—and for good reason. With just a couple of watts and a wire antenna you can work stations throughout the United States, along with a good selection of DX as well. PSK31 is easy to operate and the software is inexpensive (free, in many cases). With most amateurs owning sound-card-equipped computers these days, that's a combination too powerful to resist.

Hellschreiber

Hellschreiber is not a new mode (it was pioneered in the 1920s and 30s by Rudolf Hell), but a number of hams are beginning to discover its possibilities. Unlike all of the other modes we've discussed so far, Hellschreiber is *visual*. That is to say, the signals "paint" the text on your screen much in the same sense that a television or fax signal paints an image.

One variation of Hellschreiber known as *Feld-Hell* works its magic by keying a CW transmitter ON for every black portion in a text character, and OFF for every white space. Timing is critical. See Figure 2 for an example of Feld-Hell signal reception. Feld-Hell has drawn some interest among low power (QRP) operators because you can operate with simple (but stable) CW transmitters. Most Feld-Hell operation, however, is done using SSB transceivers using on/off tone "keying" to accomplish the same result. Feld-Hell is the most popular of the Hellschreiber modes.

You can also send text imagery by using different *frequencies* (tones) to represent the black and white areas. This version of Hellschreiber is called *Multi-Tone Hell*, or simply MT-Hell. There are several variations of MT-Hell in use.

Once again, Hellschreiber in its various flavors is available through sound-card software. If you are already set up to do PSK31 or RTTY with your sound card, you can try Hellschreiber by

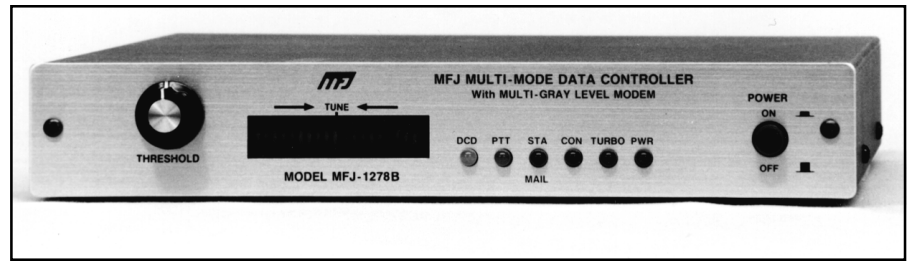
The Need for Speed

If you are considering any of the so-called "burst" modes such as AMTOR, PACTOR, Clover or G-TOR, it is critical that your HF transceiver be able to switch from transmit to receive very quickly.

Why, you ask?

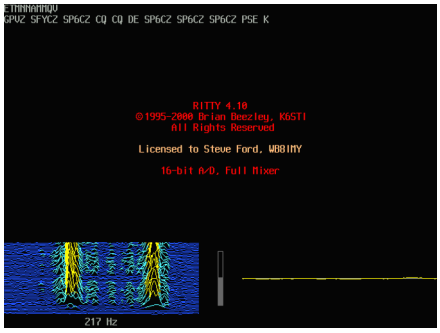
All of the burst modes use some form of ARQ—automatic repeat request. In the basic system, a chunk of data is sent and then the sending station waits for *a specific amount of time* to hear from the receiving station. Was everything received without errors? If the answer is "yes," the receiving station transmits an acknowledgment signal, or ACK, and the next data chunk is sent. If the answer is "no," a non-acknowledgment, or NAK, is transmitted and the data is repeated. This sets up a kind of ARQ dance where the stations ping-pong back and forth until everything makes it through error free. For the dance to work properly, however, the transmitting station must hear the ACKs and NAKs. If the rig at the transmitting station does not switch fast enough, the ACK or NAK could arrive before the radio is ready to receive. We're talking *milliseconds* of time!

The rule of thumb is to look for a radio that can switch from transmit to receive in less than 30 ms. The lower the number, the better. *QST* "Product Reviews" often measure transmit/receive-switching times for exactly this reason.

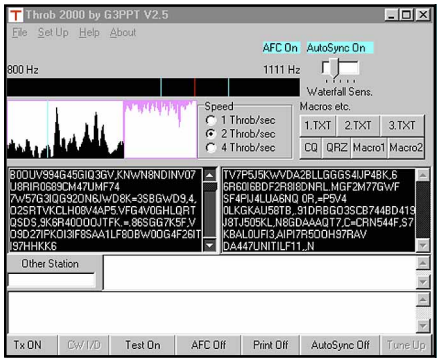


The MFJ 1278B multimode processor.

Figure 2—Reception of a Feld-Hell signal.



Brian Beezley's *RITTY* software in action.



Throb is a 9-tone MFSK digital mode. As with so many new HF digital modes, it has been implemented with sound-card-based software. You can learn more about Throb on the Web at www.lsear.freeserve.co.uk/index.html.

simply loading and running the software.

MT-63

Pawel Jalocha, SP9VRC, invented MT-63. It is a keyboard-to-keyboard "live" mode operationally similar to RTTY and PSK31. With MT-63, however, the data components are spread over 64 different tones! This allows a tremendous amount of redundancy, assuring good reception even when as much as 25% of the data has been obliterated by noise, fading or interference. Thanks to its modulation structure, MT-63 offers excellent performance under poor conditions, even rivaling Clover and PACTOR II.

There is a certain amount of controversy surrounding MT-63 in the amateur community. In the most robust form of MT-63, the signal is quite wide (1 kHz). With crowded conditions in the HF digital subbands today, the movement has been toward narrow signals. PSK31, for example, is only about 31 Hz wide. MT-63 seems to run counter to this trend. Finally, there are legal issues involving the complex MT-63 modulation scheme. As this article was written, the Federal Communications Commission had not declared MT-63 to be a legal mode for US-licensed amateurs.

Learn More!

Forgive the shameless plug, but if you want to learn more about HF digital operating, I recommend that you pick up a copy of my book, *The ARRL HF Digital Handbook*. No, I won't receive a royalty from your purchase, only a bit of ego gratification! See the ARRL Publications section in this issue, or call 888-277-5289.

Multimode Communication Processors

Kantronics, 1202 East 23rd St, Lawrence, KS 66046; tel 785-842-7745; **www.kantronics.com**

MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; tel 601-323-5869; **www.mfjenterprises.com/**

HAL Communications, 1201 W Kenyon Rd, Urbana, IL 61801-0365; tel 217-367-7373; **www.halcomm.com/**

Timewave Technology Inc, 58 Plato Blvd E, St Paul, MN 55107; 651-222-4858 **www.timewave.com/**

SCS, Roentgenstr 36, D-63454 Hanau, Germany; **www.scs-ptc.com/**

Sound Card Software

BlasterTeletype (RTTY)
www.geocities.com/SiliconValley/Heights/4477/

DigiPan (PSK31)
members.home.com/hteller/digipan/

DSP-CW (CW and RTTY)
www.zicom.se/dsp/index.html

IZ8BLY Hellschreiber (Hellschrieber)
iz8bly.sysonline.it/. Also, **members.xoom.com/ZL1BPU/software.html**

MMTTY (RTTY)
www.geocities.com/mmtty_rtty

Mix32W (RTTY and PSK31)
tav.kiev.ua/~nick/my_ham_soft.htm

Multimode (RTTY and PSK31 for Macintosh computers. PowerPCs recommended.)
www.blackcatsystems.com/software/multimode.php3

PSK31 (for Linux)
aintel.bi.ehu.es/psk31.html

RITTY (RTTY)
Brian Beezley, K6STI, 3532 Linda Vista Dr, San Marcos, CA 92069; **k6sti@n2.net**. $100 with delivery via e-mail, $5 additional for postal delivery. Check or money order only.

Stream (MFSK16 and other modes)
iz8bly.sysonline.it/

TrueTTY (RTTY)
www.dxsoft.com/

WinPSK (PSK31)
www.winpskse.com/

MFSK16

MFSK16 is among the newest of the amateur HF digital modes. By using multiple audio tones to send data, MFSK16 offers outstanding weak-signal performance. Many say that it exceeds the performance of PSK31. The most popular MFSK16 software is the *Stream* package by Nino Porcino, IZ8BLY. It is entirely sound card based and is shareware. For a thorough overview of MFSK16, see the article by Murray Greenman, ZL1BPU, in this issue.

The Future?

You don't need a crystal ball to predict that HF digital modes will continue to proliferate. Already we're hearing new modes such as Piccolo 2000, Throb, Mosaic II and others.

My guess is that we will see sound card software becoming the preferred platform for new modes in the years to come. There are several reasons for this:

- Computers and sound cards are becoming increasingly powerful while costs continue to drop.
- The majority of amateurs who own computers also own sound cards.
- The Internet offers a highly efficient means to distribute new software and updates. Most amateurs now have some form of Internet access.
- Once a sound card is successfully connected to a transceiver, the same system can be used for several modes—it's just a matter of booting up a different piece of software.

One thing is certain, if you're into HF digital hamming, there are exciting times ahead!

By Don A. Gagnon, WB8HQS

Does Your Club Need a Web Site?

Does your club need some good PR? Do your directors always seem to be at an information disadvantage? Are you tired of ever-increasing postal surcharges? My fellow club members, you need a Web site! Here's how to get started.

The question posed in the title can't necessarily be answered on the spot. There are several good reasons to have a club site—but are those reasons sufficiently important to club members to justify the effort? A club Web site should at least perform the following:

- Provide information about your club and its activities to local hams. This lets newcomers and potential new members see what your club is all about.
- Provide services to club members. The contents could include contact information, details of club meetings and activities, membership lists, club newsletters, a database of the club's "loaner gear," etc. Some of this information may be available in your club's printed newsletter, but it's not always easy to find a copy at a moment's notice.
- Provide services to all hams. These services could include general club info, hamfest info, VE tests in your area, links to specific ham-related Web sites, regional hamfest listings, contact numbers and e-mail addresses for ARRL representatives, a regional VHF/UHF repeater map, etc.

If by now you're thinking about building a club Web site, you have to decide whether it's going to be worth the effort—and if you have the resources to pull it off!

Required Resources

The most important required resource is securing the services of a person who is willing to create and maintain the Web site, and who has the time and expertise to pull it off. This is not a trivial task. It requires a substantial commitment if it's going to be done right.

You'll also need the right software to make the job manageable. One of the most popular Web site creation packages in use today is Microsoft's *Front Page 2000*. Although there are several free or low-cost alternatives (do a Web search on "HTML editor" to find links to a number of them), I think you'll find *Front Page* to be worth every penny of its $120 price tag.

You'll also need a server to host your completed Web site. Your options range from full-service commercial hosting sites (costs range from $50 to $150 per month), to no frills commercial sites ($10-$25 per month), to using a member's personal ISP Web space (no extra charge to the club). Remember, many ISPs balk at members using their personal Web spaces for commercial activities, so if hamfest advertising and promotion are in order, commercial hosting may be required. Non-profit organizations may be an exception. Be sure to get approval *before* you start the project.

The Allen County Amateur Radio Technical Society home page gives you everything you need up front, including plenty of links to additional information.

What could/should your site include?

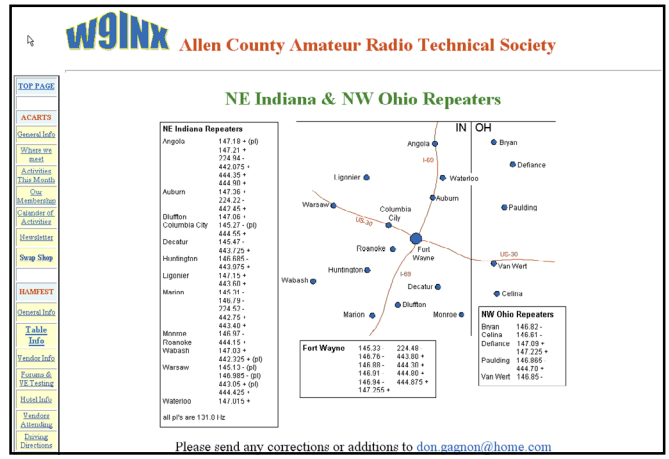
Here are some ideas about what to include on your Web site. You'll need to decide what's most important to your club and, therefore, worth the time and effort. There are several items related to your club in general, such as:

- A list of directors and managers, including each member's responsibilities and how to contact him/her.
- A list of active members, their call signs and their e-mail addresses.
- Information on club-owned equipment available for member use (items such as wattmeters, antenna analyzers, dummy loads, a packet station, transceivers, etc).
- Details on general-use club equipment such as club stations, repeaters, etc.
- Information on club activities, including a year-at-a-glance calendar and a more detailed look at the present month's activities and meetings. Detailed instructions on how to get to club meetings should also be included here.

- Electronic versions of club newsletters and publications that can be downloaded as Adobe PDF files.
- A membership application form. New members can fill it out online or print it and mail it in.

If your club sponsors a hamfest, this is an excellent place to make information on your event available to the masses. Some of the common areas you may want to cover include:

- Basic event information such as the date of the big day, when the doors open and close, what types of prizes you're offering, talk-in frequencies, etc.
- Information on guest speakers, forums, VE-administered tests, ARRL representatives, etc.
- Event rules that concern smoking, music, refunds and items that can and cannot be sold at the hamfest.
- General vendor information such as how to order tables, payment deadlines, set-up times, etc.
- General table info such as the number of available tables (be sure to keep this current), how much they cost, cost and availability of electricity, special options (if available), etc. A graphic diagram of your event's table layout could also be included.
- A table reservation form (both an on-line form if your club can accept credit cards, and a form that can be printed and mailed in).
- A list of those vendors already signed up (to let attendees know who they can expect to see).
- Driving instructions to help people find you, especially if you're not on a major thoroughfare.



The ACARTS site also provides useful reference information, such as this map of northeast Indiana and northwest Ohio repeaters.

Let's do it!

Your first step is to decide on a site-hosting service and, consequently, your site's domain name and Web address. If you're using a commercial Web-hosting agency you'll have to pay a $70 registration fee (good for two years) to get your own domain name (your hosting agency can help you with this). If you're using a members' personal Web space, you will be adding a club site directory to an existing Web address. The latter method makes for more cumbersome addresses, but it can save a lot of money, time and trouble if your site is relatively small and doesn't get tons of traffic.

Now let's look at some things to think about when designing your site. As you're reading this, why not check out the Web site I designed at **www.acarts.com**. There you will see most of these ideas in action.

- Don't try to be "cute." Don't send the club's call sign in Morse code or play repeater audio. These gimmicky tricks slow page load times and quickly become annoying.
- Use only necessary graphics and keep them physically small. Your viewers will appreciate pages that load quickly!
- Keep things logical and easy to navigate. If possible, make good use of side navigation bars.
- Don't bother with hit counters. Few people—except maybe Webmasters—really care.
- Can you make and use on-line forms? These can be handy for membership applications, hamfest table order forms, surveys, or guest books.
- Try to resist the urge to use frames, image maps and other "nifty" page items. Some users still use Web browsers that don't adequately support some of these.
- Add links to other ham radio Web sites such as the ARRL, call sign look-up sites, the FCC, ham equipment manufacturers, etc. Be sure to confirm these links on a regular basis, as Web addresses change on a moment's notice. Links to other regional club sites are a nice feature.
- If your site hosts general club and hamfest info (as our site does), consider a distinctive page/color/logo layout for all pages relating to each specific topic. This helps people navigate through your site.
- Think about whether you want to add one of several free weather links, which give local conditions, forecasts or even radar images. The banner included with this service will make your page load a little slower (because it requires a link to another server), but it's a nice touch, especially if you have a winter hamfest, as prospective attendees may want to see the kind of weather they might encounter if they attend.
- Don't use tags such as "last updated 3-1-00" unless it's absolutely necessary. These tags usually advertise the fact that you're only able to update your site infrequently!
- Make extensive use of "mail-to" links that allow visitors to directly e-mail info or comments to you, club directors, etc. This eliminates the need to look up e-mail addresses and saves a lot of unnecessary steps.
- Just before you go "live," try viewing your final product on as many computers and monitors, and different versions of the popular Web browsers, as you have access to. Be sure to weed out as many "bugs" as you can.

Maintenance

Make sure your "changing" information is kept current. It's frustrating to look up items such as meeting/program notices, hamfest sales data and club e-mail addresses—only to discover that the information is out of date. People get frustrated very quickly if they find that they've wasted their time with outdated information while surfing your Web site.

Confirm your links periodically to keep browsers from encountering dreaded "404 errors."

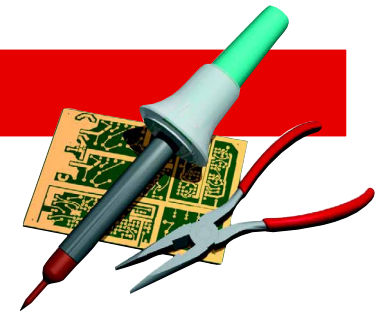
When making downloadable files available, keep the files as small as possible. For example, if you have a large graphic in your printed newsletter, consider removing (or replacing) that graphic in the electronic version. It can make the difference between a two-minute download and a 15-minute download. It's also a good idea to indicate file sizes so users can accurately gauge their interest in downloading the file before the process begins.

Wrap up

Well, that about covers the essentials needed to get you started. This article didn't cover all of the possibilities, of course, but I think it provides a lot of good ideas about hosting, design and content. By all means, look at other club sites to see what your fellow hams have done.

Have fun, be creative and do your best to make people want to come back to your site again and again.

You can contact the author at 2805 Nordholme Ave, Fort Wayne, IN 46805; **don.gagnon@home.com**



The Doctor is IN

Q Larry, WA5MHE, asks, "When operating PSK31 I notice that some hams type their text in all uppercase letters, apparently unaware that the PSK31 code supports upper and lower case. Why do they do this?"

A I suspect that some of these operators may be RTTY veterans. The RTTY code used by most amateurs in the United States is known as ITA No. 2. With the limitations of a 5-bit code, ITA No. 2 can only support a relatively short list of characters. Therefore, RTTY text is in all-uppercase letters, rather than the mix of upper and lower case that we are accustomed to seeing.

There are three problems with sending text in all uppercase: (1) It is more difficult to read, (2) in the age of the Internet the custom is to interpret all-upper-case words as SHOUTING and (3) uppercase characters in PSK31 take longer to send. Internet-savvy hams (the majority of us, these days) are becoming more sensitive to the use of upper and lowercase in digital communication. I think this issue will resolve itself over time.

Q I have a dipole cut for 20-meters fed with 45 feet of coax and I'm trying to use it on 40-meters with an antenna tuner. However, I need the full amount of tuner capacitance to get the SWR to 1:1. Does that mean that I am consuming a lot of power in the tuner?

A How much 40-meter power gets to your 20-meter dipole depends upon both the loss in the tuner and the loss in the feed line. According to the *EZNEC* antenna-modeling software, if your dipole is 35 feet above average ground, the feedpoint impedance at 7 MHz is about 13.6 – *j*1000Ω.

While that doesn't tell you what you get at the tuner end of the line, N6BV's *TL* and *TLW* programs (from the *ARRL Antenna Book* disk) will. If you are using RG-213 coax, the shack-end impedance will be 546 + *j*806 Ω (SWR 35:1). The same programs also give you the total feed line loss for a given SWR. In this case, the line loss is 16 dB. Clearly, the loss in the tuner is not all you need to worry about!

If you substitute 450-Ω ladderline instead, the shack-end impedance is 14 + *j*667 Ω (SWR 115:1), but the feed line loss drops to 3 dB. Why is it lower than the coax if the SWR is higher? The answer is that the additional loss due to the SWR is proportional to the line's characteristic loss, and ladderline has much less loss than coax. A 2.7-dB loss is half of your power, though. If you operate on 40 meters a lot you might want to consider a longer antenna (an 80-meter dipole on 40 meters gives a total feed line loss of less than 0.5 dB with 45 feet of ladderline).

Concerning the loss in the tuner, every tuner design will have a certain amount of loss. Some tuners are more lossy than others.

Q Larry, K0LWV, asks, "While tuning around 1600 kHz I heard a very weak AM signal that appeared to be repeating an announcement about a house for sale nearby. Is this kind of thing legal?"

A So-called "Talking House" transmitters generate the signals you are hearing, and they are becoming popular among realtors.

When a house comes on the market, the seller's real estate agent may install one of these transmitters to continuously broadcast a sales pitch about the home. The sign on the front lawn invites drivers to tune to a particular frequency to hear the broadcast. Talking House transmitters are FCC Part 15 devices that do not require licenses to own and operate. (They are in the same class as AM and FM "wireless microphones.") The Talking House units typically operate above 1600 kHz and have an output of 100 mW or less. Their range is limited to about 1500 feet. Believe it or not, some hard-core broadcast-band DXers attempt to receive these signals at much greater distances, although their success varies!

Q Jon, W4BCT, asks, "I recently bought some radio crystals. Most are removed from 1940s Navy radios. When I was young my father had some of these, and I wanted to take them apart to see what was inside. Of course, he wouldn't allow this. Now I have some to play with, but I was wondering if you could explain how crystals work?"

A A number of crystalline substances found in nature have the ability to transform mechanical strain (movement) into an electrical charge, and vice versa (think of a tuning fork or a church bell which can transform mechanical strain into sound). This property is known as the piezoelectric effect. A small plate or bar cut in the proper way from a quartz crystal and placed between two conducting electrodes will be mechanically strained when the electrodes are connected to a source of voltage. Conversely, if the crystal is squeezed between two electrodes a voltage will be developed between the electrodes.

Crystalline plates also are mechanical resonators that have natural frequencies of vibration ranging from a few thousand hertz to tens of megahertz. The vibration frequency depends on the kind of crystal, the way the plate is cut from the natural crystal, and on the dimensions of the plate (like the tuning fork and the bell). The thing that makes the crystal resonator valuable is that it has extremely high Q, ranging from 5 to 10 times the Qs obtainable with good LC resonant circuits.

Since the crystal has a definite resonant frequency controlled by the crystal lattice, it can be used to "regulate" an oscillator to a high degree of accuracy.

The crystals we use most often resonate in the 1- to 30-MHz region and are of the *AT cut, thickness shear* type, although these last two characteristics are rarely mentioned. A 15-MHz-fundamental crystal of this type is about 0.15 mm thick. Because of the widespread use of reprocessed war-surplus, pressure-mounted *FT-243* crystals, you may think of crystals as small rectangles on the order of a half-inch in size. The crystals we commonly use today are discs, etched and/or doped to their final dimensions, with metal electrodes deposited directly on the quartz. A crystal's diameter does not

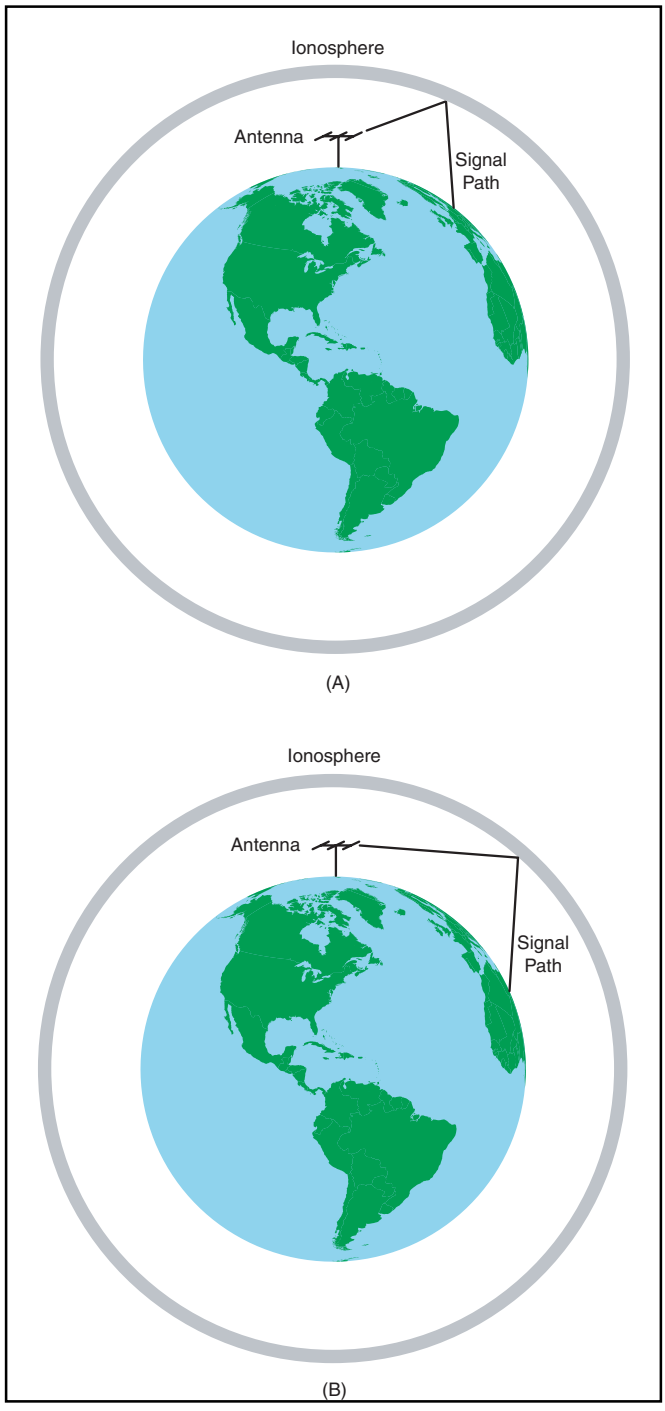


Figure 1—The elevation angle advantage. If your signal takes off at a high elevation angle (A), it won't propagate very far. Lower the angle (B), and the increase in distance can be considerable. A wavelength of height at a particular frequency results in a peak elevation angle of about 15°.

directly affect its frequency; diameters of 8 to 15 mm are typical.

AT cut is one of a number of possible standard designations for the orientation at which a crystal disc is sawn from the original quartz crystal. The crystal lattice atomic structure is asymmetric, and the orientation of this with respect to the faces of the disc influences the crystal's performance. *Thickness shear* is one of a number of possible orientations of the crystal's mechanical vibration with respect to the disc. In this case, the crystal vibrates perpendicularly to its thickness. Place a moist bathroom sponge between the palms of your hands, move one hand up and down, and you'll see thickness shear in action.

Table 1
Optimum Elevation Angles to Europe

Band	*Northeast*	*Southeast*	*Upper Midwest*	*Lower Midwest*	*West Coast*
10 m	5°	3°	3°	7°	3°
12 m	5°	6°	4°	6°	5°
15 m	5°	7°	8°	5°	6°
17 m	4°	8°	7°	5°	5°
20 m	11°	9°	8°	5°	6°
30 m	11°	11°	11°	9°	8°
40 m	15°	15°	14°	14°	12°
75 m	20°	15°	15°	11°	11°

Table 2
Optimum Elevation Angles to Far East

Band	*Northeast*	*Southeast*	*Upper Midwest*	*Lower Midwest*	*West Coast*
10 m	4°	5°	5°	5°	6°
12 m	4°	8°	5°	12°	6°
15 m	7°	10°	10°	10°	8°
17 m	7°	10°	9°	10°	5°
20 m	4°	10°	9°	10°	9°
30 m	7°	13°	11°	12°	9°
40 m	11°	12°	12°	12°	13°
75 m	12°	14°	14°	12°	15°

Table 3
Optimum Elevation Angles to South America

Band	*Northeast*	*Southeast*	*Upper Midwest*	*Lower Midwest*	*West Coast*
10 m	5°	4°	4°	4°	7°
12 m	5°	5°	6°	3°	8°
15 m	5°	5°	7°	4°	8°
17 m	4°	5°	5°	3°	7°
20 m	8°	8°	8°	6°	8°
30 m	8°	11°	9°	9°	9°
40 m	10°	11°	9°	9°	10°
75 m	15°	15°	13°	14°	14°

Q When it comes to HF antennas, how important is the elevation angle?

A Presuming that you are interested in working worldwide DX on the HF bands, the vertical (elevation) angle of maximum radiation is of considerable importance. An elevation angle of 5° is very shallow, while 90° is straight up (not a good angle for long-distance communication!). You want your radiation pattern to be at a low elevation angle so that the signal energy will be refracted by the ionosphere in such a way that it propagates as far as possible (see Figure 1).

Tables 1, 2 and 3 from *The ARRL Handbook* show optimum elevation angles from locations in the continental US. These figures are based on statistical averages over all portions of the solar sunspot cycle.

Since low angles usually are most effective, this generally means that horizontal antennas should be high—higher is usually better.

Do you have a question or a problem? Ask the doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl/org/tis/.

By Steve Thomas, WA4TQS

Mobile Fun with PSK31!

For years mobile ops have yearned for a reliable low-power mode to add to their arsenal of on-the-move operating options. According to the author, PSK31—the low-speed digital mode that's been taking ham radio by storm—is just that!

Who's driving? I've been asked that question during almost every mobile PSK31 QSO in my logbook. That's right—*mobile* PSK31. Why not? I'd been operating the handy new digital mode for about a year when I thought it would be a worthy mobile experience. PSK31 has earned a universal reputation as a good low-power, high-intelligibility mode—and what could be better for mobile ops?

Our family vacation last summer was of the "driving" variety. Our 11-year-old son had flown to Kentucky to spend a few weeks with friends, so my wife, daughter and I drove to Kentucky to celebrate the Fourth of July (and pick up our boy). I usually despise driving vacations for the simple reason that I've always done all of the driving! Everyone else reads, sleeps or watches videos on a dc-powered TV/VCR combo. But last year was different. I had PSK31 at my disposal…

During the trip-planning phase I decided to add my electronic hodgepodge to the pile of stuff we normally carry on vacation. With an HF rig, a laptop PC and an antenna, I was in business.

To keep things simple, I needed an uncomplicated antenna. Because I had never operated HF mobile, I didn't have a stockpile of mobile antenna parts breeding cobwebs in the corner of my shack. I was starting from scratch.

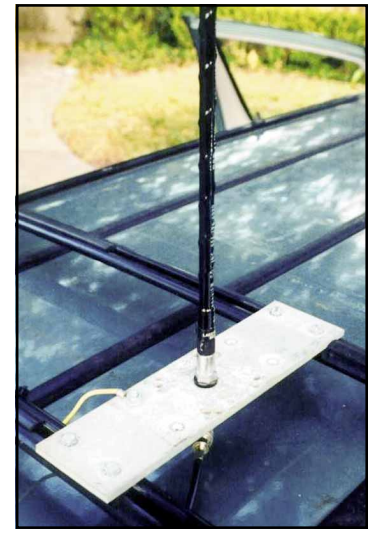
A *QST* article by Steve Ford, WB8IMY, steered me toward WD4BUM's line of Hamstick mobile whips. Perfect! They're low profile, don't catch bugs, don't whistle or make noise and don't need any guy lines or exotic mounting hardware. All I had to do was mount it on the van.

Further inspired by Steve's article, I ordered a triple-pad, magnetic-mount capable of withstanding the hurricane force winds I would generate as I cruised down the interstate at 70 mph. With the Hamstick, mag-mount and SWR bridge in hand, I headed for the van to find an optimum antenna location on the roof.

Whoops! Is there *any* metal on this thing? Lumina vans are, I discovered, constructed of corrosion-resistant plastic body panels. The mag-mount wouldn't stick anywhere!

Plan B was needed. The van is, fortunately, equipped with a luggage rack that has adjustable bars. The bars are fitted with sliding 6-mm nuts. I needed a sturdy aluminum plate to attach the Hamstick's 3/8-inch stud mount. After a half-hour of rummaging, my junk pile produced a mast-to-boom bracket scavenged from an old tribander. The only modification required was the addition of a 1/2-inch hole in the center of the plate for the stud mount. The plate was secured to the luggage rack with four 6-mm machine screws and the Hamstick was mounted and standing tall on the roof of the van.

I ran a ground wire from the aluminum plate to the nearest grounded body panel and began to tune the Hamstick. This was a relatively simple task with an MFJ antenna analyzer. In just a few minutes, I had trimmed the stainless-steel whip and adjusted it for a 1.5:1 SWR at 14.070 MHz.



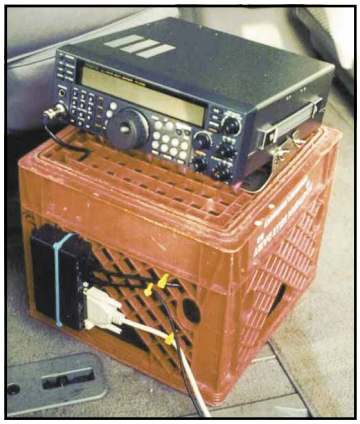
A close-up view of my Hamstick mobile antenna mount using the Lumina's luggage rack.

I powered the station from a separate 12-V marine battery that I charged with a portable ac-powered charger. This was much simpler than running power cables from the front of the van (while eliminating "received" engine noise).

I mounted the mobile bracket for my Kenwood TS-570 transceiver to a milk crate for added stability on the road. At the last minute I added a RIGblaster interface to simplify audio adjustments. We were ready to roll!

Who *is* Driving, Anyway?

Picture this: A middle-aged adult male driving a 10-year-old van 70 mph on the interstate with a laptop computer mounted on the steering wheel. *I don't think so!* Crazy people—hams included—*might* try such a stunt. But when I said I was operating PSK31 mobile, I didn't say I was *driving* and *typing* at the same time. For me, typing is difficult enough when the darn keyboard is sitting still. Hitting the right keys while sitting in the back seat of a speeding van was challenging enough in itself. Driving would have added a third complicating dimension to this already challenging task. *Don't try it—don't even think about it!*



My Kenwood TS-570 transceiver and RIGblaster interface.

Our trip took us from Lake Jackson, Texas, 50 miles north of Houston, to Texarkana. We then headed to Little Rock, Arkansas, and Memphis, Tennessee, where we spent the night. Right out of the chute I began making solid PSK31 contacts. This was going to be a great trip. I don't know why I was still so impressed with PSK31. I should have become accustomed to good copy under less-than-optimum conditions, even while running low power. The handicap of using a small mobile antenna didn't seem to be a problem. I even managed to have a great QSO with Ken, N9VV, in Chicago, running his peanut whistle PSK20 transceiver at 3-W output.

The next leg of the trip took us from Memphis to Nashville, then north on I-75 to Kentucky. This is where things became a little more difficult: The mountains, while scenic, seemed to cause a lot of fading.

After spending the Fourth in Kentucky we headed south to Oak Ridge and Chattanooga, Tennessee. While we were in Chattanooga, I took the opportunity to drive to the top of Lookout Mountain and operate briefly from Lookout Park. What a view! It was a shame that I didn't see any tribanders up there.

The final leg of the trip ran through Biloxi, Mississippi, and back to Texas along I-10. Once again, operating in the flat lands was a breeze.

All told, I made 30 PSK31 QSOs. One highlight among many was making a solid QSO with Pete, KF4TVU, who was maritime mobile on his sailboat in Belize. I was having a great time in my land yacht, but Belize somehow sounded more exotic…

Conclusion

I have been a ham, off and on, since 1960, when I was 13 years old. Over the years there has always been something to keep me coming back to this great hobby. PSK31 is one of those "interest anchors." This excursion was my introduction to HF mobile operation. What a blast! PSK31 is the most exciting mode to come to ham radio in a long time. More important than all the gizmos and technology, however, are the people who make ham radio great. I would like to thank the hams who have donated their time and talents in the best traditions of Amateur Radio in making this great mode possible and readily available to the amateur community. A special thanks goes to Nick Fedoseev, UT2UZ, and Skip Teller, KH6TY, for their amazing *DigiPan* PSK31 software. You can grab a free copy at **members.home.net/hteller/digipan/download.htm**.

If you've been looking to spice up your mobile operations, give PSK31 a try. Just make sure someone else is behind the wheel!

113 Catalpa
Lake Jackson, TX 77566
Thos001@computron.net

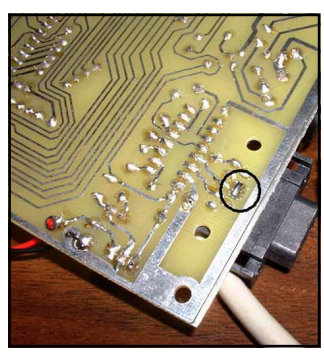
FEEDBACK

FIELD DAY

◊ The photograph shown on page 102 in the December 2000 *QST* ("Field Day 2000 Results") appeared with the wrong caption. The correct caption should have identified the operators as Jason Swalwell, VE7FXY, and his two children at the Greater Vancouver Radio Group Field Day site.

PIC KISS TNC UPDATE

◊ I've been informed that my KISS TNC does not work well with the terminal program *WinTNC*.[1] Receiving was okay, but the user couldn't transmit. Research shows that this is because (contrary to the KISS specification) *WinTNC* (as well as a couple of other programs) require "hardware flow control." Fortunately, the fix is easy. Simply jumper pins 7 and 8 of the TNC's DB9 connector, J2; these two pins are in the middle of the four-pin row of the connector. A foil-side view of a modified board is shown in the accompanying figure.



While using *WinTNC* to isolate this problem, I found it to be a fine piece of software. It is available from many Web sources including **www.tapr.org/tapr/html/softf.html**. E-mail me if you have any problems or questions.—*John Hansen, W2FS*; **john@hansen.net**

Next Feedback

[1]John Hansen, W2FS, "An Inexpensive KISS-Mode TNC," *QST*, Nov 2000, pp 53-56.

STRAYS

WANTED: UNINHABITED ISLANDS PICTURES

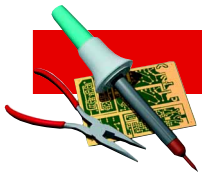
◊ Tom Sundstrom, W2XQ, forwards a request from Greg Robins who is starting a Web site called Uninhabited Islands. Robins is a writer and has visited a number of remote places, including the infamous Swan Islands (remember Radio Swan?). Because radio amateurs often visit such islands for DXpeditions and/or contesting, Robins seeks help in filling in his picture collection. If you have been on such a venture and have non-radio pictures, please consider helping Greg Robins. Send e-mail directly to **Gregsboat1@aol.com** to discuss arrangements. Watch **www.uninhabitedislands.com/** for developments.

QST CONGRATULATES...

◊ **Lou Williams, W9GSB**, who was recently inducted into the Illinois Aviation Hall of Fame. Lou has been a ham since 1933 and interested in aviation for almost the same amount of time. Lou flew combat missions during World War II in Europe and was very active in commercial aviation after the war.

◊ **Stephen Mendelsohn, W2ML**, on his promotion to Senior Audio/Video Systems Design Engineer at the ABC Television Network. Recently elected to the position of ARRL Hudson division Vice Director, Steve was also recently honored with an Emmy award as one of the Technical Managers on ABC's historic "Millennium Special," which aired January 1, 2000. The program featured New Year's Eve celebrations from every time zone around the world.

Next Strays



By H.Ward Silver, N0AX

Test Your Knowledge!

A little mathematics knuckle-cracking to fight off formulaic frustration, cram for constant conversions, and prepare for postulate prognostication!

1. What is the reactance of a 0.01µF capacitor at 60 Hz? 1 kHz? 1.82 MHz?

2. The free-space wavelength of a 146.34 MHz signal is how many meters? Feet? Inches? Cm?

3. In order to keep your self-supporting tower upright at the maximum expected wind-load, you need a base that weighs 15000 lb. If concrete weighs 150 lb/ft^3, how many cubic yards are required? Cubic meters?

4. Using a velocity factor of 66%, what is the length of the following transmission lines in feet?
a. $^1/_4$-wavelength at 3.550 MHz
b. $^1/_2$-wavelength at 443.5 MHz
c. 1-wavelength at 14.350 MHz

5. A counterweight for the new Zepp antenna needs to be at least 30 pounds to keep the wire taut. All you have is a pile of 2-kg weights. How many are required?

6. The weekend project is to put up a $^1/_4$-wavelength sloper for the state emergency net on 3975 kHz. How long is the antenna in feet? If it's attached to your tower at a height of 55 feet and the lower end must be at least 8 feet above the ground, how far from the tower base will the end be?

7. Calculate the VSWR for the following combinations of forward and reflected power:
a. P_f = 95 W, P_r = 5 W
b. P_f = 1400 W, P_r = 65 W
c. P_f = 10 W, P_r = 0.15 W
d. P_f = 800 W, P_r = 22 W

8. The finest common subdivision of the Maidenhead Grid Square system are the 5′ × 2.5′ subsquares. Assuming 60 nautical miles per degree, how big are subsquares in kilometers?

9. Willy's new rotor is rated to operate properly to –40°C. Billy just bought one rated to –40°F. Whose will operate at the colder temperature?

10. A tuned circuit must resonate at 10.105 MHz. Choose the proper value of inductance or capacitance that completes the circuit:
a. 680 pF
b. 4.7 µH
c. 220 pF
d. 1.5 µH

11. The wattmeter shows 1200 W going into the dummy load. What is the peak voltage appearing across the load?

12. A power tube requires 25 cubic feet per minute of cooling air, but you only have a squirrel-cage blower rated to deliver 1 cubic meter per minute. Will it suffice?

13. What is the length in both feet and meters of half-wave wire dipoles at the following frequencies?
a. 1.850 MHz
b. 7040 kHz
c. 24.900 MHz
d. 50.120 MHz

14. Convert the following between linear ratios and dB:
a. A loss of 1 dB equals a loss of how many percent?
b. A power gain of 8 is a gain in how many dB?
c. What is the voltage ratio corresponding to 6 dB?

15. A full-wave loop antenna for 3.6 MHz is 278 feet in circumference. If the loop is to be formed into a flat-top, isoseles triangle with a 120-foot horizontal section 75 feet above the ground, by how much will the apex clear the ground?

Bonus: What is the speed of light in furlongs per fortnight?

Count one point for each correct answer.

20-32	You hardly broke a sweat!
10-19	Your brain is popping its circuit breakers.
1-9	Does not compute . . . does not compute . . .

22916 107th Ave SW
Vashon, WA 98070

Answers

1. 265 kΩ, 15.9 kΩ and 8.75 Ω
2. 2.05 meters, 6.73 feet, 80.7 inches, and 205 cm—wavelength in meters = 300/f (MHz)
3. 3.7 cubic yards or 2.83 cubic meters—15000/150 = 100 ft^3 with 27 ft^3 / yd^3
4. 45.7 ft, 0.73 ft, 45.3 ft
5. 6.8 exactly, so use 7 weights at 2.2 lb/kg
6. 36.4 ft. The antenna is 58.9-feet long with a vertical drop of 47 feet, so the horizontal run is √(58.9^2 – 47^2)
7. 1.6: 1, 1.55:1, 1.28: 1, and 1.4:1—use the formulas in section 19 of the *2000 ARRL Handbook*
8. The subsquares are 5.75 × 2.88 miles or 9.26 × 4.63 km.
9. Trick question—both rotors are rated exactly the same. –40° C and –40° F are equal temperatures.
10. 0.37 µH, 53 pF, 1.13 µH, 165 pF
11. 346V –1200W into a 50Ω load generates 245 V_{rms}. To convert V_{rms} to V_{pk}, multiply by 1.414.
12. Yes. Divide m^3 by 0.028316 to get ft^3. The fan can deliver 35.3 cfm.
13. 253 ft or 77.1 m, 66.5 ft or 20.3 m, 18.8 ft or 5.73 m, 9.34 ft or 2.85 m – length in ft = 468 / f (MHz)
14. 20.6%, 9.03 dB, and 2
15. The 120-foot flat top leaves 79 feet on a side. Each half of the loop becomes a right triangle with a hypotenuse of 79 feet and one side of 60 feet, leaving √(79^2 – 60^2) = 51.4 feet of vertical drop so that the ground clearance is 75 – 51.4 = 23.6 feet.
Bonus: 1.8 x 10^{12} furlongs/fortnight. A furlong is 40 rods, a rod is 16.5 feet, and a fortnight is 14 days.

MFJ-434 Deluxe Voice Keyer

Anyone who has ever attempted more than a casual effort in any SSB contest knows that besides the radios, antennas and logging programs, there is one more valuable piece of equipment necessary for the contest. And if you lose it, your contest efforts are sunk. Try running stations or building up your QSO totals if you lose your *voice!*

To save the voice, and hopefully build up a respectable QSO count, I recently used the MFJ-434 Deluxe Voice Keyer in the 2000 CQ World Wide SSB Contest. I was using the keyer in conjunction with a Yaesu Mark V FT1000MP transceiver. Since the factory default settings for internal jumpers are compatible with Yaesu transceivers, no internal adjustments were necessary. To configure the 434 for use with ICOM, Kenwood or Alinco radios, all that is necessary is to remove a few screws to open the top of the cabinet and reset eight jumpers on the circuit board, a relatively simple procedure. MFJ suggests leaving the setup for Yaesu and making adapter cables for other transceivers.

The rear panel of the MFJ-434 voice keyer.

Setup and Operation

As with many MFJ products, setting up the Voice Keyer was simple. Plug in a standard 8-pin microphone plug and you have finished the front-of-the-box setup. In the rear, simply plug in a 12-Vdc, 100-mA power source (not included) and attach a lead to the station's ground. At this point, you are ready to make the interface from the 434 to the radio. After that, just plug the mike into the jack input of your radio and you are all set.

The MFJ-434 has five message-storage slots that allow you to record up to 75 seconds of messages. Message #1 has a maximum length of 32 seconds. Messages #2-4 may be 10 seconds in length each, with Message #5 having a 13-second limit. The messages may be programmed using either the internal or an external microphone. I recorded all five messages using an external microphone because it seemed to have better audio quality than the internal microphone.

Recording the messages was simple. First, push the **RECORD/PLAY** switch to **RECORD**. Next, select the internal or external microphone. Then, push the **MESSAGE** button corresponding to the message you were recording. When the red **RECORD LED** begins to flash, speak clearly. Release the message button to end recording. Once you have recorded all of your messages, push the **RECORD/PLAY** button back to play. Push one of the message buttons to replay. (The **VOLUME** knob on the front panel controls the monitor speaker levels.) To change one of the recorded messages, simply re-record over the existing message. Make certain to use the **XMIT ON/OFF** button to disable the PTT line when reviewing messages.

You may adjust the output level control on the rear panel to set the output level to the radio. If the playback audio output level is outside your transceiver's drive range, you may need to make some adjustments of the internal trimpot, R29. The MFJ-434 also provides an automatic override that stops the message being played whenever the PTT switch is keyed. You can disable this feature by removing jumper JMP1 on the internal PC board.

CQ World Wide DX Contest

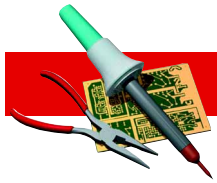
The MFJ-434 performed as expected during the contest. Several unsolicited reports of good audio were received (a function of the combination of the radio and the voice keyer being used). An external control head, allowing for remote activation of the various keyer memories, would have been convenient. MFJ does offer an optional switch (the MFJ-73), but it was not tested during this review. The keyer is also capable of interfacing with your PC, and instructions are included in the manual.

Another available feature is the ability to play back a recorded message in a loop. This can be quite handy on those long lonely hours late in the contest when CQing for those last few contacts. The loop playback can be adjusted to repeat at intervals from 3 to 50 seconds or from 30 to 500 seconds, depending on the front panel **REPEAT DELAY** adjustment and the **X10/X1** setting switch.

I was looking for a voice keyer that was simple to setup and use for the contest, and found that the MFJ-434 met my expectations. I was able to use the keyer while running stations during the contest and searching for multipliers and new stations. We didn't win CQWW, but the MFJ-434 Deluxe Voice Keyer was a welcome addition to the station. At the end of our operation, I even had my voice intact!

Manufacturer: MFJ Enterprises, Box 494, Mississippi State, MS 39762; tel 800-647-1800; **www.mfjenterprises.com**; *$179.95.*

Dan Henderson, N1ND ♦ Contest Branch Manager



THE HELP DESK

The "Considerate Operator's Frequency Guide"

The following frequencies are generally recognized for certain modes or activities (all frequencies are in MHz).

Nothing in the rules recognizes a net's, group's or any individual's special privilege to any specific frequency. Section 97.101(b) of the Rules states that "Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station." No one "owns" a frequency.

It's good practice—and plain old common sense—for any operator, regardless of mode, to check to see if the frequency is in use prior to engaging operation. If you are there first, other operators should make an effort to protect you from interference to the extent possible, given that 100% interference-free operation is an unrealistic expectation in today's congested bands.

1.800-1.830	CW, data and other narrowband modes
1.810	QRP CW calling frequency
1.830-1.840	CW, data and other narrowband modes, intercontinental QSOs only
1.840-1.850	CW; SSB, SSTV and other wideband modes, intercontinental QSOs only
1.850-2.000	CW; phone, SSTV and other wideband modes
3.500-3.510	CW DX
3.560	QRP
3.590	RTTY DX
3.580-3.620	Data
3.620-3.635	Automatically controlled data stations
3.710	QRP Novice/Technician CW calling frequency
3.790-3.800	DX window
3.845	SSTV
3.885	AM calling frequency
3.985	QRP SSB calling frequency
7.040	RTTY DX
	QRP CW calling frequency
7.075-7.100	Phone in KH/KL/KP *only*
7.080-7.100	Data
7.100-7.105	Automatically controlled data stations
7.171	SSTV
7.285	QRP SSB calling frequency
7.290	AM calling frequency
10.106	QRP CW calling frequency
10.130-10.140	Data
10.140-10.150	Automatically controlled data stations
14.060	QRP CW calling frequency
14.070-14.095	Data
14.095-14.0995	Automatically controlled data stations
14.100	IBP/NCDXF beacons
14.1005-14.112	Automatically controlled data stations
14.230	SSTV
14.285	QRP SSB calling frequency
14.286	AM calling frequency
18.100-18.105	Data
18.105-18.110	Automatically controlled data stations
21.060	QRP CW calling frequency
21.070-21.100	Data
21.090-21.100	Automatically controlled data stations
21.340	SSTV
21.385	QRP SSB calling frequency
24.920-24.925	Data
24.925-24.930	Automatically controlled data stations
28.060	QRP CW calling frequency
28.070-28.120	Data
28.120-28.189	Automatically controlled data stations
28.190-28.225	Beacons
28.385	QRP SSB calling frequency
28.680	SSTV
29.000-29.200	AM
29.300-29.510	Satellite downlinks
29.520-29.580	Repeater inputs
29.600	FM simplex
29.620-29.680	Repeater outputs

Note

ARRL band plans for frequencies above 28.300 MHz are shown in *The ARRL Repeater Directory* and *The FCC Rule Book*.

IBP/NCDXF beacons operate on 14.100, 18.110, 21.150, 24.930 and 28.200 MHz.

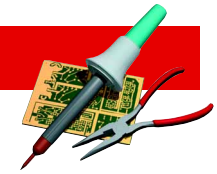
VHF/UHF/EHF Calling Frequencies

Band (MHz)	*Calling Frequency*	
50	50.125	SSB
	50.620	digital (packet)
	52.525	National FM simplex frequency
144	144.010	EME
	144.100	CW
	144.200	SSB
	146.520	National FM simplex frequency
222	222.100	CW/SSB
	223.500	National FM simplex frequency
432	432.010	EME
	432.100	CW/SSB
	446.000	National FM simplex frequency
902	902.100	CW, SSB
	903.100	Alternate CW, SSB
1296	1294.500	National FM simplex frequency
	1296.100	CW/SSB
2304	2304.1	CW/SSB
3456	3456.1	CW/SSB
5760	5760.1	CW/SSB
10000	10368.1	CW/SSB

VHF/UHF Activity Nights

Some areas do not have enough VHF/UHF activity to support contacts at all times. This schedule is intended to help VHF/UHF operators make contact. This is only a starting point; check with others in your area to see if local hams have a different schedule.

Band (MHz)	*Day*	*Local Time*
50	Sunday	6 PM
144	Monday	7 PM
222	Tuesday	8 PM
432	Wednesday	9 PM
902	Friday	9 PM
1296	Thursday	10 PM



Hamtronics T301-2 2-Meter FM Transmitter

It had been almost 20 years since I had assembled a 2-meter FM transmitter kit. My last effort was a nifty little 1-W output strip made by VHF Engineering (anyone remember those kits?). It was a crystal-controlled unit with a couple of multiplier stages and a single output transistor. In contrast, the Hamtronics T301-2 design reflects 20 years of evolution in the form of a dip-switch-controlled frequency synthesizer and modern components such as a tiny surface-mount IC.

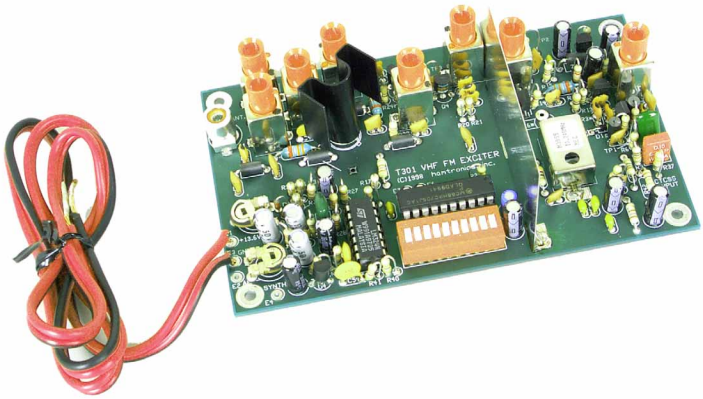
Building the T301-2

The Hamtronics T301-2 comes with informative instruction sheets and application notes, but you won't find the detailed step-by-step assembly directions that you may be accustomed to seeing with other kits. The instructions were adequate for me to build the T301-2 with a minimum of frustration, but I wouldn't recommend this kit to a beginner. The T301-2 is probably best suited to the ham with a little kit-building experience in his or her resume.

As with any kit, the first task is to identify and sort the components. New hams will need to know their resistor color codes well because the parts list only identifies the resistors by value. Capacitors, coils and chokes are straightforward, as are the transistors and ICs. (I needed a magnifying glass to read the transistor markings, though.)

The assembly went smoothly, although the tightly populated 3 × 5-inch circuit board becomes very crowded very quickly. Sockets are provided for all of the ICs except the surface-mount synthesizer chip. This little IC is mounted on the underside of the circuit board and installing it is probably the most difficult aspect of building the T301-2. You have to make sure that the chip is perfectly aligned on the circuit traces before carefully—and I really do mean *carefully*—soldering each leg. A soldering iron with a fine tip, and a set of steady hands, is a must.

My T301-2 was purchased with the high-stability TXCO option. I really didn't need that level of frequency stability, but I wanted to see what the TXCO design had to offer. The module was certainly easy to install; solder three legs and you're done.



After a total of eight hours of work, the T301-2 was complete.

The Smoke Test

I brought my T301-2 into the office and proudly presented it to Mike Tracy, KC1SX, one of the ARRL Laboratory Engineers. He scrutinized my work, then carried the transmitter to the screen room for testing. "Let's set some conservative current limiting on the power supply," he said with a smile. "Just in case."

We connected the dummy load, wattmeter, frequency meter and spectrum analyzer. Mike toggled the power supply switch and I instinctively stepped backward. No smoke! No output, either.

"Not a problem," I said, brandishing the alignment tool provided with the T301-2. I tweaked the oscillator and buffer stages. The wattmeter read 100 mW. As I adjusted the other stages, the power increased to about 1.5 W. Finally, I tweaked the output coupling capacitor and the wattmeter suddenly shot up to the T301-2's specified output of 3 W. Success! At this point the T301-2 was drawing about 500 mA from the power supply.

Turning to the spectrum analyzer, we saw that the output was fairly clean. The strongest spur was –56 dB, which was within FCC requirements. I had set the dipswitch for a frequency of 144.39 MHz and, sure enough, the frequency meter showed the output right on 144.39 MHz. Thanks to the TXCO, the frequency was rock solid throughout the tests. (Setting the dipswitch is not as easy as just dialing in the desired frequency. It uses a binary method that can be more than a little confusing. I "cheated" by going to the Hamtronics Web site and using their table of dipswitch settings for various frequencies.)

You do *not* need all of the test gear we used to check out the T301-2. According to the instructions, you can align the T301-2 with just a VHF wattmeter.

A Fun, Useful Project

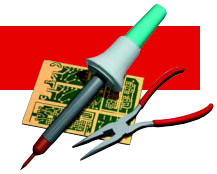
So what do you do with a T301-2? I plan to hook mine up to a miniature packet TNC and GPS receiver to make an Automatic Position Reporting System (APRS) tracker. This little rig would also be useful as a foxhunting transmitter, or as a high-altitude balloon transmitter. Hamtronics offers a companion receiver that you could even use to make your own 2-meter FM transceiver. (No, such a radio wouldn't be as versatile or inexpensive as a commercial unit, but you'd have the satisfaction of knowing that you built it yourself.)

I found that T301-2 kit to be relatively easy and satisfying. I'd recommend the experience to anyone. If you don't want to assemble the T301-2 as a kit, however, Hamtronics is happy to sell you the factory built version.

Manufacturer: Hamtronics, 65 Moul Rd, Hilton, NY 14468-9535; tel 716-392-9430; **www.hamtronics.com**. *T301-2 kit (with crystal oscillator), $109; TXCO option, $40; T301-T factory built transmitter, $189.*

Steve Ford, WB8IMY ♦ QST Managing Editor

HINTS & KINKS



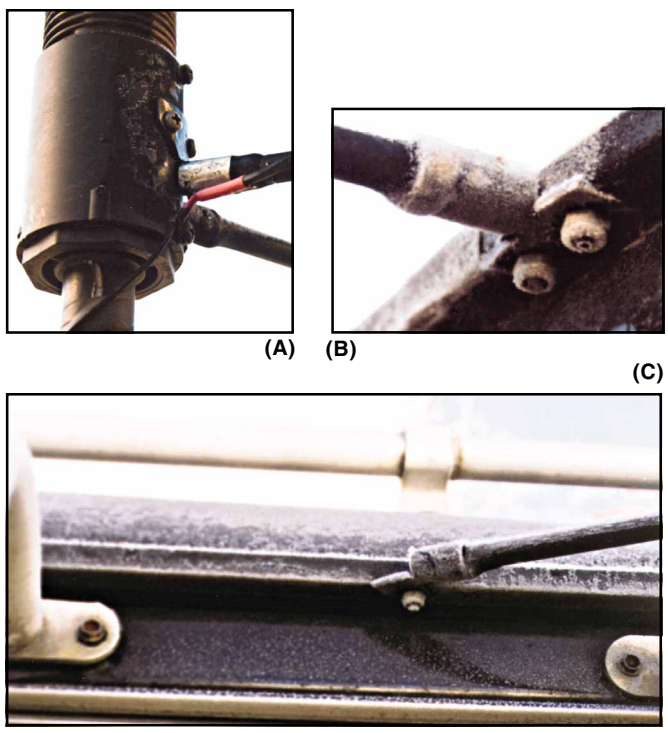
MODIFICATIONS FOR "A $20 HF MOBILE ANTENNA"[1]

◊ Having built this antenna, I thought others might be interested in seeing a small modification to the "stays" or antenna braces.

In the article, King uses braces made of 1/2-inch-diameter PVC pipe from the bottom of the upper coil assembly to the vehicle roof. The large-diameter braces are a little too visible for my taste, so I went in search of something a bit less conspicuous. I finally arrived at a solution harking back a decade or so, to my sport-archery days: carbon-fiber arrow shafts.

[1]Frank King, KM4IE, "A $20 HF Mobile Antenna," *QST*, April 2000, pp 33-35.

Figure 1—Two braces join the antenna to the van at the bottom of the upper coil. (The white fuzzy stuff is frost—*Ed.*)



(A) (B) (C)

Figure 2—Details of the aluminum mounts for the braces: (A) at the antenna, (B) the short brace at the van and (C) the long brace at the van.

The shafts are nonconductive, black in color and stronger, pound for pound, than steel. I chose a 31×0.347-inch OD unfletched shaft from my local archery supplier, and bought two (for a total of $5) in case I managed to destroy one in the process.

After measuring the length of the original PVC braces, I cut the carbon shafts to length with a Dremel tool and an abrasive disk. (The shafts shatter if sawn, so you must use a grinder to cut them.)

With the braces cut to length, I fashioned a pair of aluminum end pieces out of a strip of 0.047-inch-thick aluminum sheet purchased at the local hobby shop. The round portions were formed around the base of a 11/32-inch drill bit. Once they were bent to shape, I forced the aluminum end pieces (they're a snug fit) on the carbon shafts and slathered the assembly with clear epoxy, followed by a coat of flat-black enamel.

So far, the antenna has held up well, and the SWR didn't change when I exchanged the new carbon braces for the old ones made from PVC. I'll let you know how well they survive an Alaskan winter (grin). Figures 1 and 2 show the installation better than I can explain it. Believe it or not, the van doors clear the braces by about 5/8 of an inch.—*Greg Martin, KL0OM, 3127 Peterkin Ave, Apt 2, Anchorage, AK 99508-1049*; **gmartin@gci.net**

GOO REMOVERS

◊ Often at hamfests, you may come across a nice piece of equipment, but perhaps it has a price sticker left on it that just won't come off. Or, maybe it was a surplus unit and has some other stickers or tape that you can't remove.

Telephone companies have used a citrus based cable cleaner for years to remove the waterproof gel from cables when resplicing phone lines. Such cleaner is made by 3M and others, but is hard to find, especially in small quantities.

However, something similar is available almost anywhere, for a few bucks. The best thing I have found to remove sticky goo residue is available at Walmart and other home and automotive stores. It's MEDO[2] brand Ultra Citrus Air Freshener, in a 6-ounce pump spray bottle. You can find the air freshener in the automotive section of the store. It's 100% natural, according to the label, and comes in many "flavors or scents." I've only tried the orange scent, however. The citrus in it will remove almost any sticky goo residue, and it will also loosen those stubborn labels left on equipment. When I get the equipment home, I just spray some on the label or tape and let it soak for a minute or two. The label usually slides right off.

One word of caution: The Ultra Citrus will attack some plastics, so always test it on the material to be cleaned in an inconspicuous place before spraying.—*E. Kirk Ellis, KI4RK, 203 Edgebrook Dr, Pikeville, NC 27863;* **kirke@goldsboro.net**

◊ Several other products also work well for this purpose:

- Goo Gone (Magic American Corporation)
- Goof Off, Goof Off2, Goo Remover (Lilly Industries)

[2]MEDO Industries Inc, 660 White Plains Rd, Tarrytown, NY 10591; tel 914-332-4343, outside New York state 800-431-1358, fax 914-332-8686; **info@medo.com**.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

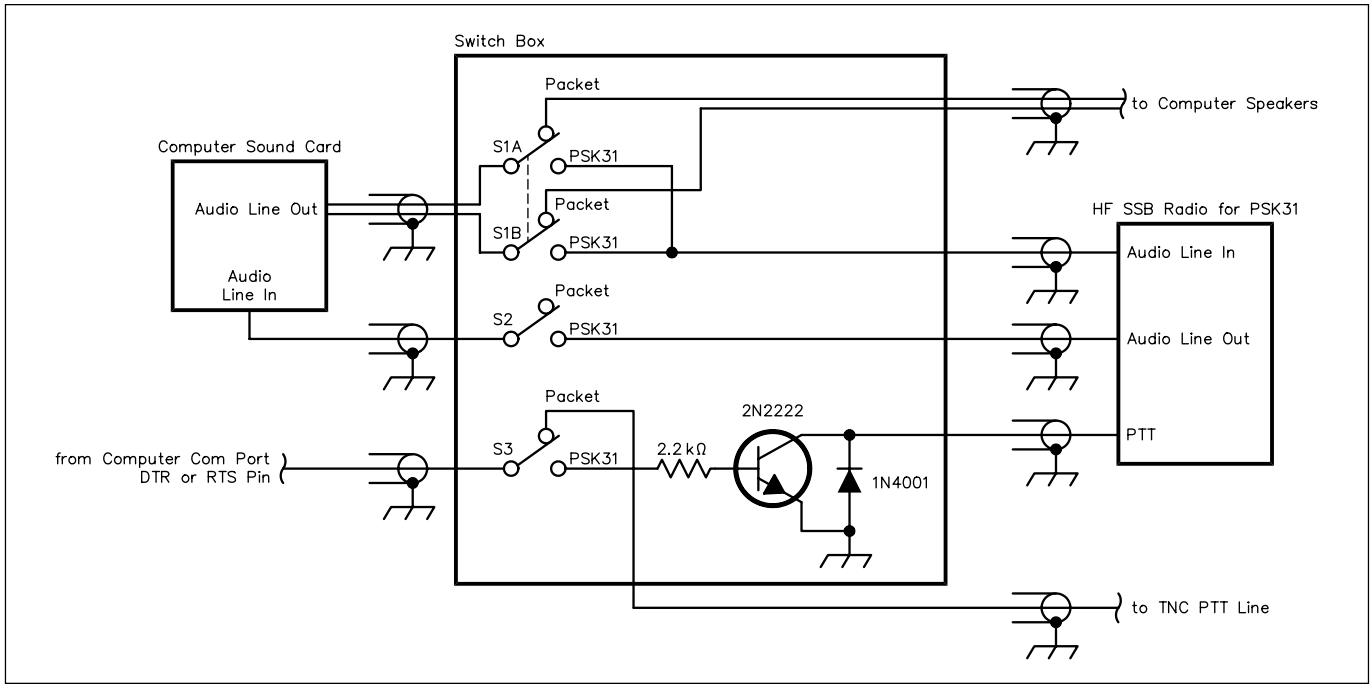


Figure 3—KN6TC's setup for switching between PSK31 and packet operation. If a 4PDT switch is available, S1, S2 and S3 could be combined.

• Krud Kutter (Supreme Chemicals of Georgia)

These products are available at many department stores, hardware stores and supermarkets.—*Bob Schetgen, KU7G, ARRL Staff*

USE THE CRYSTAL CALIBRATOR TO ADJUST DRAKE R-4C OSCILLATORS

◊ The crystal-oscillator and BFO frequencies of an R-4C receiver can be adjusted without any test equipment. This method, which uses the 25-kHz crystal calibrator, is actually simpler than those that use test equipment.

Tune the receiver to the 28.0-MHz band. With the **MODE** switch in the **SSB** position and the calibrator on, tune the receiver to 28.225 MHz. Adjust C59 for a zero-beat note. This works because 28.225 MHz is the fifth harmonic of the 5.645-MHz crystal frequency.

Similarly, with the **MODE** switch in the **AM** position and the calibrator on, tune the receiver to 27.975 MHz and adjust C60 for a zero-beat note. The VFO should to tune to 27.975 MHz although it is outside the band.

To adjust the 50-kHz BFO, connect a 0.1 µF capacitor between pin 2 of V4 and the antenna input connector. Detune the preselector for minimum noise and adjust T11 for a zero-beat note. See the instruction manual for the locations of C59, C60 and T11.—*William J. Robertson, W9WJR, 11408 Brantford Ct, Fort Wayne, IN 46814;* **W.J.Robertson@worldnet.att.net**

PSK31/PACKET SWITCHBOX

◊ I've been listening to PSK for several weeks now and have heard many operators complain about plugging and unplugging connectors in order to use the mode or change to another.

I simply made a harness containing all the necessary cables, switches and enclosures to get around all the changing and fuss. Figure 3 is a schematic of my harness. All parts are available from a junk box or your friendly local RadioShack and/or a retailer that handles computer accessories. For details of the radio and computer connections and operation, see "PSK31—Has RTTY's Replacement Arrived?" by Steve Ford, WB8IMY (*QST*, May 1999, pp 44).—*James H. (Jim) Walker, KN6TC, 211 East 22nd St, Owensboro, KY 42303-5110;* **kn6tc@freewwweb.com**

POWER ATTACHMENT TO GM SIDE-TERMINAL BATTERIES

◊ At Dayton, I've seen GM representatives distributing brochures on how to attach radios to the automotive batteries with the GM side-terminal design. Connections to these batteries are not quite as easy as they were to standard top-terminal batteries, where one may attach directly to the bolts on the terminal clamps. GM offers an attachment terminal for adding radio equipment, but I found it cost over $70 for the necessary hardware. There had to be a less expensive way that would still provide a good connection, and I found it.

Realizing that custom audio installations in vehicles must require lots of current to get that bass to thump so annoyingly, I stopped at a car-stereo installation shop. After a few minutes of discussion with the installer, I had two threaded brass terminal bolts to replace the stock bolts. The difference is that these have an additional threaded stud on the top, where radios can be connected easily. The total cost is under $10, and the resulting connections have proven durable. Be sure to know how many connections are currently on each of your car's battery terminals as that determines the length of each bolt. Happy mobiling! *Duane A. Calvin, AC5AA, 4102 Everest Ln, Austin, TX 78727;* **ac5aa@earthlink.net**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters (see page 10), or via e-mail to **rschetgen@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

Alinco DR-135TP 2-Meter FM Mobile Transceiver

Reviewed by Stan Horzepa, WA1LOU
QST *Contributing Editor*

The Alinco DR-135TP is a 2-meter FM transceiver that is relatively small in size, but big in capabilities.

The radio is available in two versions, either with or without a built-in 1200/9600-baud TNC. Should you initially decide to buy the version without the TNC and later change your mind, an optional plug-in TNC accessory board—the EJ-41U—can be purchased and installed.

The transceiver is also available in a choice of two front panel colors—black or pewter. Choose the color that best complements the interior of your car or the equipment in your shack.

The DR-135TP has an expanded receive range that spans 136 to 174 MHz for FM and 118 to 136 MHz for AM (the AM aircraft band). The AM mode is automatically selected when the receiver is tuned within the lower frequency range.

Other prominent features include 100 memory channels with alphanumeric labeling capabilities, CTCSS and DCS encode and decode, three RF power output settings (50, 10 or 5 W), DTMF autodial memories, an automatic power on/off system and an integrated theft alarm system.

Outside of the Box

The front panel includes a large amber LCD that displays the operating frequency or, when in the memory mode, your choice of either the frequency or an alphanumeric tag in a nice large format. The window also displays icons that indicate the state of many of the transceiver's selectable functions, and the brightness of the background illumination can be toggled between two levels. A vertically oriented 5-section LCD signal strength/RF output meter is located along the extreme right edge.

Surrounding the window are six multifunction keys, volume and frequency controls, a lighted power pushbutton, an LED transmit indicator and jacks for the microphone and "data." No squelch knob is provided. The threshold is adjusted by pressing a front panel **SQL** button and rotating the main encoder. Pressing and holding the same key will open the squelch.

The transceiver's controls are laid out nicely. The knobs and buttons are located far enough apart and are sensibly positioned for easy operation. I didn't run into any difficulties working this radio even while tooling around in my land barge.

The hefty EMS-56 hand mike has a large PTT lever, top-mounted **UP** and **DOWN** buttons and two front-mounted slide switches. One switch controls the backlighting for the mike's DTMF pad; the other disables the **UP** and **DOWN** buttons.

The radio consistently received glowing reports on the quality of the transmit audio.

The DR-135TP's rear panel offers an external speaker jack, a female DB-9 RS-232-C serial port (for computer connection) and a chassis-mounted SO-239 antenna connector. Dc power connection is made through a short pigtail terminated in a standard T-type connector. A mating 9½-foot dc power cord, fused in both leads at the source end, is provided.

There's a small coaxial-style dc power jack positioned just above the external speaker jack. If a connection is made between this socket and a low current (5 mA) vehicle dc power source that is controlled by the ignition switch, the radio will automatically turn on and off with the vehicle. This is a very nice arrangement for the more active mobile operators among us.

Most of the cast aluminum enclosure serves double-duty as a heat sink. Large cooling fins cover both the top and back side, and a sheet metal cover on the bottom provides access to the circuitry inside. The receiver's 2-W audio output and top-mounted internal speaker proved up to the task of supplying plenty of audio for my fairly noisy mobile environment.

Selecting an Operating Frequency

The DR-135TP offers three means of frequency control.

In the VFO mode the frequency is selected by rotating the front panel encoder knob or by pressing the microphone **UP** and **DOWN** pushbuttons. In either case, the frequency changes by a user-programmable step size. Pressing a front panel **MHz** key first allows you to use these same controls to hop around in 1-MHz increments.

In the memory mode, the memory channels are dialed up with the main encoder or the **UP** and **DOWN** buttons. In addition to the operating frequency, each memory is also capable of storing several other related parameters. These include the repeater duplex offset frequency and direction (+ or –), the CTCSS encode and decode tones, the DCS (*digital code squelch*) encode and decode codes, the memory channel lockout state, the busy channel lockout setting and the type of FM (either narrow or wide). Separate CTCSS tones can be programmed for use on transmit and on receive in a single memory position.

Bottom Line

The Alinco DR-135TP is a nicely appointed 2-meter FM mobile transceiver with an interesting twist—a built in 1200/9600-baud terminal node controller. The resulting package simplifies hardware integration for packet and APRS communications applications.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
Alinco DR-135TP, serial number T000510

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 118-136 MHz (AM), 136-174 MHz (FM); transmit, 144-148 MHz.	Receive and transmit, as specified.
Power requirement: Receive, 0.6 A; transmit, 11 A (high power).	Receive, 0.8 A; transmit, 9.0 A. Tested at 13.8 V.
Modes of operation: FM, AM (AM receive only).	As specified.
Receiver	**Receiver Dynamic Testing**
Sensitivity: FM, 12 dB SINAD: <0.25 μV.	FM, 12 dB SINAD, 0.18 μV; AM, 10 dB S+N/N, 120 MHz, 0.7 μV.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing: 64 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing: 64 dB*. 10 MHz channel spacing: 78 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	82 dB.
S-meter sensitivity: Not specified.	Maximum indication: 5.0 μV.
Squelch sensitivity: 0.1 μV.	At threshold: 0.13 μV.
Receiver audio output: 2.0 W at 10% THD into 8 Ω.	2.3 W at 5% THD[1] into 8 Ω.
Spurious and image rejection: Not specified.	First IF rejection, 99 dB; image rejection, 74 dB.
Transmitter	**Transmitter Dynamic Testing**
Power output (H/M/L): 50 / 10 / 5 W.	53 / 9.5 / 4.0 W.
Spurious-signal and harmonic suppression: ≥60 dB	70 dB. Meets FCC requirements for spectral purity.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 170 ms.
Receive-transmit turn-around time (tx delay): Not specified.	102 ms.
Bit-error rate (BER), 9600-baud: Not specified.	Receiver: BER at 12-dB SINAD, 5.9×10^{-4}; BER at 16 dB SINAD, 1.0×10^{-5}; BER at –50 dBm, $<1.0\times10^{-5}$; transmitter: BER at 12-dB SINAD, 2.4×10^{-3}; BER at 12-dB SINAD + 30 dB, 8.5×10^{-5}.
Size (hwd): 1.6×5.6×6.8 inches; weight, 2.2 pounds.	

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

*Measurement was noise-limited at the value indicated.
[1]Maximum volume was reached without distortion exceeding 5%.

The memories can also be assigned an alphanumerical label. That way, instead of trying to remember that 144.95 MHz is the local DX packet cluster frequency, you could tag that particular memory channel "DXCLSTR." The labels can be up to 7 characters long.

A press of the **CALL** button will instantly tune the radio to the programmed call channel. The factory default setting is 145.000 MHz, but this can be reassigned to any simplex or repeater frequency desired.

Direct frequency or memory channel number input from the microphone's DTMF keypad is not supported.

Searching for Activity

The DR-135TP offers several different scanning types and scan configuration options. One is the "VFO Scan." This scan searches the entire range of the receiver's VFO. In "Memory Scan" the receiver searches for activity on the memory channels. Memories with the lockout setting enabled will be skipped.

The "Program Scan" checks all of the frequencies within a particular range. For example, if 146.500 MHz is set as the lower scan limit (by programming it in the "PL" channel memory position) and 147.600 MHz is set as the high scan limit (…in the "PH" memory), the receiver will search frequencies between 146.500 and 147.600 MHz.

When the receiver encounters activity in any of these cases, the scan will stop. A menu setting allows you to have the scan pause on a frequency for 5 seconds or for as long as the activity continues.

The radio is also capable of scanning the signals it receives for a CTCSS tone or DCS code. Activate the "Tone Scan" mode while receiving a particular signal, and this feature will quickly step through the available tones or codes until it finds a matching value.

Features Galore

A variety of additional features and operational setting options are included. Most of these are controlled through a "Parameter Setting Mode" menu.

The channel step setting determines the step size of the increments or decrements when changing the frequency with the main encoder, the mike's **UP** and **DOWN** buttons or when scanning. The available step values are 5, 8.33, 10, 12.5, 15, 20, 25, 30 or 50 kHz.

If you are using a voice repeater that has a time-out timer (intended to limit long-winded transmissions), you can set up the DR-135TP to sound an alert just before the repeater is about to time out. Ignore the alert and the transceiver will

automatically stop transmitting 5 seconds later. In addition, a time-out penalty feature can be enabled to prevent transmission for up to 15 seconds after exceeding the time-out period.

An automatic power-off feature can shut the transceiver off after 30 minutes of inactivity. This is a handy way to avoid inadvertently running down a car or storage battery.

A theft deterrent feature can be enabled that will activate an alarm if a security cable is improperly removed. This system is set up by plugging in two provided cables. One cable is looped through the steering wheel (or an alternative fixed point) of your vehicle and is mated to the second cable. The second cable is plugged into the radio's front panel **DATA** connector. Once the system is armed, breaking the connection between the cables (when an attempt is made to remove the unit from the vehicle or when the cable is unhooked to allow rotation of the steering wheel) will sound the alarm.

The alarm can be turned off remotely via radio. Once the alarm is set off, the radio begins monitoring the frequency programmed into memory channel 99. If it receives a signal, the alarm will deactivate. While this did raise some eyebrows at HQ, this is legal in the 2-meter band under the FCC rules on "telecommand" (defined under 97.3(a)(43)) and is permitted in these frequencies as outlined in 97.111(b)(3).

The alarm emits a fairly loud, high-pitched sound that should certainly attract attention, but it's not exactly ear-shattering.

The memory data and operating parameters that have been programmed into one DR-135TP can be "cloned" to another. The **DATA** jacks on the "master" and the "slave" are interconnected using a cable with $^1/_8$-inch stereo plugs on each end (not included). The radios are then commanded to perform the data transfer and the master replicates its setup information in the slave.

The DR-135TP also features a DTMF autodialer. This will store up to ten 16-digit DTMF strings for commonly used phone numbers or for DTMF remote control sequences. The instructions in the manual for programming and transmitting these are incomplete though.

Follow the directions in the manual and program the DTMF memories. The last digit in the string—"0"—will always remain flashing—this digit is not transmitted (For example, if the desired phone number is 594-0216, it should appear in the display as 59402160. The final digit—the "0"—should be flashing.)

To select and transmit the contents of one of the memories, enter the autodial mode and select the desired DTMF memory by scrolling through the choices with the microphone's **UP** and **DOWN** buttons. Next, exit the autodial mode while the desired memory is still in the display. From this point on, any time that the PTT lever is held down and the mike's **UP** button is pressed, the sequence in that DTMF memory position will be transmitted.

The radio can generate tone-burst frequencies of 1000, 1450, 1750 or 2100 Hz. Tone burst is used as an access control system in some repeater systems outside the US.

The TNC Within

Our product review unit—being a DR-135TP ("P" stands for packet)—came equipped with the EJ-41U 1200/9600-baud packet radio terminal node controller.

There are two jacks on the transceiver that are used for interfacing external equipment to the internal TNC. A female DB-9 connector on the back panel provides an RS-232-C serial interface for connecting a personal computer. An $^1/_8$-inch stereo phone jack on the front panel—the **DATA** jack—allows for connection of a GPS receiver. The GPS receiver used with this radio must be one that is NMEA-0183 compatible or one that outputs data in a "SONY" proprietary format.

The internal TNC employs a subset of the AX.25 Version 2 Level 2 command set, which includes the basic commands necessary to conduct packet radio communications in the 2-meter band. Although there are no built-in mailbox commands, there are commands that permit the TNC to operate as an APRS tracker. The position data is supplied by the external GPS receiver.

I successfully used the DR-135TP to access local packet bulletin boards, packet radio networks and a nearby DX packet cluster. For software I used a basic terminal program running on my laptop. All I had to do is match the communication parameters of my terminal program with the communication parameters of the DR-135TP's serial port. These are 9600 baud (the data rate between the radio and the computer), 8 character bits, no parity, 1 stop bit and Xon/Xoff flow control. I entered my call sign with the MYCALL command and then invoked the CONNECT command.

The integrated TNC makes it especially convenient to use this radio for both voice and data communications. The microphone can remain connected. In the data mode, the mike element is automatically disabled. The receiver's audio is muted as well, thus relieving the operator from having to listen to the deafening racket of all those noisy packets.

ARRL Lab test data (see Table 1) for 9600-baud BER performance shows that the bit error rate is sufficiently low under strong-signal conditions for reasonably good data throughput. The weaker signal levels *do* result in a higher level of errors, but a note in the manual clearly states that effective 9600-baud packet operation with the DR-135TP depends heavily on strong signal levels.

APRS Tracking

Being APRS active, I was anxious to test the transceiver's APRS capabilities. I connected my Macintosh laptop to the DR-135TP installation that I had set up in my car and ran *MacAPRS* software. No problem! *MacAPRS* exchanged information with the radio and the map on the computer screen soon began filling up with APRS icons.

I quit *MacAPRS* and connected a GPS receiver to the DR-135TP's front panel **DATA** jack and fired up a plain vanilla terminal program.

I invoked the RESET command to return the internal TNC's parameters to their factory default settings. I then programmed several parameters that are required for APRS tracker operation. Those parameters are:

AUTOLF OFF
ECHO OFF
FLOW OFF
GBAUD 4800 (match this setting to your GPS's data output rate)
GPSTEXT $GPRMC
LOCATION EVERY 6 (6 represents 60 seconds)
LPATH GPSMV VIA <*your digipeater path*>
LTMHEAD OFF
MYCALL <*your call sign and SSID*>
LTMON 10
UNPROTO APRS VIA <*your digipeater path*>

(My thanks to Jeff Reinhardt, AA6JR, for confirming these settings.)

The other TNC parameters can remain at their factory default values.

The DR-135TP will not operate properly in the APRS tracker mode if you depend on the directions presented in the documentation. I recommend that you keep these programming parameters handy. These will save you considerable frustration when setting up the DR-135TP as an APRS tracker.

Those using an NMEA-0183 compatible GPS receiver should set it for NMEA output at 4800 baud. Incidentally, the transceiver emits a low-volume, high-pitched buzz as it receives each packet of data from the GPS receiver. This provides a simple way to confirm that the

transceiver is actually receiving data from the GPS receiver.

After disconnecting my laptop from the DR-135TP, I headed back to my shack and ran *MacAPRS* on the station computer. I wanted to verify that I could track my DR-135TP/GPS equipped vehicle. I took a short drive around the neighborhood and then headed home again. On my return, I was very pleased to see that my tracks did indeed appear on the station computer's map.

I continued to run the tracker during my daily travels around town and back and forth to work. What a difference 50 W makes! Where my usual low-powered tracker system (5 W) normally drops out of sight in the shadow of the mountain where my APRS digipeater is located, the DR-135TP-based tracker consistently marked its path.

The Written Word

The DR-135TP comes with two manuals. A printed manual covers the general operation of the transceiver, while an electronic manual on diskette covers the operation of the TNC. A schematic diagram is also provided.

The printed *Instruction Manual* contains the usual transceiver programming instructions and includes lots of diagrams and handy quick reference tables. The electronic manual for the built-in TNC is on floppy disk. The files are supplied in two formats: plain ASCII text format and Adobe Portable Document Format (PDF). These can be viewed on any computer platform that has text or PDF support. The supplied diskette is in *DOS* format.

In general, the documentation does a reasonably good job of describing how to operate, program and tailor the settings in the DR-135TP. However, the information for programming the TNC for APRS tracker operation and setting up and using the DTMF autodialer are lacking.

The Final Word

Overall, the DR-135TP is a very nice mobile 2-meter transceiver. It is easy to use in spite of its long list of features. It offers nice-sounding transmit and receive audio and plenty of RF power to keep you within communications range as you traverse the highways and byways.

Its available built-in packet radio capabilities are icing on the cake. Anyone who is considering putting together a 2-meter packet radio station for use at home or on the road should seriously consider the Alinco DR-135TP. The space-saving aspect of the integrated radio/TNC combination makes it an especially attractive package for anyone who's trying to cram a packet radio setup inside a modern space-challenged vehicle.

The DR-135TP's facilities for dual mode operation (both voice *and* data) certainly earn it an enthusiastic two thumbs up from this digitally-inclined reviewer.

Manufacturer: USA Alinco Branch, 438 Amapola Ave, Suite 130, Torrance, CA 90501; 310-618-8616; fax: 310-618-8758; **www.alinco.com**.

Manufacturer's suggested list price, DR-135TP, $428; DR-135T, $313; EJ-41U (for installation in the DR-135T version), $140. Typical current street price, DR-135TP, $300; DR-135T, $220; EJ-41U, $120.

AOR DDS-2A External Local Generator for the Collins KWM-2 and S/Line

Reviewed by Joe Bottiglieri, AA1GW

The main operating position in my basement shack is probably fairly typical. It includes a solid-state HF/6-meter transceiver, a couple of VHF and UHF rigs, a Pentium computer, a TNC, a handful of modern station accessories and a color television set (for when propagation *really* goes south!). Nearly everything is interconnected.

In addition to phone and CW operation, I'm all wired up and ready to rock with the latest software for the sound card-based digital modes. The station computer and the radios freely exchange information for computer-aided logging and contesting and the vast resources of the World Wide Web are but a couple of mouse-clicks away.

Turn 180 degrees and take a small leap forward though, over an imaginary line that divides my radio room, and you'll take a giant step backward in time. Welcome to the ham radio equivalent of the set of "That '70s Show." Nothing manufactured after the moment Neil Armstrong set foot on the Moon was, until recently, welcome here.

As is the case with many hams my age, over the last few years I've developed a proclivity for collecting things that were once, when I was younger, the unattainable objects of my desire.

Bottom Line

The AOR DDS-2A External Local Generator adds some of the more desirable conveniences and capabilities—previously only found in contemporary amateur equipment—to the classic Collins KWM-2 and S/Line models.

A small number of well-worn boat-anchors stare down silently from the simple pine shelves. The centers of attention in this time-warped diorama, permanent fixtures on the operating desk of this second station, are my personal pride and joy: a Collins KWM-2 transceiver and a 75S-3 receiver.

Table 2
AOR DDS-2A, serial number 00146

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: HFO, 6.55-32.95 MHz; VFO, 2.495-2.695 MHz.	As specified.
Stability: 5 ppm.	As specified.
Accuracy: Not specified.	Typically better than 1 ppm.
Power requirement: 0.6 A, 12-13.8 V dc.	0.35 A. Tested at 13.8 V.
Power output: HFO, 2.0-2.3 V RMS into 50 Ω; VFO, 2.0-2.3 V RMS into 100 Ω.[1]	As specified.
Spurious-signal and noise suppression: HFO, 70 dB at 1-25 kHz spacing, 75 dB at 26 kHz to 1 MHz spacing; VFO, 80 dB at 1-25 kHz spacing, 90 dB at 26-250 kHz spacing.	As specified.
Phase noise: 130 dBc/Hz at 25 kHz spacing.[2]	As specified. See Figure 1.
Size (hwd): 3.2×7.1×7.1 inches; weight, 4.2 pounds.	

[1]HFO output specification is equivalent to 19-20 dBm. VFO output specification is equivalent to 16-17 dBm.
[2]In a transmitter, this figure is a component of the transmitted composite noise.

An Aberration in the Time/Space Continuum

Only my antenna feed lines—and I—dared cross the line from "now" into "then." Recently however, motions have been filed for a rules change.

It all began innocently enough. For the last five years or so, AOR Inc—a well-known manufacturer of high-end scanning and shortwave receivers—has been offering a very interesting product—the DDS-2A "External Local Generator." Connect this accessory to a Collins KWM-2 or KWM-2A transceiver, or Collins S/Line equipment (the 75S-series receivers and the 32S-series transmitters) and some of the more desirable features that we've come to know and love in our more contemporary amateur rigs become available.

While, at first blush, the unit seems to be little more than an external VFO, the DDS-2A adds several enhancements to these extremely popular vintage radios.

I just *had* to give one a try…

The Generation Gap

The KWM-2 transceiver and the S/Line equipment—as delivered—covers 80, 40, 20 and 15 meters and a portion of 10—28.5 through 28.7 MHz (an additional slice of spectrum for receiving WWV on 15 MHz is also included). Each of the bands is divided into 200 kHz subsections. A band switch selects the desired band segment and the main tuning knob is used to tune around within the 200 kHz range.

The band switch controls a "High-Frequency Crystal Oscillator." The frequency of this oscillator is determined by one of 12 plug-in crystals, each corresponding to a particular band segment. Combinations of the frequencies generated by the main VFO and this HFO establish the radio's operating frequency.

(A note to other Collins aficionados: I hope you'll forgive me for not going into a protracted discussion on the 312B-5 VFO console, the 114-crystal CP-1 crystal pack, the optional crystal deck and/or the military/MARS versions of these rigs.)

Needless to say, these fine old tube-based radios didn't come equipped with digital displays, general coverage receive, 30, 17 and 12-meter coverage and programmable memories. In the case of the KWM-2, split frequency operation was also not supported. Once interconnected with a DDS-2A however, all of these features—and pinpoint frequency accuracy and TCXO-based stability to boot—are all at your fingertips.

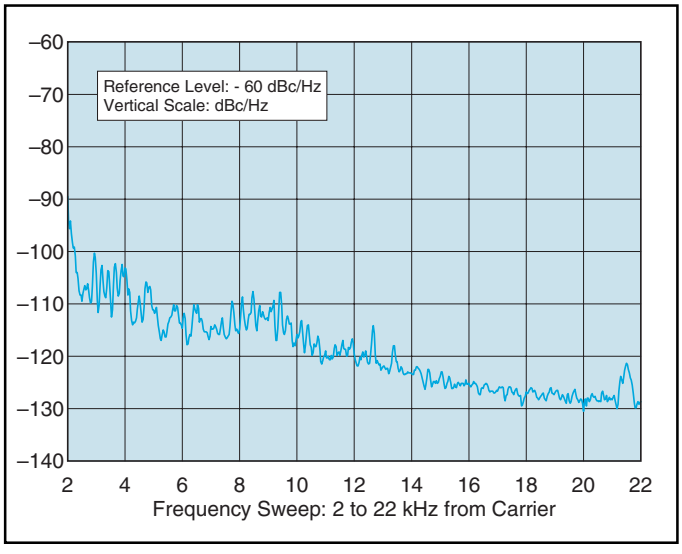


Figure 1—Worst-case spectral display of the output of the AOR DDS-2A external local generator during phase-noise testing of the HFO output at a frequency of 17.15 MHz (this is equivalent to a display frequency of 14.02 MHz). The generator's output is approximately 2.3 V RMS. The carrier, off the left edge of the plot, is not shown. The graph shows the phase noise generated 2 to 22 kHz from the carrier.

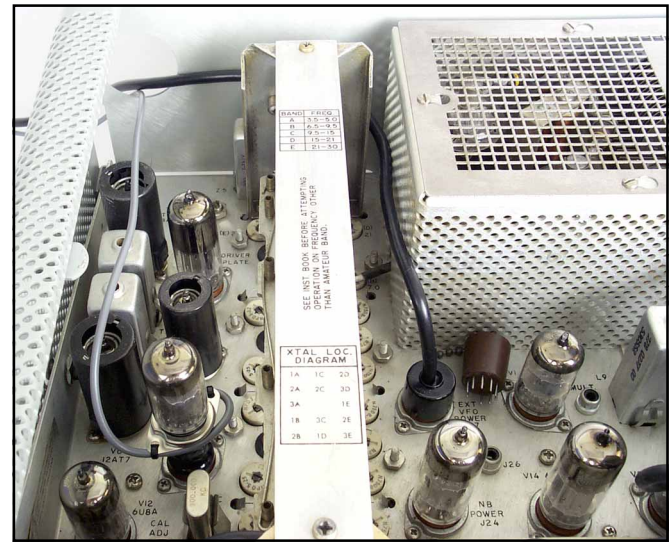


Figure 2—The DDS-2A microprocessor controlled VFO connects to the Collins KMW-2 or KWM-2A via three cables. One plugs into the EXT VFO POWER jack (the black cable on the right side of this photograph) and a second connection is made via a riser inserted between tube V13 and its socket (the gray cable on the left). A third cable, not shown, attaches to the EXT VFO phono jack located on the back panel of the transceiver.

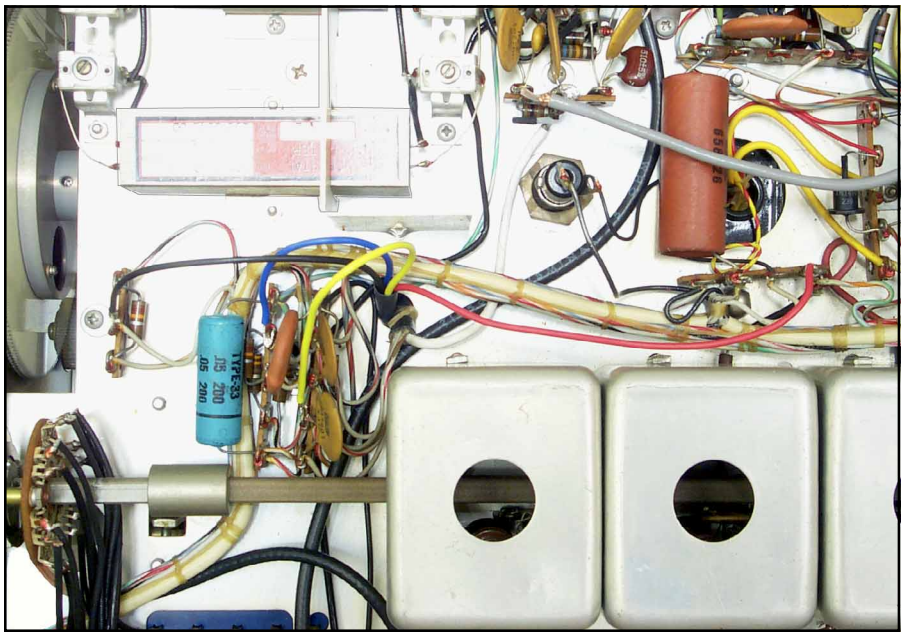


Figure 3—The DDS-2A wiring connections for a Collins 75S-3. The radio's front panel is towards the left. The black, blue, yellow and red wires attach to terminals that connect to ground, the mute line, the mode switch and B+ voltage respectively. The coax cable (with the gray jacket) connects the VFO signal input terminal and an unused (SPARE) phono jack on the rear apron.

Hooking Up

The KWM-2 and KWM-2A

Wiring the DDS-2A to the KWM-2 or '2A is a simple matter of plugging in a few interconnecting cables and feeding 12 V dc power to the unit. AOR supplies of all the necessary leads with the various plugs and jacks already installed—no soldering is required.

Two of the cable connections to the transceiver are internal, but both are readily accessible under its hinged top cover (see Figure 2). The cables are passed through a large existing hole in the back panel of the KWM-2's cabinet. A third cable is plugged into the **EXT VFO** phono jack located on the rear apron. The three cables mate with jacks on the back of the DDS-2A. Installation takes just a few minutes and converting the radio back to its normal (internal VFO) configuration is equally quick and painless.

The S/Line

Connecting the DDS-2A to Collins S/Line equipment is more challenging.

For the 75S receivers, the installation procedure begins with the addition of a 15 kΩ resistor across a power resistor within the DDS-2A. Next, the receiver's chassis is removed from its cabinet to gain access to the underside (see Figure 3).

The radio's existing VFO is contained in a small box located just behind the main tuning dial on the top side of the chassis. A multiconductor cable exits the back of this box and passes through a hole to the underside of the chassis. Only one of the five wires in this cable is coax.

The center conductor of the coax—the RF output from the internal VFO—is removed from the terminal strip that it's connected to and taped off. An RG-174 coax jumper is then prepared and installed between an unused phono plug (labeled **SPARE**) on the rear apron of the receiver and this same terminal.

Color-coded wires are soldered to four of the lugs in an inline 9-pin socket. These leads are passed down through the same hole as the VFO's multiconductor cable and are connected to ground, the mute line, the mode switch and a source of B+ voltage.

The 15 kΩ resistor, the RG-174 coax, the 9-pin socket and the four wires are all supplied with the DDS-2A.

The instructions provided by AOR do not include detailed diagrams or descriptions of recommended connection points to the receiver's circuitry. Figure 3 shows where I chose to connect the wires in *my* 75S-3. If you are *at all* squeamish about using the information given in the DDS-2A documentation and the Collins manual to trace the wiring and locate and verify these points for yourself, seek assistance from an Elmer.

Once these modifications are complete, the chassis can be reinstalled in the cabinet. Hooking up the interconnecting cables between the 75S and the DDS-2A is then very similar to the arrangement described for the KWM-2. The inline 9-pin jack becomes the **EXT VFO POWER** socket, the **SPARE** phono connector is now the **EXT VFO** jack, and the tube riser with the cable is inserted between tube **V3** and its socket. If you want to switch back to using the receiver's built-in VFO, you'll have to remove the chassis from the cabinet, unhook the coax that now goes to the **SPARE** connector and reattach the output coax from the internal VFO. The DDS-2A cables are then unplugged and removed and tube **V3** is returned to its socket. The 9-pin socket can remain installed.

With the DDS-2A set up with a 75S-series receiver, you can interconnect a 32S-series transmitter using the standard Collins S/Line integration arrangement. This allows use of the DDS-2A VFO for S/Line station transceive (including split frequency operation). The frequency of both the receiver and the transmitter will be controlled by the DDS-2A.

An installation procedure for wiring the DDS-2A directly to a 32S-series transmitter is also described in the manual. This is primarily intended for applications where these Collins transmitters are used with any non-S/Line receiver.

A couple of resistors, a capacitor and a coax cable with phono plugs on each end are needed. These components are not supplied by AOR.

Minor modifications to the transmitter's circuitry are necessary. This installation involves some part swapping, and—as you can imagine—returning the transmitter to its original internal-VFO configuration becomes a little more involved.

Looking Good

AOR did a very nice job of designing the DDS-2A so that it complements the style of the Collins gear. The cabinet has the distinctive rounded edges and front panel trim ring. The three-color paint scheme closely approximates that of the radio's. The quality of the construction and finish is top-notch.

The front panel has a nice large backlit LCD display that renders the frequency and memory channel numbers in easy-to-read digits. Icons in the display indicate which VFO—A or B—is currently in use. Ten pushbuttons set up in two rows of five are similar in title and function to the frequency controls you commonly find on present-day HF transceivers. There's **ENTER**, **M.in**, **M/VFO**, **VFO**, **A=B**, **SPLIT**, **LOCAL** and **LOCK** buttons (the **LOCAL** button is not used). Right and left arrow buttons select the frequency digit that's varied with the main tuning knob. This provides a tremendous selection of "step sizes" for moving around through the frequencies or bands. The tuning and display frequency resolution is 1 Hz. The

slowest tuning rate setting is very fine—*considerably* finer than that of the transceiver's built-in VFO.

The tuning knob on the DDS-2A is approximately 2¼-inches in diameter and features a spinner dimple. The shaft size used on the encoder is the same as that in the Collins gear, so an actual Collins tuning knob can be substituted to further enhance the "factory" look. The rotation feels smooth—nearly as good as the VFOs on the Collins.

Five LEDs are arranged in a semicircle on the left side of the front panel. Each is labeled with a letter. These letters correspond to the band switch ranges on the front of the connected Collins radio. These **BAND** LEDs indicate which band switch position to set the radio for a particular operating frequency.

Worlds Collide

With my KWM-2 and the DDS-2A all wired up and ready to go, I decided to begin with a cruise through 20 meters. I set the transceiver's band switch to the 14.2 position, dialed up 14.22500 MHz on the digital display, and then tuned the transmitter using the same old familiar time-honored procedure (peak and dip, peak and dip…). All loaded up and ready for bear, I switched from the dummy load to the antenna, touched up the loading, and began tuning down the band.

As I approached 14.200, I encountered the telltale signs of a DX station working split—folks were frantically shouting their call signs over a wide chunk of radio real estate. Split frequency operation is not supported in a standalone KWM-2, but it *is* with a DDS-2A connected.

I programmed a strategically chosen transmit frequency and the DX station's frequency into the DDS-2A's dual VFOs, pressed the front panel **SPLIT** button, and dove headfirst into the fray. I was soon rewarded with a new country contact for this band. This was *very* cool. Suddenly the imaginary line just behind my wooden chair was becoming a *dotted* imaginary line…

Next, I took a brief junket to 30 meters, a ham band hitherto unexplored by this particular piece of American iron. I set the digital display to 10.10800 MHz, clicked the transceiver's band switch to 14.0 (as suggested by the LED **BAND** indicator on the DDS-2A) and maximized the receive signal with the radio's **EXCITER TUNING** control (it serves double-duty as a preselector on receive). I was surprised to discover that the peak fell somewhere between the 80- and 40-meter band marks that are printed around the perimeter of the control. A little further reading in the KWM-2's manual revealed the reason.

A graph in the section that covers operation outside of the amateur bands (10 MHz was *not* an amateur band when this transceiver was all shiny and new) provides "logging scale" value starting points for the **EXCITER TUNING** and **P.A. TUNING** controls for the full range of this transceiver's frequency capabilities. The peak I had encountered was right where it belonged. I completed tuning up the transmitter and worked a couple of CW stations just for kicks.

Operation on 30, 17 and 12 meters results in variations in the optimum position of the radio's **INCR LOAD** lever—it may no longer line up with the **50 Ω** mark. This is not a sign of trouble in a properly working radio. Limitations in the design of the KWM-2 and S/Line radios do not allow operation between 5 and 6.5 MHz.

The DDS-2A adds general coverage receive to the KWM-2, so I spent a bit of time listening to AM shortwave broadcasters—albeit in the LSB mode. (This radio doesn't include the AM mode.) Careful tuning of the AM signals in LSB works pretty well though—especially at the 1-Hz tuning rate.

I was anxious to give the 75S-3 its turn. It took me a little over an hour to perform the conversion.

Cruising the Shortwaves in Style

The 75S-series receivers were highly respected in their day, and linking one with an external accessory that results in general coverage receive, 1-Hz tuning, a digital display and 100 memory channels is a wonderful enhancement.

I'm not an avid shortwave listener, but a setup like this could quickly turn me into a convert. The rich-sounding tube-enhanced audio pouring out of the ancient Hallicrafters speaker I had the rig connected to was enough to impress even my spouse. The selectable tuning steps and the multiple memories made it easy to tune around and locate and store interesting stations.

The Rub…

The appropriateness of tagging on one of these new-fangled solid-state DDS-2A VFOs to classic Collins gear is predictably a hot topic of debate among folks who own, operate and care for these faithful, aging classics. Some are adamant in keeping everything in their station absolutely original, while others are willing to experiment with enhancements. I'll forewarn the purists though: If you give one of these units a try you'll likely find yourself very reluctant to part with it.

The DDS-2A is not exactly an inexpensive accessory. Considering that this is high quality, custom-designed equipment for a very small market—much as the Collins gear was in its day—I guess we shouldn't find this too surprising.

With a list price that's nearly equal to that of some economy-class HF transceivers, justifying the expense of one of these with my mate would definitely involve a very liberal application of fuzzy math.

Hmmm, perhaps there are a few idle treasures hanging around on those pine shelves that I could stand to part with…

Manufacturer: AOR USA Inc, 20655 S Western Ave Suite 112, Torrance, CA 90501; 310-787-8615; fax: 310-787-8619; **www.aorusa.com**.

Manufacturer's suggested list price, $769.95.

FEEDBACK

◊ Andrew S. Griffith, W4ULD, author of "A 146- and 445-MHz J-Pole Antenna," *QST*, Oct 2000, pp 50-53, has identified an antenna resonant-frequency problem resulting from the use of heavier type L copper pipe in lieu of the type M pipe. Because the description is lengthy and contains four graphs and a picture in JPG format, we're making the information available as a ZIP file downloadable from the ARRL ftp site. Visit **www.arrl.org/files/qst-binaries/** and download the file GRIFFFB.ZIP.—*Ed.*

◊ After visiting six RadioShack stores in the Chicago area, I was unable to find the DPDT relay (RS 275-249) used at K1 in Jim (N9ART) Mitrenga's article, "A Flexible Digital-Mode Interface," *QST*, Nov 2000, pp 39-42. RadioShack does stock a part with the number 275-249a (note the suffix), but that unit does not fit the holes in the FAR Circuits PC board made for this project. I did find a fitting substitute, however, at local supply house: Crash Electronics, Lombard, IL, **www.crashelectronics.com**. The NTE R40-11D2-12 (DPDT 2A-12VDC) relay fits the FAR PC-board mounting holes. This relay has contacts rated at 2 A rather than 5 A. (The difference in contact current rating will likely not matter for the switching purposes intended with modern rigs.—*Ed.*)—*tnx Peter Laws, N5UWY/9, Lombard, IL*

◊ The price of the Paddlette KP-4 Iambic Key/Keyer that appeared in the *New Products* announcement on page 94 of the December 2000 *QST* is incorrect. The $94 price includes an optional knee mount. The unit sells for $84 without the mount. Also misstated: the contents of the message memories in the KP-4 keyer *are* volatile. QST

Previous Feedback

FCC *Order* Declines to Include CC&Rs in PRB-1

The FCC has denied an ARRL *Petition for Reconsideration* calling on the Commission to declare that PRB-1 applies to amateurs living in areas governed by deed restrictions or condo regulations just as it does to hams regulated solely by local zoning laws. The FCC *Order* also sought to "amplify" the definition of the oft-cited "reasonable accommodation" phrase in PRB-1 with respect to local land use and zoning.

The *Order* said the League failed to demonstrate any "significant change in the underlying rationale of the PRB-1 decision" that would necessitate revisiting the issue.

Deputy Wireless Telecommunications Bureau Chief Kathleen O'Brien Ham issued the November 13 *Order* under what's known as "delegated authority." At press time the ARRL was mulling whether to submit an application for review by the full Commission.

ARRL Executive Vice President David Sumner, K1ZZ, expressed disappointment. "The *Order* provides some additional clarification on the extent of PRB-1 preemption, but it falls short of providing the relief that ARRL was seeking," he said. Sumner said the denial was "not particularly surprising at this point, especially when you're asking the same person [Ham] to 'rethink' their original decision." He said the League believes the issue is "critically important" and continues to gather additional information and plan on how to present its arguments more persuasively before the FCC.

The ARRL has argued that since PRB-1 was promulgated in 1985, the FCC has made it clear that it has Congressional authority to prohibit restrictive covenants that could keep property owners and even renters from installing antennas to receive TV, satellite and similar signals. The League asserts that the same principle applies to Amateur Radio.

The *Order* said that regardless of the extent of the FCC's discretion with respect to CC&Rs, "we are not persuaded by ARRL's arguments that it is appropriate at this time to consider exercising such discretion with respect to amateur station antenna preemption," the *Order* said.

The FCC *Order* also took the opportunity to clarify by example what PRB-1 means by "reasonable accommodation."

"The Order . . . falls short of providing the relief that ARRL was seeking"

The *Order* says the FCC does not believe that zoning regulations providing for extreme or excessive prohibition of amateur communications "could be deemed to be a reasonable accommodation." As an example, the *Order* said, "we believe that a regulation that would restrict amateur communications using small dish antennas, antennas that do not present any safety or health hazard, or antennas that are similar to those normally permitted for viewing television" is not reasonable accommodation or minimum practicable regulation.

On the other hand, the *Order* said, communities wanting to "preserve residential areas as livable neighborhoods" would be free to adopt zoning that forbids antennas "commonly and universally associated with those that one finds in a factory area or an industrialized complex." The FCC conceded that while such rules could constrain amateur communications, "we do not view it as failing to provide reasonable accommodation to amateur communications."

The FCC *Order* also stuck to the earlier conclusion that current PRB-1 standards "are sufficiently specific to cover any concerns related to unreasonable fees or onerous conditions." The FCC also said that it continues to believe that it should not specify height limitations below which communities may not regulate.

The *Order* combined the FCC's response to the ARRL *Petition for Reconsideration* with its response to a similar filing from Barry N. Gorodetzer, N4IFE, and Kathy Conrad-Gorodetzer, KF4IDH, of Ft Lauderdale, Florida.

NEW CENTRAL DIVISION DIRECTOR, HUDSON DIVISION VICE DIRECTOR ELECTED

The ARRL Central Division will get a new director, and a former Hudson Division vice director and director and ARRL First Vice President is back as the division's new vice director. Incumbents will return to office in the Northwestern, New England and Roanoke divisions. Ballots were counted and tabulated November 17 at ARRL Headquarters.

In the Central Division, challenger George R. "Dick" Isely, W9GIG, topped the field in a three-way race for the Director's seat. He outpolled incumbent Director Edmond A. Metzger, W9PRN, and a second challenger, Richard David Klatzco Jr, N9TQA. Isely picked up 1926 votes to 1466 for Metzger and 946 for Klatzco. Central Division Vice Director Howard Huntington, K9KM, was unopposed for re-election.

ARRL Central Division Director-elect Dick Isely, W9GIG.

In the Hudson Division, former ARRL First Vice President and Hudson Division Director and Vice Director Stephen A. Mendelsohn, W2ML, ousted incumbent Vice Director J.P. Kleinhaus, W2XX. The vote was 2240 for Mendelsohn and 1187 for Kleinhaus. Hudson Director Frank Fallon, N2FF, was unopposed for re-election.

In the Northwestern Division, incumbent Director Greg Milnes, W7OZ, edged out Mary E. Lewis, W7QGP, a former Northwestern Director, 2383 to 2237. Milnes had defeated Lewis for the vice director's slot in 1998, then moved up to director following the death of Director Mary Lou Brown, NM7N. Incumbent Northwestern Division Vice Director James E. Fenstermaker, K9JF, outdistanced challenger Edward W. Bruette, N7NVP, 2620 to 1873.

ARRL PHOTO

Outgoing Central Division Director Ed Metzger, W9PRN, has served as director since 1981 and has to his credit 42 years of service as an ARRL elected official.

Isely, the Central Division Director-elect, is an ARRL

Rick Lindquist, N1RL ♦ Senior News Editor

ARRL PHOTO

Back in the Hudson Division leadership as Vice Director is former ARRL First VP and Hudson Director and Vice Director Steve Mendelsohn, W2ML.

and AMSAT Life Member and Extra class licensee. Licensed since 1977, he is perhaps best known for his role as an organizer, officer and board member of the National Frequency Coordinators Council. Among other candidate platform positions, Isely pledged to promote improved recruitment of young people into Amateur Radio, to lobby for spectrum protection legislation, and to work to expand PRB-1 to include covenants and restrictions.

Mendelsohn, the Hudson Division Vice Director-elect, was a familiar face on the ARRL Board for 17 years. While First Vice President, Mendelsohn was a nominee to succeed Rod Stafford, W6ROD, for the ARRL presidency. He was thwarted in that bid last January when the ARRL Board of Directors elected Jim Haynie, W5JBP, on a 9-6 vote. An ARRL life member, Mendelsohn headed the ARRL Computer Committee that spearheaded system upgrades at ARRL Headquarters.

ARRL PHOTO

ARRL election officials, West Gulf Director Coy Day, N5OK (left, standing), and Southeastern Director Frank Butler, W4RH (right, standing), share a light moment with ARRL Headquarters staffers counting ballots November 17 at ARRL Headquarters. Seated (l-r) are Kristy Perillo, Lynne Anderson and Helen Dalton.

FCC News

FCC INTERVENES IN ANOTHER POWER LINE INTERFERENCE CASE

The FCC has written a Wisconsin electric utility as a result of complaints of suspected power line interference filed by two Iowa amateurs. The FCC intervened after Alliant Energy of Madison indicated that it already considered itself to be in compliance with applicable state and federal laws. The FCC explained the utility's obligations under its Part 15 rules and requested that Alliant advise the complainants within 30 days of the steps it is taking to correct the reported interference problems.

The FCC's intervention October 27 stemmed from harmful interference complaints filed by James L. Spencer, W0SR, and Frederick M. Spinner, W0FMS, both of Cedar Rapids, Iowa. The ARRL also has been in touch with Alliant Energy on behalf of the two ARRL members in an effort to resolve the matter.

Spencer told the ARRL that he's been working for several years to resolve power line noise problems and has logged dozens of contacts with the utility. Spinner, who contacted the utility more recently, said he's received no indication that Alliant intends to correct his problem and, in fact, had suggested that he might have to live with it.

In response to an inquiry from ARRL Lab Supervisor Ed Hare, W1RFI, Steven Baker, Alliant's general manager for customer operations, said his company "cannot financially justify making major system changes or investments to address problems, which are understood to be incidental radiators with no harmful interference as per FCC requirements." Baker said several of the RFI problems in Spencer's area were traced to "fish tank heaters, doorbell transformers and other devices" not under the utility's control.

"The nature of the RFI in Mr. Spencer's case is intermittent and at frequencies which have no effect on the public general broadcast frequencies," Baker said.

The FCC Consumer Information Bureau's Sharon Bowers told Alliant that even interference to a limited range of frequencies constitutes harmful interference to a licensed service. The FCC pointed out that the utility must not cause harmful interference to licensed services, and, if it does, should locate and correct problems within a reasonable time.

Last year, the FCC intervened in the wake of longstanding RFI complaints from several West Coast amateurs who claimed they were receiving harmful interference from Pacific Gas and Electric power lines or equipment.

FCC TO MONITOR AUCTION SITE FOR ILLEGAL ITEMS

The FCC says it has reached an agreement with the eBay auction site that's aimed at curtailing the sale of clearly illegal radio equipment.

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth says eBay has agreed to cooperate in removing advertisements in which the item for sale "is clearly noncertified" under FCC rules. Hollingsworth said most of the equipment involved falls into the CB category, including illegal amplifiers.

Hollingsworth agreed to publicize the initiative at the urging of the ARRL Regulatory Information Branch's John Hennessee, N1KB. "I've got a whole folder of people who have been complaining about this and will be delighted to know that the Commission is taking action," Hennessee said.

Hollingsworth said a review team within the Technical and Public Safety Division of the FCC Enforcement Bureau is screening eBay ads each week. He said the practice could be extended to other auction sites if the FCC learns of similar problems.

Hollingsworth credits complaints from the Amateur Radio community with getting the new system in place. "I've been collecting complaints for a year, but the amateur community really generated it," he said. Hollingsworth says he sees about 10 complaints a week about auction site radio gear advertisements—sometimes several about the same ad. Complaints

Incumbent New England Director Tom Frenaye, K1KI, and Vice Director Mike Raisbeck, K1TWF, and Roanoke Director Dennis Bodson, W4PWF, and Vice Director Les Shattuck, K4NK, were elected without opposition. All terms are for three years beginning at noon January 1, 2001.

BOARD TO CONSIDER MORSE CODE POLICY REVIEW

The ARRL Board of Directors will review the League's position on the Morse code as an international licensing requirement when it gathers for its annual meeting in January. Because the issue is expected to come up at the IARU Region 2 Conference next October, the ARRL Executive Committee decided at its November 11 meeting in Irving, Texas, to place the issue on the Board's January agenda.

The ARRL's Morse policy was formalized by Board resolution in 1993. It supports the retention in the International Radio Regulations of the provision obliging administrations to require that applicants demonstrate ability to send and receive Morse code before they may operate below 30 MHz. Consistent with that policy, ARRL International Affairs Vice President Rod Stafford, W6ROD, cast the lone dissenting vote last summer at the IARU Region 3 Conference in Australia on a motion calling for the eventual elimination of Morse as an ITU requirement for HF operation.

In January, the Board may decide to reaffirm this policy, to modify it, or to seek additional input from members. In the past, a majority of members have supported the policy.

The Executive Committee also proposed that the Board determine a process for soliciting membership input on possible repartitioning of the HF bands in restructuring's wake. As part of its original restructuring package, the League had proposed "refarming" the current Novice bands to allow for more efficient use of the most crowded HF allocations. The FCC has declined to take up any possible repartitioning, however, until it's had a chance to gauge the effects of restructuring. Amateur Radio license restructuring became effective last April 15.

In other action, Stafford and ARRL Executive Vice President David Sumner, K1ZZ, reported briefly on preparations for WRC-2003. Stafford is focusing on developing support for the Amateur Radio 7 MHz position within Region 2. The IARU seeks a 300-kHz worldwide amateur allocation in the vicinity of 7 MHz. Sumner has been named to the core IARU delegation to that conference.

The Executive Committee also heard a wide-ranging update of other FCC matters, including the League's efforts to gain primary amateur status at 2400 to 2402 MHz and at 2300 to 2305 MHz.

The Executive Committee also briefly discussed legislative restrictions on the

should be based on clear-cut FCC rules violations, such as attempts to sell illegal linear amplifiers, Hollingsworth said.

Amateurs can send items to **fccham@fcc.gov**.

FCC COMMENDS BAND PLANS IN ENFORCEMENT LETTER

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth used the occasion of an enforcement letter to commend the value of band plans. "Although band plans are not mandatory, they exist to enhance the required cooperation and sharing of frequencies in the Amateur Service," Hollingsworth said in an enforcement inquiry to a Connecticut ham.

The FCC wrote Advanced licensee Alan J. Koepke, K1JCL, on October 11, 2000, citing complaints alleging that Koepke's AM-mode 2-meter repeater was causing interference to coordinated repeaters.

"A repeater operating contrary to coordination is an uncoordinated repeater," Hollingsworth told Koepke. Citing Section 97.205 of the rules, Hollingsworth said that where there is interference between a coordinated and an uncoordinated repeater, the licensee of the uncoordinated repeater has the responsibility to resolve the interference.

"Band plans minimize the necessity for Commission intervention in Amateur operations and the use of Commission resources to resolve amateur interference problems," Hollingsworth wrote in expressing the FCC's position on band plans. "When such plans are not followed and harmful interference results, we expect very substantial justification to be provided" that's consistent with FCC rules.

In December 1999 the FCC dismissed an ARRL petition calling on the Commission to equate observance of voluntary band plans with "good amateur practice." The FCC said it did not want to transform voluntary band plans into mandates.

Amateur Enforcement

♦ **Former California ham agrees to jail for unlicensed operation:** Former amateur Richard Allen Burton reportedly has agreed to serve three months in jail for operating on Southern California amateur repeaters without a license, pending pre-sentencing and medical reports. Burton, who has a long history of alleged unlicensed operation, was arrested August 5 after being indicted last May by a federal grand jury. Sentencing will be in February. Formerly WB6JAC, Burton faced six felony counts of violating the Communications Act of 1934. Burton's General ticket was revoked in 1981. In the intervening years, he's been fined and jailed and put on probation for unlicensed operation. The FCC refused to reinstate Burton's ham ticked in 1992. In 1996, he passed a Technician exam and was granted KF6GKS, which the FCC promptly set aside as soon as it realized its error. Burton has been free on $20,000 bond.

♦ **FCC cuts deal in Texas amateur interference case:** A Texas amateur facing an $8000 fine in a malicious interference case instead will give up his Amateur Radio license for five years and pay $1000. The FCC adopted a consent decree terminating the forfeiture proceeding against Technician licensee Robert L. Meyers, N5WLY. Last spring, the FCC affirmed $8000 fines levied on Meyers and General licensee Paul E. Holcombe, K4TOF, both of Houston. The two were charged with causing malicious interference on a local repeater and with failing to identify. The consent decree only affects the case against Meyers, who has demonstrated to the FCC that he was financially unable to pay the fine. "We are proceeding to collection of the Holcombe forfeiture," FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said. He indicated that Meyers now is cooperating with the FCC in its investigation. The fines followed an FCC investigation that involved the use of direction-finding equipment to track interfering signals to Holcolmbe's and Meyers' vehicles. As part of the consent decree, Meyers agreed to not contest the findings of the *Forfeiture Order*, but he did not admit the violations either.

use of cell phones that have been popping up in various localities. Hudson Division Director Frank Fallon, N2FF, noted that an effort is under way in New Jersey to exempt Amateur Radio operation from the effects of such legislation.

See "Moved and Seconded" on page 79 for the Executive Committee meeting minutes.

CREW MEMBER LOGS FIRST ARISS QSOs

The International Space Station Expedition 1 crew of US astronaut and ISS Expedition 1 Commander William "Shep" Shepherd, KD5GSL, and Russian cosmonauts Sergei Krikalev, U5MIR, and Yuri Gidzenko checked out the initial ham station gear in mid-November. Then, Shepherd made a few unheralded casual contacts, marking the first general QSOs from the International Space Station—also known as *Alpha* station.

Shepherd was able to take a few minutes out of his busy schedule November 17, to talk via Amateur Radio with a few lucky hams. At press time, details of the first contacts were unavailable, and school schedules and additional casual contacts were pending. The Expedition 1 crew arrived on board the ISS November 2, after blasting off from Baikonur Cosmodrome in Kazakhstan October 31.

Two initial Amateur Radio "engineering passes" were conducted on 2 meters via R3K at the Gagarin Cosmonaut Training Center in Star City near Moscow, with Russian ARISS delegate Sergej Samburov, RV3DR, at the controls. A subsequent test pass via NN1SS station at the NASA Goddard Space Flight Center was equally successful.

Students at the Burbank School in Burbank, Illinois, were tentatively scheduled to have the first Amateur Radio contact with the Expedition 1 crew. Another 18 schools are under consideration for ARISS school contacts.

Tentative operating frequencies are: Worldwide downlink for voice and packet, 145.80 MHz; worldwide packet uplink, 145.99 MHz; Region 1 (Europe/Africa) voice uplink: 145.20 MHz; Region 2 and 3 voice uplink, 144.49 MHz. ISS crew members may use their personal call signs or one of the "club station" call signs issued for ISS use—NA1SS, RZ3DZR or DL0ISS.

Visit the ARISS Web site, **ariss.gsfc.nasa.gov/**.

NASA

The "Alpha" Expedition 1 crew: Commander William "Shep" Shepherd, KD5GSL, center, is flanked by Russian cosmonauts Sergei Krikalev, U5MIR (left), and Yuri Gidzenko in this NASA publicity photo. The flags represent the countries participating in the ISS program.

ARRL CONTINUES CAUTIONARY TONE IN UWB REPLY COMMENTS

In reply comments in the FCC's ultra-wideband proceeding, the ARRL reiterated its stance that the Commission should not act in the matter until more test data are in and analyzed. Pointing out that the ITU and the ARRL have only just begun their own UWB studies, the ARRL characterized the rulemaking proceeding as "entirely premature."

The extensive record in the proceeding (*Notice of Proposed Rule Making*, ET Docket 98-153), the League noted, "still lacks conclusive test results from ongoing testing efforts from various sources." The ARRL joined the US Department of Defense in urging the FCC to await the outcome of tests looking at the interference potential of UWB devices to amateur receivers before deciding on UWB operational and technical requirements. The Defense Department, with which the Amateur Service shares some spectrum, also has urged the FCC to await ongoing analyses and measurements before it acts in the proceeding.

The League has arranged with the University of Southern California's UWB lab to test the interference potential of UWB devices to "typical Amateur Radio station configurations" and anticipates participating in additional tests.

The League warned the FCC about making assumptions concerning UWB's interference potential without first insisting on objective technical tests. "ARRL is convinced that the studies conducted to date cannot accurately reflect the diversity of the Amateur Radio Service," the ARRL said, "and it urges that no sweeping rules changes be made until all available studies and data are available and analyzed."

The League also urged "most strongly" that any UWB devices be required to operate above 2450 MHz "to avoid interference to sensitive receivers, especially those used for amateur satellite reception."

ARRL's comments in the UWB proceeding are available at **www.arrl.org/announce/regulatory/et98-153/index.html**.

SECTION MANAGERS ELECTED IN TEN ARRL SECTIONS

The ballots have been counted, and ARRL section managers have been elected in races in Eastern Massachusetts and South Carolina. Incumbent SMs were returned to office in eight other ARRL sections without opposition.

In the Eastern Massachusetts Section, Phillip E. Temples, K9HI, of Watertown outpolled Stan Laine, WA1ECF, 781 to 351. Temples replaces Joel Magid, WU1F, who did not seek re-election.

In the South Carolina Section, Patricia M. Hensley, N4ROS, of Richburg topped a field of three candidates. She received 301 votes, to 229 for James Boehner, N2ZZ, and 188 for Laurie Sansbury Jr, KV4C.

In Brief

• **Eastern Pennsylvania gets new Section Manager:** Veteran ARRL Eastern Pennsylvania Section Manager Allen Breiner, W3TI, stepped down effective December 31, 2000. Breiner, who's 80, has been part of the ARRL field organization for many years. First elected as Section Communications Manager—as the SM job used to be known—in 1959, he held that post for 12 years. Breiner was elected as SM in 1995 and re-elected in 1998 and 2000. ARRL Field & Educational Services Manager Rosalie White, K1STO, named Eric Olena, WB3FPL, of Mohnton to replace Breiner effective January 1, 2001. Olena has served as Section Emergency Coordinator since 1994 and was an Assistant SM from 1992 until 1996. He will complete Breiner's term, which runs through April 2002.

• **VE3FRH is new AMSAT-NA president:** Canadian amateur and ARRL member Robin Haighton, VE3FRH, has been elected president of AMSAT-NA. Haighton, 63, was elected at the AMSAT-NA Annual Meeting October 29 in Portland, Maine. He replaces Keith Baker, KB1SF, in AMSAT-NA's top slot. Prior to his election, he had served as AMSAT-NA's executive vice president. An electrical engineer, Haighton has been licensed since 1977. He previously was GD4INU. He's been a member of AMSAT since 1991. Haighton is one of two Canadian representatives to the Amateur Radio on the International Space Station—or ARISS—project. Baker, who surprised the Amateur Radio community in September by announcing that he did not plan to seek another term, remains an AMSAT-NA board member. Ray Soifer, W2RS, has stepped back into the job of executive vice president vacated by Haighton.—*RAC and AMSAT News Service*

• **Goldwater K7UGA call sign re-issued:** The famous K7UGA call sign formerly held by the late US Sen Barry Goldwater has been re-issued to the Central Arizona DX Association. The FCC granted CADXA's request for K7UGA on October 24. The call sign came up for grabs after the mandatory two-year waiting period following the cancellation of Goldwater's amateur license ended. Goldwater died in 1998. CADXA President Gary Capek, K8BN, says the club, which traded its N7KJ club station call sign for K7UGA, plans to keep the call sign active. Goldwater's family has donated his amateur equipment, memorabilia and furnishings to the Arizona Historical Society's museum in Tempe. Capek says he's met with representatives of the museum—which plans to reconstruct Goldwater's ham shack as an exhibit—and says CADXA will cooperate in making the call sign available for special events at the museum.

• **Two amateurs among "flying doctors" killed in plane crash:** Two Amateur Radio operators died when a private plane carrying medical volunteers crashed October 14 during a humanitarian mission to Mexico. Oakland, California, dermatologist Dr Marvin S. Weinreb, KE6WPH, a Technician licensee, and Deborah Wayne Lucero, KC6UEJ, a Tech Plus licensee, were members of *Los Medicos Voladores* or "the flying doctors." Weinreb was a 20-year veteran of Los Medicos Voladores; Lucero reportedly helped in translating and in setting up the doctors' visits. The volunteers died when the Cessna 320E, piloted by Weinreb, crashed outside Ensenada, Mexico, about two miles from the airport where it was attempting to land.—*thanks to Jim McSherry, N3AMF and Clark Crabbe, WA7NBU*

• **Vote on *QST* Cover Plaque Award:** The winner of the *QST* Cover Plaque Award for October was George Eldridge, N6RVC, for his article "Decoding the Disneyland Telegraph." The winner of the *QST* Cover Plaque Award for November was L.B. Cebik, W4RNL, for his article "A Beginner's Guide to Modeling with NEC." Congratulations, George and L.B.! ARRL members are reminded that the winner of the *QST* Cover Plaque award—given to the author(s) of the best article in each issue—now is determined by a vote of ARRL members. Voting takes place each month on the ARRL Members Only Web site at **www.arrl.org/members-only/qstvote.html**. As soon as your copy arrives, cast a ballot for your choice.

• **Coast Guard honors MARS operator:** An ARRL member has received the Coast Guard's second highest civilian award for his MARS service. Richard C. Johnson, W3BI/NNN0GKF, received the USCG's Meritorious Public Service Award in a ceremony November 28 in Nazareth, Pennsylvania. The award was in recognition of Johnson's 37 years of voluntary service as a Military Affiliate Radio System operator. Since 1963, Johnson has conducted thousands of ship-to-shore phone patches for deployed Coast Guard men and women. Last January, Johnson also volunteered to join the MARS High Frequency e-mail program supporting Atlantic Area Coast Guard cutters. Since then, he has processed 500 to 600 e-mails a day supporting crews aboard Coast Guard cutters. Johnson is the only MARS operator participating in the e-mail program in the Atlantic Area and has operated nearly around-the-clock to meet the needs of Coast Guard personnel at sea.—*USCG news release*

• **Ham radio relay brings helicopter help to ill hunter:** According to a report in the *Eugene Register-Guard*, a Coos Bay, Oregon, man who fell ill while hunting November 12 can thank Amateur Radio for his rescue. James Pichette, 58, was hunting with his stepson, Matt Grigsby, KC7PZH, east of Reedsport when he experienced apparent heart problems. Grigsby called for help via ham radio. The call was picked up by an unidentified ham in Florence who relayed the message to one of Pichette's sons. The son called Reedsport police, who, in turn, contacted the Coos Bay Coast Guard office. The Coast Guard transported Pichette to a Eugene hospital. Grigsby says his stepfather has been transferred out of intensive care and is doing fine.—*thanks to Patrick Roberson, WA7PAT*

• **KE6JAB is back on the ice:** Ron Ross, KE6JAB, has begun a two-month expedition in the mountains of Queen Maud Land in Antarctica. Ross will be assisting Polar Explorer Alain Hubert in his wall climb of Holtanna, a 5000-foot peak. As he's done on past trips, Ross has taken along an amateur satellite station to transmit text and images from Antarctica back to a Web site in San Francisco. He also has two APRS-enabled weather stations with him that will transmit data via SUNSAT to an Antarctic ground station or I-gate. Check out Ron Ross's Web site at **www.thistle.org** for more information.—*SpaceNews*

• **Ham call signs turn up in kids' book:** When Laurel Parker, KA1WJL, spotted the Amateur Radio call sign N1IQB in a children's book, *The Wanderer*, it piqued her curiosity. So, she wrote to Newbery Medal-winning author Sharon Creech and to Wayne Grabowski of Spencer, Massachusetts, who holds N1IQB, to find out more. As Parker explained in a note to the ARRL: "Neither of them knew each other, and the author had just more or less made up the call and hoped that if it did belong to someone that they would be flattered that their call had been used. The other call that she used (WB2YPZ) is not an active call at this time." *The Wanderer* is a tale of growing up and self-discovery surrounding a young teenaged girl, Sophie, who journeys across the Atlantic on a sailboat accompanied by her adoptive mother's three brothers and two nephews.

ARRL Ham Radio insurance to cover antennas, towers, rotators

Seabury & Smith, the ARRL "All Risk" Ham Radio Equipment Insurance Plan administrator (formerly Albert H. Wohlers and Company) has announced that, effective immediately, the plan will insure antennas, towers and rotators. Coverage for antennas, towers and rotators may be written only as an endorsement—or rider—to an existing policy. As in the existing program, the policy is that all the equipment must be scheduled. Members may not insure antennas, tower, and rotators without also purchasing coverage for their other station equipment. The cost of coverage is $1.50 for every $100 of valuation—the same as that for station equipment. Amateurs with further questions can contact the Seabury & Smith Customer Service Department at 800-503-9230.

Hensley was tapped last year to take over the South Carolina SM job when former SM Les Shattuck, K4NK, was elevated to Roanoke Division Vice Director.

Candidates in eight other ARRL sections were unopposed. All were incumbents. Returning to office are Dale Bagley, K0KY, Missouri; Bill McCollum, KE0XQ, Nebraska; George Tranos, N2GA, New York City-Long Island; Thomas Dick, KF2GC, Northern New York; Jean Priestley, KA2YKN, Southern New Jersey; David Armbrust, AE4MR, West Central Florida; John Rodgers, N3MSE, Western Pennsylvania; and Bob DeVarney, WE1U, Vermont.

Ballots were counted November 21 at ARRL Headquarters. The terms of office for all successful candidates are two years, beginning January 1, 2001.

SUPREME COURT ENDS KV4FZ RENEWAL SAGA

The US Supreme Court has put an end to the high-profile amateur license renewal case of Herbert Schoenbohm, KV4FZ, by denying his petition for certiorari. The petition was his last avenue of legal appeal in the case, which stretches back to 1994.

Schoenbohm may continue to operate legally until 12:01 AM on Monday, January 29, 2001, and, after checking with the FCC, he took advantage of the time remaining. Schoenbohm says he made some 160-meter CW contacts during the CQ WW DX Contest in late November. The FCC Enforcement Bureau has declined to say whether or not it would prefer that Schoenbohm stay off the air.

The Supreme Court's refusal to hear his case was "as expected," Schoenbohm said. "The saga has gone on for almost eight years and was worth the fight."

Following Schoenbohm's 1992 felony conviction on federal fraud charges, the FCC turned down his renewal application in 1998. The US Appeals Court upheld the FCC's decision last spring, and Schoenbohm had petitioned the high court in August to review his Appeals Court record.

The 1998 FCC *Order* included a provision that authorizes Schoenbohm to continue to operate his station until the 91st day "following the release date of any order on reconsideration or the completion of judicial review, whichever is later."

Schoenbohm holds the call signs VP2VFZ, VP2MFZ, VP2EFZ, and PY1ZAI, but he may not use any of them from US territory. For now, Schoenbohm says he'll content himself with communicating with his friends via the Internet. "There is certainly less QRM," he said.

NOMINATIONS SOUGHT FOR ARRL INSTRUCTOR, RECRUITER, EDUCATOR AWARDS

Nominations close January 31 for ARRL awards that recognize excellence in teaching Amateur Radio classes, using Amateur Radio in the classroom, and recruiting others to Amateur Radio.

The ARRL Herb S. Brier Instructor of the Year Award goes each year to a volunteer Amateur Radio instructor. The ARRL Professional Educator of the Year award goes to a professional teacher who has incorporated Amateur Radio into his or her class curriculum. The ARRL Professional Instructor of the Year award is presented to a paid, non-state certified ham radio instructor, such as those teaching classes offered through adult education programs.

The ARRL Excellence in Recruiting Award goes to a ham who exemplifies outstanding recruiting enthusiasm and technique and has gone the extra mile to introduce others to Amateur Radio.

All winners receive beautifully engraved plaques, which may be sponsored by clubs.

Complete information and nomination forms are available on the ARRL Web site at **www.arrl.org/ead/award/**. Completed forms go to section managers before January 31.

For more information, contact Jean Wolfgang, WB3IOS, **jwolfgang@arrl.org**.

Section Manager Election Notice

To all ARRL members in the Maryland–DC, Nevada, New Hampshire, Northern New Jersey, Rhode Island, San Joaquin Valley, Utah and West Texas Sections. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 12 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are *not* acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. We suggest the following format:

(Place and Date)

Field & Educational Services Manager, ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL section of the _____ division, hereby nominate _____ as candidate for Section Manager for this section for the next two-year term of office.

(Signature___ Call Sign___ City__ ZIP__)

Any candidate for the office of Section Manager must be a resident of the section, a licensed amateur of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters by 4 PM Eastern Time on March 9, 2001. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before April 1, 2001, to full members of record as of March 9, 2001, which is the closing date for nominations. Returns will be counted May 22, 2001. Section Managers elected as a result of the above procedure will take office July 1, 2001.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 2001. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the July 2001 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Field & Educational Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Rosalie White, K1STO, Field & Educational Services Manager*

MOVED & SECONDED

MINUTES OF EXECUTIVE COMMITTEE Number 465

Irving, Texas—November 11, 2000

Agenda

1. Approval of minutes of July 20, 2000, Executive Committee meeting
2. FCC matters
3. General legal matters
4. Antenna matters
5. Legislative matters
6. International matters
7. Organizational matters
8. Recognition of new Life Members
9. Affiliation of clubs
10. Approval of conventions
11. Date and place of next EC meeting
12. Other business

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:30 AM Saturday, November 11, 2000, at the Dallas/Fort Worth Airport Marriott Hotel, Irving, Texas. Present were the following committee members: President Jim Haynie, W5JBP, in the Chair; First Vice President Joel Harrison, W5ZN; Executive Vice President David Sumner, K1ZZ; and Directors Frank Butler, W4RH, Frank Fallon, N2FF, Tom Frenaye, K1KI, and Fried Heyn, WA6WZO. Also present were International Affairs Vice President Rodney J. Stafford, W6ROD, and General Counsel Christopher D. Imlay, W3KD.

1. On motion of Mr. Butler, the minutes of the July 20, 2000, Executive Committee meeting were approved in the form in which they had been distributed.

2. FCC matters were reviewed as follows:

2.1. Mr. Imlay reported on the status of the FCC Ultra-Wideband (UWB) proceeding, ET Docket 98-153. The ARRL filed reply comments on October 27. Others share our concerns about interference to conventional systems from UWB systems, particularly at frequencies below 2.5 GHz. The FCC has acknowledged that compatibility tests are underway but has declined to postpone the comment deadline until after they are completed. The ARRL is working with the UWB Lab at the University of Southern California to test compatibility with 1.2-GHz amateur equipment.

2.2. The ARRL submitted comments in response to an FCC Notice of Inquiry in ET Docket 00-47, software defined radios (SDR). It is not anticipated that the FCC will issue rulemaking proposals on the subject any time soon. In any event, no rules presently preclude amateur experiment with SDR.

2.3. Mr. Haynie reported briefly on his trip to Washington, DC, in mid-September. A luncheon meeting with amateurs who are employed in various capacities in the nation's capital was very productive and will be repeated early next year.

2.4. Mr. Imlay reported on behalf of the Ad Hoc Spectrum Strategy Committee. This group was appointed in September by President Haynie to address problems arising from the proliferation of Part 15 devices operating above 30 MHz. The committee expects to deliver its report prior to the 2001 Annual Meeting of the Board. An FCC request for nominations to its Technological Advisory Council was discussed. It was agreed that President Haynie is authorized to decide, in consultation with the Spectrum Strategy Committee and Executive Vice President Sumner, whether the ARRL should make a nomination.

2.5. Mr. Imlay reported that he is working to complete a draft petition to renew our request for an upgrade of the amateur service allocation 2300-2305 MHz from secondary to primary. The best time to submit the petition will be after the FCC disposes of a competing proposal for this spectrum.

2.6. Mr. Imlay gave an optimistic report with regard to the prospects for favorable FCC action on RM-9949, an ARRL petition that seeks upgrading of the amateur and amateur-satellite allocation at 2400-2402 MHz from secondary to primary.

2.7. There was little new to report with regard to the efforts by public safety agencies in Los Angeles to gain access to 2402-2450 MHz for television downlinks from helicopters. Special temporary authorization was granted for operation during a political convention, but operation was very limited and provided no useful evidence with regard to whether sharing with amateurs was practical.

2.8. FCC action is expected soon on the ARRL petition, RM-9404, filed October 22, 1998, seeking amateur access to low-frequency (LF) spectrum. A Notice of Proposed Rulemaking is anticipated that will propose the allocation of at least a part of the spectrum being sought.

2.9. At Minute 62 of the 2000 Second Meeting of the Board a motion was adopted directing the filing "at the appropriate time" of a petition to permit spread spectrum emissions in the bands 219-220 and 222-225 MHz. After discussion it was agreed that this is not the appropriate time to file.

2.10. Mr. Imlay reported that the FCC has granted a waiver of §97.207(g)(1) to permit operation from the International Space Station (ISS) without the 27-month advance notification required by the rules. He observed that §97.113(e), which permits the retransmission, under certain conditions, of United States government communications between a space shuttle and its associated Earth stations, does not extend to the ISS.

2.11. Mr. Imlay reported that a decision is expected soon on the ARRL petition for reconsideration of the FCC's denial of RM-8763, our request for clarification and extension of the PRB-1 preemption policy. Some language in the First Report and Order and Further Notice of Proposed Rulemaking in WT Docket 99-217, concerning the promotion of competitive networks in local telecommunications markets, may be helpful to us.

The committee was in recess for luncheon from 11:50 AM to 1:09 PM.

2.12. Mr. Imlay reported that the FCC is expected to act by the end of the year on pending petitions for reconsideration of various aspects of WT Docket 98-143, the amateur license restructuring proceeding. It was noted that while the ARRL had proposed refarming of the Novice bands as a part of its restructuring package, the FCC had declined to take up the possible repartitioning of the HF bands until later. While the time is not yet ripe to raise the issue again with the FCC, the Board should consider in January how it wishes to solicit membership input. On motion of Mr. Heyn, it was voted to add the matter as an agenda item for the 2001 Annual Meeting of the Board.

2.13. Mr. Haynie requested a detailed progress report, prior to the January meeting of the Board, on the 5-MHz experimental operations being conducted in support of a possible amateur allocation.

2.14. Mr. Imlay reported that the FCC is expected to issue a Public Notice shortly, announcing the appointment of the ARRL and others as club and military recreation station call sign administrators.

2.15. The committee briefly discussed the status of FCC enforcement activities, noting that a particularly difficult case in the New York City area is not yet satisfactorily resolved.

3. Mr. Imlay reported briefly on the status of draft revisions of certain memoranda of understanding to which the ARRL is a party.

4. Mr. Imlay reported for the Antenna Case Funding Review/Assistance Committee. Unfortunately, the first request brought to the committee for consideration fell outside the guidelines for assistance and had to be declined.

5. Legislative matters were reviewed briefly as follows:

5.1. Mr. Sumner observed that HR.783 and S.2183 were not likely to be enacted during the "lame duck" session of Congress that will follow the elections. The principal sponsors of both bills are returning for the 107th Congress in January and probably will be willing to reintroduce the legislation if requested to do so.

5.2. The ARRL legislative agenda for 1999-2000 has been circulated to the Board with a request for suggested changes for 2001-2002. The Board will be asked to approve an updated legislative agenda in January.

5.3. Legislative restrictions on the use of cellular telephones by the drivers of vehicles were discussed briefly. Mr. Fallon observed that an effort is under way in New Jersey to exempt amateur operation from the effects of such legislation.

6. International matters were discussed as follows:

6.1. Mr. Stafford reported on the IARU Region 3 Conference in Darwin. The conference reaffirmed its endorsement of the objective of a 300-kHz worldwide amateur allocation at 7 MHz. The conference also adopted a resolution calling for the removal of Morse code testing as an ITU requirement for an amateur license to operate below 30 MHz. Consistent with existing Board policy, the ARRL voted against the resolution. The issue is expected to be raised again at the Region 2 Conference in Guatemala in October 2001. On motion of Mr. Heyn, it was voted to place the issue on the agenda for consideration at the 2001 Annual Meeting of the Board.

6.2. Mr. Stafford noted that the Region 2 Conference also will consider a proposal to revise the Region 2 Constitution and Bylaws and will elect regional officers and executive committee members for the 2001-2004 term. As a member of the Region 2 Executive Committee, he is encouraging strategic planning and partnerships between the larger societies and the smaller ones to encourage more activity by the latter.

6.3. Mr. Stafford and Mr. Sumner reported

briefly on preparations for WRC-2003. Mr. Stafford's focus is on developing support for the amateur 7-MHz position within Region 2. Mr. Sumner has been named to the core IARU delegation to the conference.

7. Organizational matters were considered as follows:

7.1. Proposed amendments to the Articles of Association and Bylaws to make their language gender-neutral have been circulated to the Executive Committee for comment. Comments received will be incorporated and a revised draft circulated. Mr. Heyn noted that work on proposed amendments to Article 11 with regard to eligibility to hold ARRL office is ongoing, but is not yet ready for presentation.

7.2. Mr. Heyn asked that staff make greater effort to ensure that each director receives copies of relevant correspondence with the members of his division.

7.3. Mr. Haynie noted with pleasure the recent increase in ARRL membership and congratulated staff on the efforts that have led to this result.

8. On motion of Mr. Butler, 59 newly elected life members were recognized and the Secretary was instructed to list their names in *QST*.

9. On motion of Mr. Heyn, the following clubs were declared affiliated or their earlier affiliation by mail vote was ratified:

Category 1

Arizona Amateurs on Television Club, Glendale, AZ
Bayou Contest Club, Hammond, LA
Jersey Coast DX Association, Bradley, NJ
Memphremagog Amateur Radio Society, Derby Line, VT
Montgomery Amateur Radio Society, Robbins, NC
Platte Valley Amateur Radio Emergency Service, Torrington, WY
Raytheon Radio Club, Greenville, TX
Rensselaer Amateur Repeater Association, Rensselaer, NY
Southeast Arkansas Radio Club, Monticello, AR
St. John Valley Amateur Radio Association, Grand Isle, ME
Tri County Amateur Radio Club, Basin, WY

Category 2

Gulf Coast DX Association, Semmes, AL
OMIK Amateur Radio Association, Inc, Florissant, MO

Category 3

Connecticut Amateur Radio League of Youth, Bloomfield, CT

The ARRL now has the following numbers of active affiliated clubs: Category 1, 1924; Category 2, 26; Category 3, 145; Category 4, 16; Total, 2111.

10. On motion of Mr. Butler, the holding of the following ARRL conventions in 2001 was approved or their earlier approval by mail vote was ratified:

NYC/LI Section, Jan 21, North Babylon, NY
Mississippi State, Feb 2-3, Jackson, MS
Tennessee State, Feb 10-11, Memphis, TN
Roanoke Division, Mar 10-11, Charlotte, NC
Nebraska State, Mar 30-31, Norfolk, NE
San Francisco Section, Jun 23-24, Ferndale, CA

11. It was agreed that the next meeting of the Executive Committee would be held at the call of the President.

12. On motion of Mr. Fallon, it was voted that the Executive Committee congratulates and thanks the ARRL staff members whose work resulted in the new Web pages and the new look in *QST* that were initiated this year.

There being no further business, the meeting was adjourned at 5:29 PM.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

LIFE MEMBERS ELECTED NOVEMBER 11, 2000

Jan S. Adam, KC8P; Clifford H. Ahrens, K0CA; Evan Alford, KQ4CI; Burness F. Ansell, KI0AR; Paul J. Antoniewicz, KD9R; John B. Bellows, K0QB; Thomas A. Benham, W3DD; Sharon A. Bird, KB0MHH; Brian A. Bird, NX0X; James D. Clarkson, K7WOW; Joseph D. Creel, WB4AWM; Edwin P. Curran, WA9YYF; Gregory L. De Hoogh, N6PM; James T. Fattore, N7RZA; Dale Gardner, N7RNX; Raymond Garraud, N2IJ; Lamar F. Harris, WW5N; Donna C. Harrison, KD5GWM; James S. Heath, KB6SX; William E. Himwich, N3HXQ; David B. Holtkamp, K5KH; Larry W. Honaker, KC8PDX; Frank J. Hubbard, AD6SB; Geir Hunsbedt, KB9PXT; Carol E. Johnson, KD7KIL; Joseph W. Kangas, N1ZID; Thomas A. Kavic, AA3TK; Elliott K. Klein, K7ER; Satoshi Kouya, JQ1OCR; Edward V. Lajoie, W1MA; Terrance M. Leitch, KA4KTU; Steven J. Lomasky, WB2HOZ; Stephen Marcus, N1NYL; Michael W. Mars, N5DKR; Michael D. Mc Laren, K8LH; Jay D. Medlen, AG4AA; Phillip A. Mehalko, KC0EOE; Glenn V. Miller, N6GVM; Oscar V. Ocasio, WP4KWQ; Michael A. Perry, PA7XG; Ronald J. Polityka, WB3AAL; Dave Rand, NH7CM; Donald A. Rice, N0BVE; Terry Rolon; Jeffery D. Russell, K1XU; Al Schemmer, WB0YRQ; William H. Schwarz, AA4GG; Richard B. Sherwood, N2NGF; Dawn M. Silveira, KA6OPN; Gabrielle T. Steinau, KG6CXL; Tateshi Sunouchi, NV2N; Douglas M. Taylor, AA7XC; Anita J. Townsend, N5AOK; Matthew F. Tyszka, WA1HRE; Steven E. Walz, K0UO; Gilbert R. Watson, WD5FEE; Anderson White, W5OL; Michael R. Widner, KI8CY; David W. Young, N0MVC. QST

NEW PRODUCTS

IMPROVED ROTATOR CONTROL FOR HAM-M AND TAILTWISTER

◊ Idiom Press now offers Rotor-EZ, an accessory board kit that adds several control enhancements to the Hy-Gain HAM series and Tailtwister rotator systems.

Highlights include hands-free "Auto-Pointing," manual pointing, brake activation delay, electronic end stops, overshoot compensation, 90-degree indicator offset (for secondary antennas) and a jam prevention routine.

Rotor-EZ is a small circuit board kit that you assemble and then wire into your control box. It can be installed in any of the HAM series and Tailtwister control units with three control paddles.

In the Auto-Pointing mode, the calibration knob on the rotator control box serves as an aiming control. The knob is used to set the antenna direction indicator needle to the desired heading. The brake paddle is pressed and rotation begins. The indicator immediately reverts back to "standard" operation and tracks the antenna as it moves. When the antenna reaches the target heading the rotation automatically stops. After a 5-second delay the brake sets.

In the Manual mode, paddle operation is essentially identical to that of the unmodified control box. The automatic 5-second brake delay feature remains enabled though, allowing the antenna time to come to a stop before the brake is applied.

Programmable end stops can be set up to stop the rotation 5 degrees before the end limits. This is intended to prevent end-stop jams. Manual rotation control is still possible in the end zones. An Anti-Stick startup routine can also be implemented.

A version that includes an RS-232 computer interface is also available. This provides computer rotator control capabilities from logging and contest programs that support the Hy-Gain DCU-1 protocol. A free *Windows 9X* pointing program is in the works.

Price: Rotor-EZ basic kit, $99.95; Rotor-EZ kit with RS232, $129.95. Shipping and handling, $5 ($10 to locations outside of the US). Contract kit assembly and installation can be arranged. For additional information contact Idiom Press; PO Box 1025; Geyserville, CA 95441; tel 707-431-1286; **sales@idiompress.com**; **www.idiompress.com**.

THE 6TH EDITION OF THE NRC'S *AM STATION MAP BOOK*

◊ The National Radio Club has released the 6th edition of their *AM Station Map Book*. This 239-page publication, edited by Bill Hale, catalogues the latitudes and longitudes of all known US and Canadian AM broadcast stations assigned to the frequencies between 530 and 1705 kHz.

A 5-page introduction, written by NRCer Dave Sundius, provides instructions and equations for using the location information to calculate a station's distance and bearing or to determine its sunset/sunrise times. Several examples are included.

The station listings are sorted by frequency. Clear Channel (US, Canadian, Mexican and Cuban), Regional and Local frequencies are identified. Each section contains tables of the call signs of the stations assigned to that frequency—ordered alphabetically by state—and their latitudes and longitudes. Maps of the US and Canada showing the relative station locations appear on each left-hand leaf.

The *AM Station Map Book* is printed on 8$^{1}/_{2}$ × 11-inch paper, 3-hole punched and in loose-leaf format. It's a valuable reference tool for the AM broadcast DXer and is a fine companion to the NRC's *AM Radio Log*.

Price for NRC or IRCA members is $12. For non-members: $17.95 in the US and Canada; $21.50 in Latin America; $23.50 in Europe and $25 elsewhere. Postage is included. Payment by check only to the National Radio Club, Publications Center, Box 164, Dept W, Mannsville, NY 13661; **nrclog@aol.com**; **www.nrcdxas.org**. QST

Previous • Next New Products

A Key to Neighborhood Disaster Preparedness

By Douglas Stinson, KG6ADR

RON MACHADO

Members of one CERT district's communications staff discuss assignments to search and rescue teams while monitoring net traffic. From left to right: Liz Bush, KF6YYH, Doug Stinson, KG6ADR, Mellissa Palleschi, and Bill Bush, KF6YYG.

Our local police and fire departments serve our communities well through the ups and down of normal life. When an earthquake, hurricane or other natural disaster strikes, the magnitude and geographic extent of the injuries and damage quickly overtax the professional services. If you are in distress during a disaster, damage to roads and bridges may prevent help from reaching you, even if assistance is available. Downed communications lines may prevent service providers from even knowing of your fate. Amateur Radio operators have a long and distinguished record of service in such emergencies. This commitment to service finds expression in organizations such as the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES).

Disasters bring out the best in other people as well. Neighbors turn out to help each other, regardless of personal cost or risk. This can be a mixed blessing. Following the Mexico City earthquake, spontaneous volunteers saved 800 people. However, 100 people lost their lives while attempting to save others. This is a high price to pay.

Injury to volunteer disaster workers is preventable through proper training. To provide this training the Community Emergency Response Team (CERT) concept was developed and implemented by the Los Angeles City Fire Department in 1985. CERT provides basic training in hazard mitigation, utility control, fire suppression, disaster medicine, light search and rescue, disaster psychology and the Incident Command System. The goal of the program is to help people not become victims themselves, and then to organize their neighborhoods to be self-sufficient in dealing with the emergency. Since its inception, CERT has spread to many communities in at least 30 states, Canada and New Zealand.

During CERT training, the need for effective communications, both within neighborhoods and between neighborhoods and government officials, becomes readily apparent. If a neighborhood forms search and rescue teams, how do you keep in touch with them? How do the teams request help or report situations which are beyond their capability to handle? Once they get over the shock of learning that their cell phones may not work after disaster strikes, people attending the training start to look for other methods of communication. As they begin to appreciate that the responsibility for bringing order to chaos falls on them, the discipline of the Amateur Radio Service begins to look appealing. CERT training classes are an excellent place to recruit new hams!

One Community's Response

Fremont and Union City are two California communities that have enthusiastically embraced the CERT program. Located on San Francisco Bay, these communities form the northeast tip of Silicon Valley. As with any community, these cities present many challenges to the disaster planner. For starters, Fremont and Union City's 100 plus square miles and population of over a quarter of a million straddle the Hayward Fault—generally agreed by geologists to be the most likely origin of the next "big one."

Two individuals, Mike Fung, WA6AWI, and Ray Wong, KE6OGM, active in both CERT and the local ARES group, recognized the need for a ready supply of hams trained in emergency communications who would respond as CERT members. Training sessions were organized to help CERT members obtain their first "ticket." Joe Peterson, KE6YHG, Nancy Peterson, KF6HOI, Brian Krause, AD6MG, and David Ward, VE7DWJ, together with Mike and Ray, developed a series of training classes for CERT members interested in communications.

CERT members with ham licenses became part of an informal group known as the CERT Amateur Radio Team, or CART. The CERT organization had divided the two cities into eight districts, each with a district coordinator. To encourage participation in CART activities, and to integrate radio communications into the district's activities, each district coordinator appointed a district communications coordinator.

Putting CART to the Test

The newly trained "communicators" received their first test at a citywide CERT drill on April 29, 2000. By 9 AM, about 160 CERT members had reported to 8 district staging areas in response to a simulated magnitude 8.0 earthquake. Volunteer district coordinators had created various scenarios to which the arriving CERT members had to respond. The scenarios, which were staged to varying degrees of realism, included collapsed buildings, overturned tanker trucks, toxic gas releases and fires of various intensities and extents.

ARES ran a directed net from the Police Department's Field Operation Center (FOC) to handle the drill's voice communications. The net was conducted primarily on the WA6PWW repeater on 2 meters.

Districts ran sub-nets for communication with search and rescue teams using 2-meter simplex or Family Service Radios. One district experimented with

packet radio, operated by Florence Wong, KF6GAH, as their link to net control. In all, 29 hams supported CERT communications during the drill.

One outcome of the drill was increased confidence in the volunteers by the professionals. The ARES/CART-managed communications network "really made a believer out of me," said acting Division Chief Victor Valdes of the Fremont Fire Department. "By incorporating Amateur Radio into our City's Disaster Management Operations plan we are able to expand our response and reporting capabilities far beyond what would be possible from our normal staffing."

Lessons Learned

The success of any drill is measured by how much is learned. By all accounts, this drill was a resounding success! The most gratifying lesson was that all of the preparation paid off. Radio communications significantly improved the effectiveness of the CERT teams.

ARRL Southern Florida Section Manager Phyllisan West, KA4FZI, (left) is shown meeting with Rosalie White, K1STO, who has turned over the reins for the Public Service column to Steve Ewald, WV1X.

Steve Ewald, WV1X (left) is shown receiving a plaque from Missouri Section Manager Dale Bagley, K0KY, at the ARRL Missouri State Convention. Kenneth Foster, KC0AMH, prepared the wooden plaque, cut into the shape of Missouri.

More information on CERT can be found at **www.qsl.net/kg6adr**.

Emergency communication procedures for the ARRL East Bay Section are summarized in the Instant Trainer at **www.pdarrl.org/ebsec/it2000.pdf**.

Field Organization Reports

Public Service Honor Roll
October 2000

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 8 categories (as reported to their Section Managers). Please note the maximum points for each category: 1) Checking into a public service net, using any mode, 1 point each; maximum 60. 2) Performing as Net Control Station (NCS) for a public service net, using any mode, 3 points each; maximum 24. 3) Performing assigned liaison between public service nets, 3 points each; maximum 24. 4) Delivering a formal message to a third party, 1 point each; no limit. 5) Originating a formal message from a third party, 1 point each; no limit. 6) Serving as an ARRL field appointee or Section Manager, 10 points each appointment; maximum 30. 7) Participating in a communications network for a public service event, 10 points each event; no limit. 8) Providing and maintaining an automated digital system that handles ARRL radiogram-formatted messages; 30 points. Stations that qualify for PSHR 12 consecutive months, or 18 out of a 24-month period, will be awarded a certificate from HQ on written notification of qualifying months to the Public Service Branch at HQ

882 NM1K
627 K9JPS
352 K7BDU
340 K5NHJ
309 KK5GY
298 WA5OUV
279 AG4DL
256 WD8V
254 WB4GM
242 N5JZ
230 KJ3E
229 WA9VND
227 KA2ZNZ
221 KK3F
218 K5MC N2LTC W7TVA
209 KJ4N
206 K7VVC
202 W4ZJY N2YJZ
198 NN7H K9FHI
197 WB5ZED
193 N2CCN
188 KC2DAA
184 KA4FZI
183 N2OPJ
182 KB2RTZ N2RPI
179 N9BDL W7BO
176 W6DOB
175 K2UL
174 N2JBA
172 W4EAT WA1JVV
171 W4CAC
170 K4IWW KB1DSB KA5KLU W6IVV
169 KT4PM
168 KA2GJV K6YR
166 KC2AHS WA3HJC N7YSS
164 KV4AP N5IKN
163 W5ZX W8YS
162 AA3SB
161 KC4TLG
160 WB2GTG
159 KB2VVB
158 WO0A WA2UKX W8SZU
157 AD4IH
156 K0IBS N7YSS
155 W3CB N8IO KB2VRO
154 WN0Y KC5OZT
153 K8PJ N9VE
152 N1LKJ
151 WA1FNM N5OUJ
150 W2AKT WA5I
149 W3YVQ WB2ZCM W7ZIW KC4ZHF
148 W2JHO KB0DTI KD4GR W6QZ
146 KB5W N2AKZ KB2KLH W0OYH
144 K4SCL WB0ZNY
143 WA4DOX WD9FLJ KB2VVD KC5VLW
142 N3ZKP N8BV W0WWR AF4GF
141 KE4JHJ W2RJL
140 AB4XK WD4JJ WB2UVB W0LAW
139 N3WAV K4RBR K2DN
138 K3JL W4NTI KT6A N2WDS W7NWP NR2F W7GB
137 KA1GWE W9YCV
136 KC2EOT
135 N3WKE
134 NN2H KA4UIV
133 KB3AMO
132 K9LGU NY2V
131 N0SU W2EAG
N5NAV K4FQU
130 WD9HII AF4NS W9CBE W7LG KB5TCH WB5NKC
129 K5VV KC7SRL
128 W3VK K5IQZ WA0TFC WB2QIX N9MN WB2FGL WD8DHC
127 N3WK W5CDX WA4QXT KB2WII WX4H W7GHT
126 WD0GUF
125 W1ALE KC4PZA
124 KA4HHE KB2EV KC8CON
123 AA4AT N1JBD KC7ZZB
122 AG9G
121 K4AKC K5DPG W9ZY N8DD KD1LE K2VX W1QU K4DMH K7GXZ
120 AA2SV N9TVT
119 KF6OIF
KI4YV W4CKS W4PIM WB4TVY N9KNJ K4MTX KG2D W2FR
118 K9GBR NZ1D W3BBQ K0PIZ KA2DBD K7MQF K4BG KA8WNO KE4IFD
117 AD6LW W4DGH N5GG
116 KA1VED N7AIK W7VSE
115 KK1A
113 WB5NKD WB7VYH
112 WB2LEZ K2PB KB2ETO
111 W5GKH WI2G AF4QZ KB4DXN
110 W1JX
109 AA3GV W1PEX W2MTO W2JG
108 NC4ML AD4XV KA1VEC W4WXA WU4C KA2CQX AF2K
107 KC4VNO
W2PII
106 W5XX K4WKT
105 KG5GE KT4TD KE0K N2JRS KE4WBI
104 KC3Y W5AYX
103 W5CU
102 KC6NBI AA4YW WA8SSI W2GUT WA4EIC
101 KF4KSN WA2CUW W1JTH KG4EZQ
100 KE4GYR WA4GLS W7QM WW8D KD4HGU
99 AE4NW KA4LRM
98 W4CC K4BEH KA2BCE W2LC
97 WB4UHC
96 K4YVX KF5A
95 WA1QAA W4DLZ KM5YL KC8HTP KJ7SI KA7TTY
94 KE3FL WB4PAM KG4CHW
93 WB4ZNB W6JPH KC6SKK
92 AF4CD
89 W2CC
88 KA8VWE KC7SGM
87 K8LEN
86 KE4VBA K1SEC
85 N1LAH KR4MU AC5Z WB4CSQ
84 W4SEE
83 N5JUU KE4DNO
82 WA4EYU WB9GIU
81 KA0DBK KC7SGL
80 K1STV KB1AJ
79 KC2ANN
78 W4AUN
77 K3CSX
76 N1IST KG4IGE N4JAQ KB4WBY
74 WA2YOW AA4BN
73 KJ5YY K1JPG
71 N8NMA

The following stations qualified for PSHR in September, 2000, but were not listed in this column last month: W7GHT 127, WB7VYH 105, KC8HTP 95. (Aug) N2CCN 146.

Section Traffic Manager Reports
October 2000

The following ARRL Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, DE, EMA, ENY, EPA, EWA, GA, ID, IA, IL, KS, KY, LA, MDC, ME, MN, MO, MS, NC, NFL, NH, NLI, NNJ, NTX, NV, OH, OK, OR, ORG, SB, SC, SFL, STX, TN, VA, VT, WCF, WI, WMA, WPA, WWA, WY.

Section Emergency Coordinator Reports
October 2000

The following ARRL Section Emergency Coordinators reported: AL, AZ, CT, ENY, EWA, IN, KS, KY, LA, MDC, NFL, NLI, OH, SD, SFL, STX, SV (North), TN, VA, WCF, WMA, WPA.

Brass Pounders League
October 2000

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
KK3F	49	1000	956	44	2049
NM1K	783	311	810	3	1907
W5SEG	53	567	567	25	1212
WX4H	6	620	479	7	1112
N2LTC	0	531	549	20	1100
K9JPS	0	532	31	525	1088
K1TLK	520	10	520	0	1050
W1PEX	9	72	793	6	880
W9IHW	5	423	47	380	855
KT6A	0	400	434	0	834
WB5ZED	11	246	355	18	810
K7VVC	67	299	326	11	703
K7BDU	179	213	301	5	698
WZ7V	0	331	31	303	665
W9YPY	0	303	335	0	638
KA2ZNZ	16	299	244	73	632
W6DOB	17	308	261	11	597
WA9VND	40	312	223	11	586
WA5OUV	0	233	63	230	526
WB2GTG	6	209	273	36	524
W4EAT	1	262	251	3	517
K5NHJ	206	38	255	6	505
KJ3E	84	114	287	18	503

BPL for 100 or more originations plus deliveries: K9GU 196, KK5GY 191, N5JZ 104. The following stations qualified for BPL during September, 2000, but were not listed in this column: KB7GZU 682, W7GHT 650, W7BOI 568.

On the Bands

The World Above 50 MHz and its predecessor columns have been published in *QST* for more than 60 years, making it one of the oldest features of the journal. The format has remained nearly unchanged during that entire period, consisting of a general-interest lead followed by a summary of on-the-air activities. Bill Tynan formalized the activities portion of the column with the heading On the Bands soon after he began writing the column in 1975.

For many years, On the Bands provided the single most important and timely record of VHF and higher activities. Readers sent in their reports by mail or telephoned them directly to the column authors. Several weeks after the reports were filed, *QST* came out with the latest news in the world above 50 MHz.

Effects of Information Technology

That began to change during the 1980s, when VHFers found other ways to get timely information. Regional DX packet clusters announced news of rare DX and VHF openings nearly instantaneously. E-mail messages, especially e-mail bulletin boards and reflectors, also spread news quickly. By the mid-1990s, a variety of Web sites were offering an immense amount of information, including up-to-the minute status on the various bands. Even national and regional club newsletters sent via first-class mail could get to readers faster than *QST*.

These new technologies also affected how operators reported their activities to the World Above 50 MHz. Ten years ago, the majority of reports were still received through the mail and via telephone messages. During the 1990s, that began to shift dramatically in favor of e-mail messages. The amount of mail received has dwindled during the past decade, from more than two dozen letters a month to barely half a dozen. The number of telephone messages has declined similarly. Now, nearly all reports come in via e-mail or from various Web pages.

Even more significant is the sheer volume of reports. The number of e-mail messages received directly from individuals and via the VHF reflectors easily exceeds 100 and sometimes 200 a month. Because of the speed, volume and prior dissemination of information via electronic media, much of the activity appearing in On the Bands is no longer strictly news.

Some New Looks

Nevertheless, On the Bands remains an important part of the column, but recent developments suggest some changes are needed. Indeed, some readers have already noticed that there has been greater emphasis on providing retrospective summaries of great propagation events, including presentations in maps and tables. Such broad overviews are not possible in real time, but can only be compiled after many individual reports have been received, analyzed and synthesized into concise form. This approach actually provides new information. At the same time, it creates a necessary permanent record of activities.

Future On the Bands summaries may give less space to ordinary and routine activities, such as the day-to-day sporadic E openings during the summer, VHF tropospheric ducting of less than 1000 km or aurora affecting only the northern third of the US and southern Canada. There is normally not much news in these events anymore, especially four to eight weeks after they take place. This does not mean that you should stop sending in reports! Reports of routine activities are still essential, because there is no other way to make even summary statements, such as "the Midwest enjoyed 18 days of 6-meter sporadic-E openings during the month."

Standings Boxes

Increased VHF activity and technological changes have also affected the Standings Boxes, which have also long been a fixture of the World Above 50 MHz. The first Standings Box, which appeared in April 1947, was designed to mark the advancement of 6-meter stations toward Worked All States. Standings Boxes for other bands soon followed. In November 1948, a 2-Meter Standings Box first appeared, listing 17 stations with their states worked. The World Above 50 Mc for February 1960 featured a 220- and 420-MHz Standings Box, and similar microwave and EME standings boxes appeared in later years.

The Standings Boxes have endured because of their immense popularity. They have provided goals for new operators, a low-key competition among the more experienced, and a continuing permanent record of achievement and activities. Additional criteria that reflected new interests or operating achievements were added from time to time, including countries worked, grid-locator totals and best DX. Some additional subtle shifts may be called for in the future.

Standings Boxes on the WWW

One change has already taken place. The complete Standings Boxes for all bands can now be viewed on the ARRL Web pages at any time. Check **www.arrl.org/announce/standings/**. The up-to-date Web-based boxes list all stations that filed reports, whether or not they meet the minimum criteria required for publication in the column.

Standings Boxes will still be published once a year, but they will be considerably shorter, leaving more room for other kinds of news and features. The appearance of the Standings Boxes will also change slightly. Instead of ranking stations within call areas (which will be retained in the Web-based listings), the shortened published version will rank within four US regions and Canada.

You can see the difference in this month's Microwave Standings. Regions group adjacent call areas: the Northeast (1, 2 and 3), South (4 and 5), West (6 and 7), Midwest (8, 9, and 0). Yes, Texas and Oklahoma are not really a part of the South, and those in other states may object to their arbitrary categorization, but these are only labels of convenience. Even so, these regional labels do a fair job of reflecting natural areas with similar operating challenges and propagation characteristics.

This Month

January 3	Quadrantids meteor shower peaks
January 20-22	ARRL VHF Sweepstakes

ON THE BANDS

The big news of October was the great increase in worldwide 6-meter DX. There were some ordinary aurora events on October 4-5 and October 28-29, more significant for their effects on 6-meter propagation than for contacts made at 144 MHz and higher. An unusual

Emil Pocock, W3EP ♦ Box 100, Lebanon, CT 06249 (voice 860-642-4347, fax 860-594-0259) ♦ w3ep@arrl.org

sporadic-E opening between the upper Midwest and New England early on October 23 was in progress at the same time some northerly stations were reporting OX and VE8 beacons via auroral E. Finally, WB2AMU reported anoth*er unusual sporadic-E opening from New York and southern New England to Newfoundland on October 29 after 2100. Dates and times are all UTC.

Six Meter DX

Six meters came alive for worldwide DX from North America in October. There were many days with strong signals from Central and South America, several opportunities to work Europe and Africa, and scattered reports of contacts across the Pacific. Solar flux ranged from 151 to 194 during the second half of the month, when most of the activity took place.

Caribbean, Central and South America

Six-meter operators in much of the US east of the Rocky Mountains and the eastern provinces of Canada had good propagation toward the south, especially during the mornings of the latter half of the month. Signals of commonly worked LU, CX, CE, HK and TI stations were usually strong, making SSB contacts relatively easy, even for more modest stations. Other commonly cited calls included 9Y4AT, FY/W7XU, HC2FG, HC8GR, J87AB, P43JB, PY0FF, V31PC, YS1AG and YV1DIG.

DXers on the West Coast and in the Rocky Mountain states had fewer opportunities, yet they were not left out entirely. K7ICW had some fine runs on October 5 and 14, picking up YS1AG, V31PC, PY0FF and several others. Scattered reports from Montana and California showed that even remote parts of the country had opportunities to make some DX contacts.

Central and South Americans had many days with propagation to Europe. October 29 and 30 were especially productive days, boosted by the aurora then in progress. YV4DDK made 75 contacts with 18 countries (eight of them new), mainly in the Mediterranean area, including SV, 5B and 4X. UT5JCW worked J87AB and found FY/W7XU the next day.

Africa and the Indian Ocean

Stations primarily in the Northeast (VE1, VE9 and W1) had some highly selective openings to southern Africa and the adjacent Indian Ocean on October 15, 20, 21, 24, 26 and 28. Calls logged included 7Q7RM, FR1AN, FR1GZ, FR5DN, ZS6EZ and ZS6PJS. Signals were sometimes strong, making SSB contacts more common, but openings usually did not last very long or cover large areas at any given time. On October 31, the same group of African stations, joined by TR8DA, worked widely throughout the VE1, VE9, W1, 2, 3, 4, 8, 9 and 0 call areas.

Europeans continued their almost daily runs into Africa and the adjacent Indian Ocean. Among the most sought after stations were 3C5I (Equatorial Guinea), 5V7VJ (Togo), 5X1GS (Uganda), 8Q7QQ (Maldives), 9E1C, 9E1S and ET3VSC (Ethiopia), E30TA (Eritrea), J28FF (Djibouti), VQ9JT (Chagos), Z22JE (Zimbabwe) and XT2OW (Burkina Faso). The expedition to Burkina Faso was especially successful. XT2OW made over 1000 contacts with 772 different stations, mainly Europeans, including 340 QSOs with Italy, 82 with France and 69 with Germany.

The VHF/UHF/microwave towers of Tom Whitted, WA8WZG, looked like limp spaghetti draped over his barn after a tornado passed near his home on Lake Erie this past July. The tornado traveled about 3 miles, but never got closer than 80 to 100 feet above the ground. Only trees and towers above that height were damaged.

Europe, the Mediterranean and the Middle East

Six meters opened from the East Coast to Europe for the first time during the fall season on October 13, a little earlier than expected. W3EP and EH7KW made an SSB contact at 1311 via a skewed path, perhaps the initial contact of the day, followed by K2RTH/4 to CT1EKF at 1355. Transatlantic propagation over the next two weeks was marginal, with only a few of the better equipped northeastern stations making occasional transatlantic contacts, primarily with Spain and Portugal.

The first big break came on the morning of October 28. VE9AA had a good run into EH8, EH, EI, GM, GW, GI, G, ON, PA, OZ, DL, I and OK. W1 stations worked somewhat fewer of these countries, but W4 area stations also reported F, 9H and YU. Some of the more unusual contacts included UT5JCW to K2RTH/4 (the first time the Ukrainian had worked North America) and to WA4LOX. In addition, 5B4FL found K2RTH/4 and W1JJM.

Conditions on the morning of October 29 were most unusual, perhaps due to the aurora. Stations in the Northeast heard loud European 48.250-MHz video signals skewed far to the south, and soon after they began copying weak Europeans at headings between 120° and 170°, also far south of the 60° direct path. They made contacts with EH, 9H, F, I, DL, 9A and YU at least, primarily on CW. UT5JCW appeared for a second day, working W3EP at 1353, followed by W1JJM, K1TOL, W1RA and W1GF. ZS6WB worked VE1YX and K1DAM about the same time. Stations in Florida and other W4 call area states did slightly better on a skewed heading closer to 120°, still well off the direct path. K2RTH/4 logged 29 stations in EH8, CN, EH, G, ON, F, DL, I, 9H, OK, 9A, YU, SV, YO and LZ.

Stations in the favored Northeast and adjacent areas had little trouble working the strong SSB signals from CN8NK, CN8LI, EH9IB and several EH stations on October 30, but little else was reported. The next morning, northeastern stations were at it again, working FR1GZ, FR2NK and FR5DN, mostly on SSB. W1JJM caught TR8CA, and K1TOL worked 7Q7RM before 1300. WB8XX, K8MFO and probably other Midwest stations also worked 7Q7RM. By 1345, stations throughout the Northeast were working CN, EH9, ZB, EH, CT, GM, GI, GW, G, ON and F, with some lucky W1 operators also catching 5B and 4X. W4 and W5 area stations had to settle for EH7KW and several other Spanish stations.

Asia and the Pacific

Stations on the West Coast and scattered throughout the Rocky Mountain region had good success working across the Pacific, again primarily during the latter half of October. Their interesting catches for the month included TX0SIX (Chesterfield Island), V73AT (Marshall Islands), YJ8UU and YJ0DX (Vanuatu), along with several ZLs and VKs. In addition, the K5K (Kingman Reef) expedition made more than 250 contacts with W6s and W7s.

A few stations outside the western US also reported interesting contacts across the Pacific. Texans Pat Rose, W5OZI, and John Butrovich, W5UWB, reported TX0SIX, V73AT and YJ0DX among their catches on October 14. A week later, Roman Flores, XE2EED, logged K5K, FO0TOH, FO0ELY and TX0SIX. Shep Shepard, W7HAH in Montana, worked VK4BKL and two other VK4 stations during the late afternoon of October 28-29 with his beam pointed at 30°, directly into the auroral curtain. Shep reported that the VKs had the distinctive aurora note, but they were not readable along the direct path. K7CW in Washington found KH6s and several weak VKs about the same time.

For their part, Australian VK4, 6 and 8 area stations worked into Europe, from Portugal

Microwave Standings

Published Microwave Standings include only regional leaders as of November 1. For a complete listing of all stations, check the VHF/UHF/Microwave Standings Boxes at **www.arrl.org/announce/standings/**. To ensure that the Standings Boxes reflect recent activity, submit reports at least every two years by e-mail to: **standings@arrl.org**. Printed reporting forms are available by sending a request with SASE to: Standings, ARRL, 225 Main St, Newington, CT 06111. Stations are grouped into regions based on US call areas.

33 cm (902-928 MHz)

Minimum Terrestrial DX = 800 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	16	2	43	970
WA2FGK	PA	14	2	27	940
K1UHF	CT	13	1	30	858
N2WK	NY	12	2	46	950
K2AN	NY	9	2	27	1401
W5LUA*	TX	20	2	58	1725
W5ZN	AR	15	1	40	1150
AA5C	TX	12	1	38	1528
W5RCI	MS	10	1	17	1200
N5QGH	TX	5	1	20	1062
WB4JEM	FL	3	—	3	1430
K4RF	GA	2	1	10	1045
N6CA	CA	4	3	18	3978
W6CPL	CA	1	2	17	825
WA8WZG	OH	22	2	52	1533
K3SIW/9	IL	17	2	56	1200
K8TQK	OH	16	2	33	1378
KE8FD	OH	13	2	32	1402
K2YAZ/8	MI	11	1	34	960
K8MD	MI	11	2	29	896
WA0BWE	MN	10	2	27	1353

23 cm (1240-1300 MHz)

Minimum Terrestrial DX = 1000 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W3RJW	PA	18	2	50	1123
K1TEO	CT	17	2	42	1010
N2WK	NY	16	3	54	1201
W2CNS	NY	16	2	48	1154
W1JR*	NH	13	4	36	1054
K2AN	NY	11	2	34	1401
W5LUA*	TX	41	39	239	2060
WD5AGO*	OK	36	35	202	1240
W5ZN	AR	20	1	54	1500
K4MRW	AL	20	1	46	1300
W5RCI	MS	17	1	66	1200
WA4OFS*	FL	17	14	59	1789
AA5C	TX	17	1	59	1721
K4RF	GA	17	1	32	1067
K5SW	OK	15	1	55	1583
N5QGH*	TX	14	7	45	1545
W4DEX	NC	14	1	23	1078
WB4JEM	FL	12	1	38	1647
WA5TKU	TX	10	1	43	1988
W4WTA	GA	9	1	16	1023
KD9KP	TN	9	1	11	1165
W5UWB	TX	6	1	14	1664
N6CA*	CA	8	11	44	3978
K6QXY	CA	4	2	18	3794
W6CPL	CA	3	3	27	3984
WA8WZG*	OH	37	22	119	1533
K3SIW/9	IL	21	2	74	1207
W9ZIH	IL	19	1	34	1184
K2YAZ/8	MI	18	2	57	1300
WB9SNR	IL	16	2	51	1250
N0LL	KS	13	1	46	1321
K8TQK	OH	13	1	32	1026
W0UC/9	WI	11	1	46	1180
W8PAT	OH	10	2	26	1407

13 cm (2300-2310, 2390-2450 MHz)

Minimum Terrestrial DX = 600 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W3RJW	PA	14	1	26	1079
K1TEO	CT	12	1	19	720
N2WK	NY	10	2	31	950
W5LUA*	TX	20	19	92	1533
W5ZN	AR	10	1	27	1040
W5RCI	MS	10	1	18	920
AA5C	TX	8	1	23	1439
K4MRW	AL	8	1	8	925
N5QGH	TX	5	1	14	1013
WA5TKU	TX	3	1	11	704
W4DEX	NC	3	1	4	714
N6CA	CA	3	3	15	3978
W7PUA	OR	2	1	11	605
WA8WZG	OH	19	15	62	1533
K3SIW/9	IL	13	1	48	1041
WA0BWE	MN	9	2	25	1353
W9ZIH	IL	9	1	10	1184
K8TQK	OH	6	1	15	673
W0UC/9	WI	6	1	10	783
WB9SNR	IL	6	1	9	812
K2YAZ/8	MI	5	1	23	600

9 cm (3300-3500 MHz)

Minimum Terrestrial DX = 400 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W3RJW	PA	7	1	10	664
W1VT	VT	6	1	12	419
N2WK	NY	4	2	19	950
W5LUA*	TX	9	5	30	1353
W5ZN	AR	7	1	18	1040
AA5C	TX	5	1	15	1048
W4DEX	NC	4	1	5	714
N6CA	CA	3	3	12	3978
W7PUA	OR	2	1	7	418
N3CEV/7	WA	1	1	1	463
WA8WZG	OH	14	1	24	1045
W9ZIH	IL	11	1	26	943
K3SIW/9	IL	9	1	35	880
WA0BWE	MN	5	1	17	1353
K8TQK	OH	5	1	10	537
WB9SNR	IL	5	1	8	518
W0LD	CO	4	—	6	517
K2YAZ/8	MI	3	1	3	400

5 cm (5650-5925 MHz)

Minimum Terrestrial DX = 300 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W1GHZ	MA	6	1	8	367
W1VT	VT	5	1	9	419
N2WK	NY	3	2	11	892
W3RJW	PA	3	1	6	366
NO3I	PA	1	1	1	334
W5ZN*	AR	8	3	21	1040
W5LUA*	TX	7	13	42	1187
AA5C	TX	5	1	18	1134
WA5TKU	TX	3	1	6	304
N6CA	CA	3	3	20	3978
W6OYJ	CA	1	1	1	344
N3CEV/7	WA	1	1	1	463
WA8WZG	OH	15	2	22	1045
W9ZIH	IL	11	1	31	943
K3SIW/9	IL	8	1	33	800
WA0BWE	MN	5	2	7	655
WB9SNR	IL	5	1	7	614
K2YAZ/8	MI	4	1	9	600

3 cm (10-10.5 GHz)

Minimum Terrestrial DX = 300 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
AF1T/1	MA	10	1	12	772
W1VT	CT	10	1	7	303
AF1T	NH	9	1	13	425
K1UHF	CT	9	1	12	897
WA1ECF	MA	9	1	11	630
W3RJW	PA	8	1	13	548
W1GHZ/1	NH	8	1	13	549
W1GHZ/1	VT	8	1	11	501
K1AE	NH	7	1	10	486
W1AIM/1	NH	6	1	10	313
N1RWM	NH	6	1	8	486
WA1HOG	NH	5	1	8	326
N2WK	NY	3	2	9	892
W5LUA*	TX	10	14	46	510
AA5C*	TX	6	14	34	—
N5QGH	TX	3	1	13	382
W5ZN	AR	3	1	7	1040
W4DEX	NC	6	1	7	899
WB6CWN	CA	3	2	18	1123
N6CA	CA	2	2	16	3978
W6OYJ	CA	2	2	13	657
W7PUA	OR	2	1	12	605
WA6QYR	CA	2	2	11	919
W6ASL/6	CA	1	1	15	770
W6CPL	CA	1	2	9	510
W9ZIH	IL	10	1	22	898
K3SIW/9	IL	7	1	19	464
WA8WZG	OH	7	2	18	1045
WB9SNR	IL	5	1	10	742
K2YAZ/8	OH	3	1	5	387

12 mm (24-24.25 GHz)

Minimum Terrestrial DX = 50 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
KA2MCU	NY	2	1	2	80
W2EV	NY	1	2	4	66
W5LUA	TX	2	1	3	160
WW2R/5	OK	2	1	2	162
K5RHR	NM	1	1	5	118
W4SW	VA	1	1	2	90
W6CPL	CA	1	1	5	175
N6CA	CA	1	1	5	167
WA6QYR	CA	1	1	5	136
W6OYJ	CA	1	1	1	133
WA8WZG	OH	2	1	2	65
K3SIW/9	IL	1	1	4	113
W9ZIH	IL	1	1	2	70
W0LD	CO	1	—	2	75
WB9SNR	IL	1	1	1	113

6 mm (47-47.2 GHz)

Minimum Terrestrial DX = 10 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W2SZ/1	MA	3	1	7	106
W2EV	NY	1	1	4	38
W2SZ/4	VA	1	1	5	114
WA1ZMS/4	VA	1	1	1	66
K2AD/4	VA	1	1	1	66

4 mm (75.5-81 GHz)

Minimum Terrestrial DX = 1 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W2SZ/4	VA	1	1	5	114

2.5 mm (119.98-120 GHz)

Minimum Terrestrial DX = 1 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
WA1MBA	MA	1	1	1	1.15

2 mm (142-149 GHz)

Minimum Terrestrial DX = 1 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
WA1MBA	MA	1	1	1	3.8

1 mm (300 GHz and Higher)

Minimum Terrestrial DX = 1 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
N2LPN	NJ	1	1	1	—
KB0QXR	NJ	1	1	1	—

†terrestrial
—Information not supplied
*Some stations worked via EME

to Poland, on October 5, 15, 16 and 25 at least, but mostly under marginal conditions. VK4BRG made some difficult contacts into UT, YO, OH and YL on October 25. In addition, 9M6BAA (East Malaysia) made about 40 contacts into southern and eastern Europe on October 22 and 26.

Japanese operators worked stations on every continent, including a fortunate few in the US. Among their more unusual catches were 3D2TC (East Timor), 5B4FL (Cyprus), 8Q7QQ (Maldives), EY8MM (Tajikistan), S21YJ (Bangladesh), US5CCO (Ukraine) and YL3AJ (Latvia). Jose Carbini, LU6DRV, worked long strings of Japanese after 2200 on October 11, 12 and 13 along the direct path. YV5LIX and TI5BX found a few weak JA stations on October 8, 1400-1500, via a long-path opening.

Several US stations reported similar long-path openings during the same time frame on succeeding days. W5OZI heard JA1PVI on October 18, and W5EU worked JH7MSB/JR6 on the 21st. On October 28, W5OZI found JS6CDB, and N5JHV in New Mexico worked JR6VSP.

The enthusiastic 6-meter operators of Hong Kong were probably among the most excited of any during October. VR2LC, VR2XMQ, VR2XMT and others worked such sought-after stations as 5B4FL, 4S7YSG (Sri Lanka), 7Q7RM, 9E1C, EY8MM, J28NW, ST2SA, TA1AZ (Turkey) and XU7ABD (Cambodia). In addition, they had some spectacular runs into Europe on October 18 through 21 and 30. Charlie Ho, VR2XMT, made 74 European contacts on October 20, including 11 with new countries, mostly in Central Europe. On the 30th, Charlie ran off 115 QSOs in 18 European countries scattered from Spain to Poland and Bulgaria. These openings put both VR2LC and VR2XMT over the 100 mark in DXCC entities.

There were other interesting contacts across Asia. On October 15, VR2XMQ found VU2MKP (India) on 50.350 FM, the only frequency and mode the Indian stations are authorized to operate at present. JY9NX (Jordan) worked VU2GTE the same day and found 4S7YSG on October 17. Taiwanese stations BX2AB connected with VQ9JT on the 16th, and BV2DP made it with J28NH on October 23. Gilbert Lappay, 4F2KWT, worked more than 50 central and eastern European stations from the Philippines on October 27, his first day on the band. He had another opening to central Europe on the 21st.

Transcontinental

Although not considered true DX, openings from the East to West coasts of the US and Canada were interesting nonetheless. Bruce Sternstein, K2RTH/4 in south Florida worked numerous stations in British Columbia, Washington, Oregon, Montana and Nevada after 1550 on October 23 for the first time this season.

Many thanks also to K1DAM, K1SIX, K1WVX, W1REZ, N3AWS, KB4CRT, WB4WXE, K5CM, WA5JCI, N7CNH, N7CZ, N7EPD, W7GJ, W9JUV, W9GM, W9RPM, W9/VE3CDP, N0VSB, K0FF, 4F2KWT and VE1IWI, not otherwise mentioned, for their reports. Other information was gleaned from the Web sites: DX Summit, OZ6OM DX Bulletin, SM7AED Six Meter Info and UKSMG Announcement Page; the daily summaries from G4UPS; and advance copies of the VHF columns written by G4ASR, G3FPK and VK5KK.

Two-Meter TEP

From time to time, stations in the Caribbean, Central America and Venezuela have reported extraordinary 2-meter contacts with Argentina and Uruguay via transequatorial field-aligned irregularities (TE). TE is more likely during the spring and fall equinoxes of solar-cycle peaks, but it was still surprising to learn that Jose Santiago, WP4KJJ, reported a remarkable string of 15 consecutive days of TE propagation in October. He made contacts with two stations in Brazil, six in Uruguay and eight in Argentina, mostly in the Buenos Aires area.

Microwaves

10 GHz

Steve Tolley (KL7FZ), Curt Law (AL7LQ) and Ed Cole (AL7EB) are nearly ready to initiate what may be the first 10-GHz activity from Alaska. Steve and Ed have recently acquired Gunnplexer transceivers and Curt is installing a 10-GHz beacon on Mt Pillar, adjacent to the city of Kodiak. The AL7LQ beacon antenna will be pointed northeast, toward Cook Inlet and the Kenai Peninsula. Ed believes there are frequent and persistent inversions over Cook Inlet during winter and is optimistic about making contacts throughout the maritime area, perhaps as far as Anchorage, nearly 400 km from Kodiak.

Jack Nyiri, AB4CR, is promoting microwave activity from his new home in Nashville. Soon after making his move, Jack made 3456-MHz and 10-GHz contacts with his friend K4EFD back in Lexington over a 100-km path, but they have not quite made it yet on 24 GHz. The pair runs 200 mW on 10 GHz and 60 mW on 24 GHz, with 0.6-meter dishes. Jack looks forward to working other stations in the Tennessee Valley and beyond on the microwave bands.

145 GHz Record

Brian Justin, WA1ZMS, and Geep Howell, WA4RTS, have claimed a new North American distance record on 145 GHz. The pair completed a 34-km contact in northern Virginia on November 6. WA1ZMS set up on the Blue Ridge Parkway (FM07fm), while WA4RTS was down in the valley at Lynchburg (FM07ji). Their transmitters ran about 5 mW. The CW signals were just out of the noise and Brian thought they were just about at their distance limit.

NOTES FROM ALL OVER
Maritime Mobile High Speed Meteor Scatter

The newest sport on the high seas seems to be running high-speed CW (HSCW) meteor-scatter contacts on 144 MHz. As captain of the SS *Chemical Pioneer,* Clint Walker, W1LP/mm plies the Pacific, Gulf and Atlantic coasts as far south as the Panama Canal. Over the past several years, Clint has given out dozens of all-water grids on 50, 144, 432 MHz. Recently he has had some encouraging results on 10 GHz as well. His newest success has been running HSCW contacts on 2 meters.

During his fall voyage through the Gulf of Mexico and north along the Atlantic coast, Clint completed several dozen HSCW contacts with at least 11 different stations from 20 different grids in contacts from fields EK, EL, EM, FL and FM. Shelby Ennis, W8WN (EM77), who has been one of the most active promoters of HSCW, completed with W1LP/mm while Clint was steaming through 10 different grids.

Clint made most of his contacts by calling CQ and completed them within a few minutes. He notes that HSCW is much easier than attempting the same meteor-scatter contacts on SSB. This is certainly an effective way to log quite a number of all-water grids. Clint usually announces his voyages and operating habits on the W6YX VHF reflector.

W1LP is not the only VHF maritime mobile station running HSCW. For the past year or so, Andy Adams, G0KZG, has been making 2-meter contacts on board the RRS *Charles Darwin* from the North Sea with European stations as far east as Germany, the Czech Republic and Italy. According to David Butler, G4ASR, Andy made two dozen 2-meter HSCW contacts from half-a-dozen all-water grids in field IP during this past August. G0KZG/mm has also made some fantastic runs into Europe via aurora during the past year.

VHF/UHF/MICROWAVE NEWS
Call for Papers

The Southeastern VHF Society seeks presentations and papers for its fifth annual conference to be held April 20-21 in Nashville, Tennessee. Call Dick Hanson, K5AND, at 770-844-7002, e-mail Dick at **k5and@ga.prestige.net** or check the society's Web site at **www.svhfs.org/svhfs** for details. The deadline for submissions is February 20.

Year-Long Cumulative Contest

Bill Tynan, W3XO/5, announces the second annual Roadrunners Microwave Group Cumulative Contest. It is a yearlong event intended to encourage activity throughout the year on the higher bands. The complete rules are a bit involved, but they can be obtained for an SASE sent to RMG Competition, PO Box 93175, Austin, TX 78709; or viewed on the RMG Web site at **www.k5rmg.org**.

Transatlantic Beacons

Mark Dzuban, K0GHZ, has recently installed a beacon on 144.299 MHz on Cape Hatteras, North Carolina (FM25). K0GHZ/4 currently runs 30 W into a loop antenna. By May, Mark hopes to increase the power to 100 W with a new antenna system, composed of stacked loops plus a 13-dB Yagi pointed toward southern Europe.

When the project is complete, K0GHZ/4 will be the second dedicated American 2-meter beacon designed to provide indications of possible transatlantic propagation. The other East Coast 2-meter beacon with a Yagi pointed toward Europe is W1RJA in southern Rhode Island (FN41cj) on 144.282 MHz.

Europeans have designated 144.400 to 144.410 MHz especially for transatlantic beacons. F5AXR (IN87) transmits on 144.405 MHz with 400 W to a nine-element Yagi pointed toward North America. This may be the most useful beacon currently on the air. EA8VHF (IL28) transmits on 144.402 MHz from the Canary Islands with 10 W to a halo antenna. Other transatlantic beacons are planned. QST

NEW PRODUCTS

MILLENNIUM KEY FROM MORSE EXPRESS

◊ Morse Express has recently made available a limited edition "Millennium Key," manufactured by Llaves Telegraphicas Artisanes (*LTA*), located in the Balearic Islands of Spain.

The design of this key is the same as that of LTA's Model GMO, but several enhancements have been made to create their special millennium edition.

The components used in the mechanism are carefully selected, highly polished and then gold plated. The knob and base are constructed of ebony—a material specifically chosen to accent the gold-plated hardware.

Each of the 100 special edition keys is serial numbered and includes a certificate on the underside of the base identifying it as a limited production version. The keys come with a "presentation quality" wooden storage box with red felt lining.

The price for the Millennium Key is $89.95. For more information contact Morse Express, 3140 S Peoria St, Unit K-156, Aurora, CO 80014; tel 800-238-8205; fax 303-745-6792; **info@MorseX.com**; **www.MorseX.com**. QST

Previous • Next New Products

2001: A Technological Odyssey

Thirty-three years ago, I became aware of the year 2001 when I went to the Connecticut premier of *2001: A Space Odyssey* at the Cinerama in Hartford. (Cinerama was the IMAX of the day, using three 35-mm projectors simultaneously to show films on a screen with an arc length of 96 feet!)

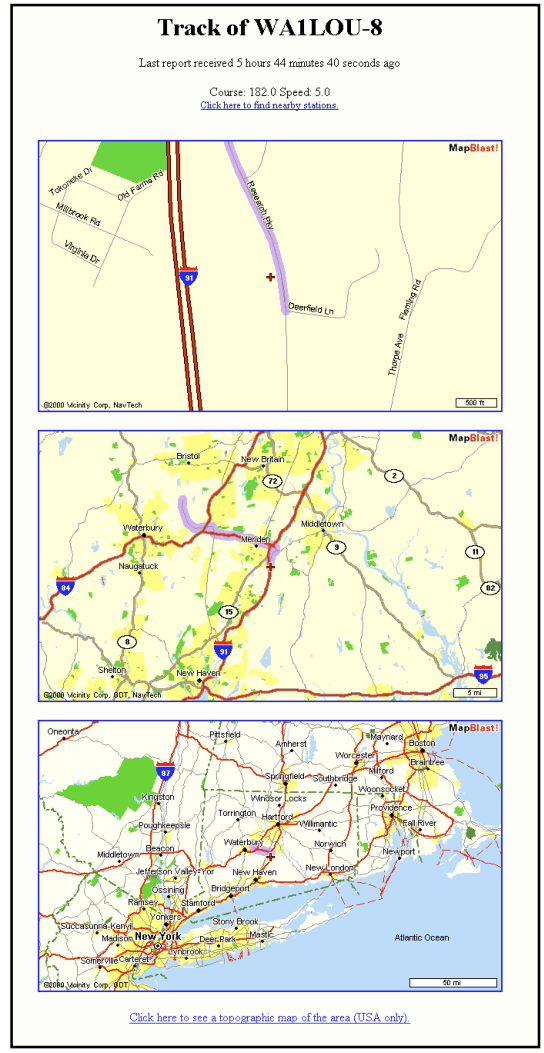
Lacking celebrity status (I was just a high-school kid), I was at the premier because I was the first caller to a local radio station giving away pairs of ducats for the premier. That was a notable achievement because I was using a rotary-dial telephone in order to be the first caller (that was years before DTMF dialing and one-button redialing became available).

I was relegated to the balcony, but I got there early and found seats smack dab in the middle of the front row of the balcony—and those seats turned out to be the catbird seats.

I still get chills down my spine when I recall the beginning of that motion picture. It seemed as if the theatre was a spaceship lifting off the surface of the Moon with the movie screen acting as a porthole. To think that Moon colonies, manned flights to Jupiter and Earth-orbiting Howard Johnson's were only 33 years away!

Okay, so I won't be ordering a fried-clam platter in Earth orbit very soon now, but I will enjoy using all the amazing technology that is now in our grasp.

So, welcome to the 21st Century!



The APRS Database Access Web page displays the path of an APRS tracker in three levels of map magnification.

Finding You

One of those gee-whiz turn-of-the-century technological wonders that I enjoy using is the APRS Database Access Web page at **www.findu.com**.

For nearly four years, the APRS Internet system has been up and running collecting APRS data from around the world to link all the local RF APRS networks into a single real-time wide-area network. The system handles approximately 300,000 packets a day. Until recently, there was no provision for long-term storage of the data. Now, there is a system in place to store the APRS packets.

This APRS Database Access system has been up and running for a while, but it is often being tweaked and improved by its creator Steve Dimse, K4HG. By querying the system, you can obtain pertinent data concerning APRS activity.

For example, I use the system almost every day. After I arrive at the salt mine, I check the system to see if the APRS tracker in my land barge is working. If it is working, my tracker's path from home to the salt mine appears on the maps displayed by the APRS Database Access Web page.

As shown in the accompanying figure, the APRS Database Access Web page displays three maps that indicate the location and/or track of the station you ask about. A local street-level map covers an approximately 0.5×1 mile area, a city- and town-level map covers approximately 25×50 miles, and a regional map covers approximately 200×400 miles.

The page indicates when the last packet was received from that station and the course and speed of that station, if it was in motion, that is, like an APRS tracker. The page also displays the station's distance and direction from the nearest city, the contents of the station's status packet and the contents of the last raw packet received from that station.

Links on the page allow you to access a list of stations near the station of interest. They also allow you to display a US Geological Survey topographical map and an aerial photo, if available, that covers approximately the same area as the local street-level map.

In addition to station location and tracks, you can also display messages sent to or from a particular station, find APRS stations near another station, near a specific ZIP code and near a specific latitude and longitude. Also, current weather information and weather history from specific APRS weather stations may be viewed. Raw packet data from any APRS station may also be viewed.

Brian Riley, N1BQ, created a Web page, N1BQ's APRS Search Page at **www.wulfden.org/APRSQuery.shtml**, that makes it a little easier to access data from the APRS Database Access system. N1BQ's page contains a form in which you enter the call sign, ZIP code or latitude and longitude you seek, instead of entering an URL, which is required on K4HG's page. In either case, the output is the same and illustrates what can be done with some creative programming that ties Amateur Radio and the Internet together. QST

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott, CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

USTTI Class of 2000 Learns about Amateur Radio

Five students from as many African nations attended the 2000 United States Telecommunications Training Institute/ARRL/IARU course on Amateur Radio administration at ARRL Headquarters. The course was held August 28-Sept 1.

Coordinated by USTTI and presented jointly by an IARU volunteer and ARRL staffers, the program covered—among other topics—the International Telecommunication Union and ITU regulations, the IARU, spectrum management, emergency communication, digital communication, satellites, electromagnetic interference, international licensing and Amateur Radio exams.

The trainees also constructed a simple 40-meter receiver in the ARRL Lab.

Attending the weeklong session were Paullycape Kaniki of Zambia; Annettie Mugerwa of Uganda; Tomas Paul Osiro of Kenya; Hamidou Diallo of Guinea; and Hillow Maeko of South Africa. All are in occupations in their home countries that involve the use of telecommunications.

Teaching the majority of the Amateur Radio Administration Course were ARRL Technical Relations Specialist Walt Ireland, WB7CSL, of the ARRL's Washington, DC, office, and Ken Pulfer, VE3PU, of IARU and Radio Amateurs of Canada. Lisa Kustosik, KA1UFZ, of the Executive Vice President's office served as USTTI Coordinator this year. Jo-Ann Arel was the Headquarters tour guide for the group.

ARRL

The USTTI Class of 2000. Left to right are Walt Ireland, WB7CSL; Tomas Paul Osiro; Lisa Kustosik, KA1UFZ; Annettie Mugerwa; Ken Pulfer, VE3PU; Hamidou Diallo; Hillow Maeko, and Paullycape Kaniki.

Others from the ARRL Headquarters staff who assisted in the program were ARRL Lab Supervisor Ed Hare, W1RFI; Technical Information Specialist Al Alvareztorres, AA1DO; *QST* Managing Editor Steve Ford, WB8IMY; Wayne Irwin, W1KI, of the ARRL-VEC; Senior Assistant Technical Editor Larry Wolfgang, WR1B; and Steve Ewald, WV1X.

For more information on USTTI, visit the USTTI Web site, **www.ustti.org/**.

ITU, IARU Ink Publishing Agreement

The International Telecommunication Union and the International Amateur Radio Union have agreed jointly to produce an ITU publication made up of excerpts relating to the amateur and amateur-satellite services from other ITU publications. The new publication, called a *fascicle*, will be available in English, French, and Spanish, and in both print and CD-ROM versions.

This is the second such agreement between the ITU and the IARU. The earlier agreement resulted in the publishing of a similar fascicle in 1995. Subsequent World Radiocommunication Conferences have adopted changes that have made the earlier edition obsolete.

The new fascicle will include relevant excerpts from the international Radio Regulations as amended by WRC-2000 held in Istanbul, the table of allocation of international call sign series, ITU Recommendations relating to the amateur and amateur-satellite services, and a glossary. Publication is anticipated in early 2001. The fascicle will appear on the official ITU list of publications and will be available from both the ITU and the IARU.

The agreement was signed November 9 in Geneva by ITU Secretary-General Yoshio Utsumi and IARU President Larry E. Price, W4RA.

IARU

IARU President Larry E. Price, W4RA (seated, left), and ITU Secretary-General Yoshio Utsumi (seated, right) sign the publication agreement in Geneva with (standing, l-r) ITU Radiocommunication Bureau Director Robert Jones, VE3CTM, ITU Radiocommunication Bureau Administrator Philippe Capitaine, HB9RKG, and ITU Deputy Secretary-General Roberto Blois looking on. QST

A QRP Kayaking Expedition to the Cape Lookout National Seashore

By Paul Stroud, AA4XX

In the autumn of 1999, I began searching for campsites along the coast of North Carolina that would provide proximity to the Atlantic Ocean and the sounds. The intent was to locate areas that would provide the opportunity to test various HF vertical antennas over salt-water paths favoring Europe and the US West Coast.

After extensive research, I chose the Cape Lookout area because of its many miles of shoreline on the sound side of the Outer Banks. It looked like an ideal location from which to conduct the experiments. Since the Outer Banks ferries don't operate during the months of January to March, primary months for testing 160 and 80-meter antennas, I needed some way to get radio equipment, food, water, camping gear and myself to the islands year-round.

Enter the Sea Kayak

I selected a kayak that provided a good fit for my gear and myself. The following months were filled with kayaking safety lessons, along with a study of North Carolina coastal areas, water conditions and so on.

I planned my first real QRP Kayaking Expedition for the July 3, 2000 Spartan Sprint contest, sponsored by Adventure Radio Society (**www.natworld.com/ars**). The Spartan Sprint provides the opportunity to score points based on "QSOs per pound." Simply stated, the lighter your station, the more points you accumulate for a given number of QSOs. I built a lightweight station consisting of a SW-20+ transceiver, microswitch code key, small earphone and battery pack. The total weight of this equipment was only 0.3 pounds!

The antenna system consisted of a phased 2-element 20-meter vertical array, using half-wavelength 20-meter verticals spaced $^1/_2$ wavelength apart. Phasing between the two verticals was accomplished using a small homebrew phasing controller.

Leaving with the Tide

My departure point for the paddle to the Cape was Shell Point, on Harker's Island. The Cape Lookout Lighthouse was just visible from this point, appearing to be the size of a toothpick three to four miles away. Taking advantage of the outgoing tide, the paddle to the Cape area was relaxing.

AA4XX's camp on the Shackleford Banks.

I decided to rest at the Shackleford Banks. I set up the verticals, spacing them 34 feet apart, parallel to the line of the beach, which ran generally north and south. The tent was erected halfway between the verticals, which allowed the use of half-wavelength feed lines from the phasing controller to each vertical. Lightweight RG-174 coax was used in order to reduce bulk and weight. Each vertical element was composed of 34 feet of stranded hookup wire attached to a DK9SQ telescoping 10-meter fiberglass mast. The two masts were supported by PVC ground stakes that were screwed into the sand. A parallel L/C matching network was used at the base of each vertical to match the high feedpoint impedance to approximately 50 Ω.

The phasing controller allows instantaneous direction switching, which is a significant aid in eliminating QRM from undesired directions. A two-position switch on the controller provides either in-phase or 180° out-of-phase energy to each element. Thus, it is possible to select either "broadside" or "end fire" patterns with this array.

According to the tide table, high tide at my location would be at 10:30 PM local time. By 8:30 PM, the water had risen within two feet of the tent, giving me an uneasy feeling about my site selection. By 9 PM, occasional small waves were lapping within 18 inches of the tent flap. This was going to be one interesting evening!

At 9 PM sharp, 14060 kHz came alive with signals from fellow Spartan Sprinters. I cranked the output power down to 100 mW and joined the fun. The average received RST was 559 on my end, with 599 reports being received from Alabama, Texas, California and New York. It was a little odd sending code with a tiny microswitch, but that worked out okay, even if the code speed was relatively slow.

By 10:45 PM, it was obvious that the tide was indeed receding; I could see two feet of sand outside the tent flap. Adding to this good news was the appearance of KH6B on frequency. I knew Dean had good ears, but would he hear me running 100 mW with just fifteen minutes remaining in the contest? Not wanting to miss this opportunity, I cranked the power up to 200 mW and gave him a call. Words cannot describe my emotions when Dean came back with: "AA4XX de KH6B RST 339 HI 5 Watts." Hawaii to the North Carolina Outer Banks using only 200 mW! Not bad.

Homeward Bound

The following morning around dawn, cloudbanks were approaching from the west along with increasing winds. I had repacked the kayak and I backed into the inlet between Cape Lookout and Shackleford Banks. The currents in this area can be rather strong, so it is necessary to time the trip according to the tides. Within a few minutes, I was well on my way, skirting the eastern end of Shackleford Banks with Harker's Island in view. I spent a good while watching wild ponies grazing on grass at the edge of Shackleford Banks. There is a large herd of ponies on the island, and from a distance they sometimes appeared to be walking on water. What a marvelous sight!

There is tremendous satisfaction in meeting the challenges posed by such an operation. It's a wonderful feeling to be on your own, paddling around the Outer Banks while being treated to some marvelous scenery. More importantly, combining QRP and the great outdoors is a whale of a lot of fun! QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

New Morse Exam Standards to be Implemented by Midyear—2001 ARRL Test Fee Expected to be $10

At its July 21, 2000 meeting, the National Conference of VECs (NCVEC) voted to adopt new Morse code testing standards to be followed by all VECs and VEs effective on or before July 1, 2001. Those new standards are:

• Only the fill-in-the-blank format 10-question quizzes will be used (multiple choice format 10-question quizzes are to be phased out by July 1, 2001).

• Morse code examinees are entitled to be scored up to two (2) ways in order to pass a Morse code exam…

—By correctly answering seven of ten fill-in-the-blank format questions; or

—By achieving a character count of at least 25 characters copied correctly on a one-minute-solid-copy review.

• All routine Morse exams will be transmitted/sent using the Farnsworth method of sending the characters (characters are sent faster than the overall speed, with additional spacing between characters and words to balance out the message to the prescribed speed). As necessary, standard 5 WPM exams (sent at a 5 WPM character speed) or special message/character speeds (necessary to accommodate persons with such needs) are available upon request.

• The Farnsworth character speed used for routine exams will be between 13 and 15 WPM.

• The Morse code audio note frequency will be in the range of 700–1000 Hz.

The NCVEC's goal in setting and announcing these standards is to put the amateur community on the "same page" in so far as Morse code exam procedures and parameters are concerned.

QUESTION POOLS

The three current question pools (and any exam designs based on these question pools) are valid as follows:

• Extra class Element 4—valid from April 15, 2000, through June 30, 2002

• Technician class Element 2—valid from April 15, 2000 through June 30, 2003

• General class Element 3—valid from April 15, 2000, through June 30, 2004

[this cycle is expected to repeat accordingly]

The first pool to enter a revision cycle is the Extra class pool. The update will be completed by the end of 2001, for July 1, 2002 implementation in exams. The Technician and then General class pool revisions will follow the Extra class pool revision by one year and two years respectively. This revision cycle will be our opportunity for a complete and comprehensive review of each of the question pools. These pools can be viewed on the ARRLWeb at **www.arrl.org/arrlvec/pools.html**.

ARRL VEC Anticipates $10 Test Fee for 2001

The ARRL VEC plans to set its test fee for calendar year 2001 at $10. The current fee of $6.65 is based on a provision in the Communications Act, adopted in 1984, that established a $4 cap on reimbursement of out-of-pocket costs with an annual adjustment based on the Consumer Price Index. More recent legislation removed this cap. An FCC announcement of changes in its rules, reflecting the change in the law, is expected soon.

A $10 ARRL VEC test fee will be formalized as soon as the FCC gives the word that it has made the necessary adjustments to Part 97 to bring it in line with the updated Communications Act. As soon as that happens, the ARRL VEC will make a formal announcement to establish the new fee. Until then, ARRL VEC volunteer examiners will continue to charge applicants at the 2000 test fee rate of $6.65.

Seeking Public Input (Your Input) to Revisions of the Element 4 Amateur Extra Syllabus and Question Pool

Your input is requested and invited in order to assist us with the update of the Element 4 Amateur Extra syllabus and question pool. Syllabus input is specifically requested at this time, but question input can be sent in now as well. A formal question-input solicitation is expected in February or March—but you can certainly start assembling your input now, to send to the committee at any time.

Please include with your submission the subelement reference that you are supplying input on; or for question updates please reference the current subelement and/or question number and the text of the existing question, answer or distractors that you would like to see replaced. For new questions, please supply as much of the full question, answer and three distractors as possible. Full questions can be worked through the committee far easier than partial ones.

Send your question pool input to QPC Acting Chairman Scotty Neustadter, W4WW, with copies to QPC Members W5YI and myself, W9JJ, as follows:

QPC (Acting Chair), Scotty Neustadter, W4WW, 9710 Dortmund Dr SE, Huntsville, AL 35803; **w4ww@arrl.net**

QPC Member Fred Maia, W5YI, POB 565101, Dallas, TX 75356-5101; **w5yi@w5yi.org**

QPC Member Bart Jahnke, W9JJ, ARRL VEC Manager, 225 Main St, Newington, CT 06111; **w9jj@arrl.org**

2001 ARRL-SPONSORED NATIONAL EXAM DAY WEEKENDS

Spring National Exam Day Weekend—April 28-29, 2001

Fall National Exam Day Weekend—September 29-30, 2001.

If you are looking for information regarding exams to be held in your area, or information about the question pools, see that ARRL/VEC Web site at: **www.arrl.org/arrlvec/** or call 860-594-0300. For instructors and club info, contact the ARRL at 860-594-0200. The ARRL can provide media kits for your use in publicizing your Spring and Fall 2001 ARRL National Exam Days. Contact Jennifer Hagy, N1TDY, at ARRL HQ (860-594-0328 or **jhagy@arrl.org**) to receive your media package. QST

Bart Jahnke, W9JJ ♦ ARRL VEC Manager

Collecting History

Early ham newsletters and magazines are a wonderful way to collect and learn about early Amateur Radio history. The following excerpts are from *Radio News*, a ham club newsletter dated September 3, 1915, from Atlantic City, New Jersey. I was very lucky to come across seven early issues covering up to January 7, 1916, at a radio estate auction.

RADIO NEWS

Published the first and third Friday of each month. Offices at 2011 Atlantic Ave and 145 St Charles Place. Jerome Haas, Editor, Earl Godfrey, Associate Editor. Advertising rates upon request.

Local Amateur News

Mr. Neveling has purchased a DeForest audion and is having remarkable results.

Mr. Doughty's aerial has fell down several times recently but is up again. He has also burned out his transformer.

Mr. Albertson has erected his aerial again at his home in Pleasantville and will be ready for business soon.

3IF and NJ will be back at 145 St Charles Place after the fifteenth of September.

Mr. Seymore's station, 3IT, is hampered by having the front of the aerial only 8 feet above the roof. CS was afraid the pole would fall in the street and someone mistake it for slivers.

Mr. Cook has established a station at Little Beach. They will use a 3-inch coil. Everybody listen for CM.

Do not use linoleum on the floor of your station if you do much transmitting. Messers Jeffreys and Haas were badly shocked recently on account of the ground wire making circuit thru the linoleum.

In all probability the Pier station [the Million-Dollar Pier on the Boardwalk] will be closed after the first of October. Here's hoping old man Neptune leaves it there for next summer.

In later issues there are updates on stations, news of a 350-foot aerial at Haas' station, and listing of new hams and members. It appears that there were about 26 members by January 1916. It is also rich with hand drawn schematics of various stations and new designs for antennas. And on the last page of every issue there are advertisements for slide tuners, galena crystals for detectors and large slinky-type antennas. These enterprising teenagers made almost everything themselves.

Jerome Haas went on to Drexel Institute [now Drexel University] and into an Engineering career. I found his photo in a 1920 issue of *The Radio Amateur*, a small magazine from the Midwest. At the time he was Technical Editor. He was resigning to become a married man.

HOW I STARTED IN WIRELESS

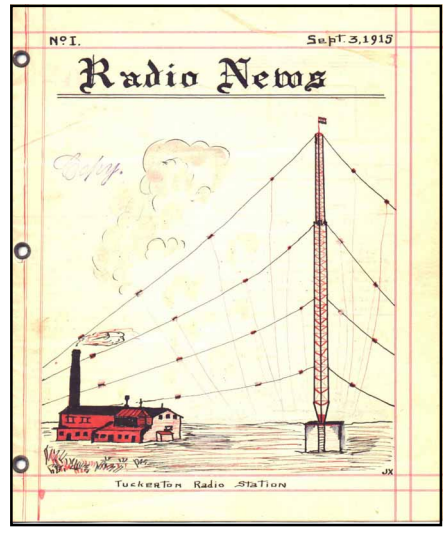
By J. Hass (September 3, 1915)

Jerome Haas, 3RQ, circa 1915.

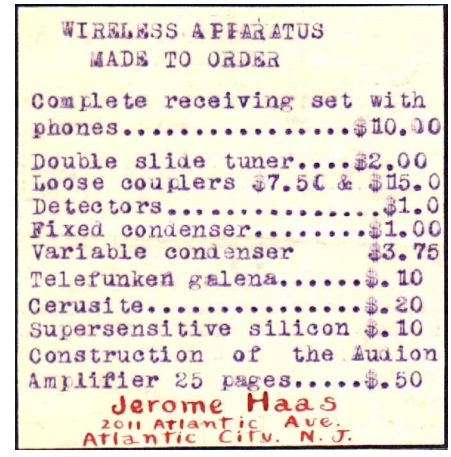
I have been interested in wireless since 1908 and from that year on, I purchased *Modern Electrics* and read many articles in it that interested me. Yet, I did not care to install a set. I knew of no amateurs in this city [Atlantic City, New Jersey]. In 1910 during a short visit to Newport, R.I., I saw the government station and determined to put up a station of my own. While the Marconi station was on the air I became acquainted with Mr. Lessenco and by watching him send press in the evening I learned the code. I bought a cheap set in Philadelphia in the fall of 1912. The only stations I could hear were AX and a few ships. I improved my set rapidly after that. At first I had only 2 wires 50 ft. long.

Mr. Lessenco gave me a letter of introduction to Mr. Jeffries and in March 1913 I joined the Association. After that I put up two spiral aerials and made a 4 slide-tuning coil. During the summers of 1914 and 1915 I worked in the station of the Jeffries Young Antenna Co., on the pier, which gave me some experience. In January 1915 I took the examination at the Philadelphia Navy Yard and was given 3RQ for a call letter.

This about finishes my story with the exception that I have planned for a fine receiving set this Fall and intend to install a high power station at the Drexel Institute in Philadelphia, for which we have asked for a special license.



The cover of *Radio News* from the Atlantic City 1915 ham club. The sketch shows the Tuckerton Radio Station, built by Germany before World War I.



An advertisement from *Radio News*.

Conclusion

If anyone has more information on Jerome Haas or any other early southern New Jersey hams, I would be interested in hearing from you. Check out my Web page for some additional newsletter scans at **www.eht.com/oldradio/arrl/index.html**

I am planning to attend the "Frostfest" near Richmond, Virginia, on January 21, 2001, weather permitting. I will have a table inside with some of my collection on display for you to enjoy. Look for my call letters on my hat and say hello.–*K2TQN* QST

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

Conway Reef

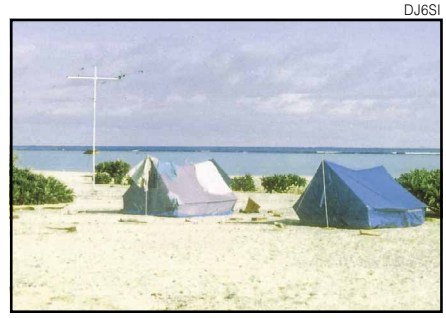
Conway Reef is located about 482 kilometers (300 miles) southwest of Suva, Fiji in the South Pacific Ocean. The reef, known as Ceva-I-Ra to the Fijians, is approximately 3 kilometers (2 miles) long. It was discovered in 1838 by Captain C. Ramsey Drinkwater Bethune and named after his ship the HMS *Conway*. In 1856, Captain Denham of the HMS *Herald* surveyed the reef, which runs east west and is located at 21° 44′ 18″ south and 174° 38′ 24″ east. At high tide the reef of sand and coral measures approximately 50 meters wide, 200 meters long and somewhere between 1.5 and 3 meters above sea level. The small reef plays a major economic importance to Fiji as it marks their southern limits of the Economic Zone.

The first DXpedition to Conway Reef was 3D2CR in April 1989 by Anne, DF3KX; Rolf, DF9KH; Dieter, DJ9ON; Harry, DL8CM; and headed up by Hans, DK9KX. Another team quickly followed this in July 1989, which included Henry, DJ6JC; Baldur, DJ6SI; Vince, K5VT; and Karl, DK2WV. This team used one call for each operator (3D2HL, SI, VT and WV) making some 15,900 QSOs, including 800 on RTTY. Less than 12 months later a third DXpedition took place with the call of 3D2AM, which made some 45,000 QSOs. This group included Masa, JG2BRI; Wayne, N7NG; Pekka, OH1RY; Martti, OH2BH; Mats, SM7PKK; Steve, VE7CT; and Dale, VE7SV. The last operation from this tiny reef was 3D2CT in March 1995 with the capable hands of Nils, SM6CAS; Jun, JH4RHF; Garry, NI6T; and once again Mats, SM7PKK; and Pekka, OH1RY. This team made some 30,000 QSOs despite loss of equipment.

N7NG

Fijian government officials have placed a benchmark on Conway Reef.

DJ6SI



Conway Reef is about 300 kilometers southwest of Suva, Fiji. The island portion of the reef is about 50 meters by 200 meters, and a mere 3 meters above sea level.

A boat landing on Conway can be very difficult, as both Mats and Pekka can attest. During their second trip both experienced the feeling of what it was like to be dunked unexpectedly in the South Pacific. Thankfully no one was hurt.

Once on the island the next obstacle is the local Conway Reef tick. These small critters are everywhere and like to seek refuge under arms, on backs and stomachs, and just about everywhere else. Other occupants of this tiny reef include birds and hermit crabs. There are bushes, but no trees to be used for supports of antennas. (Mats and his group did plant some coconuts on their last visit.) A typical trip takes two to three days by boat.

Three DXpeditions to Conway Reef?

Three days in a row in mid-October 2000, three separate groups announced their intentions to go to Conway Reef. The first was a mostly Scandinavian team, which announced they would activate the ARRL Most Wanted Country # 30 in April 2001. The group includes Jon, SM0DJZ; Pekka, OH1RY; Siggi, TF3CW; Steve, G4EDG; and headed up by Mats, SM7PKK and Nils, SM6CAS and two other operators to be announced at a later date. This was the team that brought us the "Double Trouble" DXpedition of T31T/K and ZK3CW last year. A majority of their equipment is already waiting for them in Fiji. This team's captain, a 25-year veteran, refuses to go to Conway before mid-March because of the possibility of typhoons. They will be sailing a 75-foot steel yacht, which has two 75 horsepower diesel engines.

Next, Bill Horner, VK4FW, announced he had plans to be QRV from this semi-rare Pacific entity. No dates or details were given about this trip.

The following day a mostly Yugoslavian team claimed they would go in early February. Hrane, YT1AD, and Dragon, Z32ZM, had just returned from the Pacific having operated in Tonga and the Fiji Islands. While there they did some

N7NG

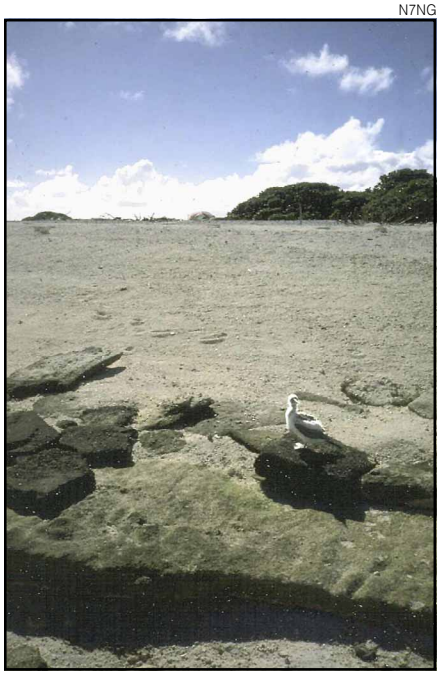
Conway Reef can play havoc on boats during storms. This wreck is located on the north side of the island.

N7NG

Here is a flat rock that Baldur, DJ6SI, found during his 1989 DXpedition. It is properly marked "3D2SI 1989." The 1990-3D2AM crew also left their mark on the rock.

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

N7NG



One of the locals on Conway Reef waiting for the visitors to go home.

homework for a future DXpedition. YU1RL, YT6A, YU1NR and Z32AU/YU1AU will join the two. Approximately 90% of their equipment is in Fiji already. The group's license for Conway was issued in early October 2000. A 20-meter motor yacht has been hired and the captain assures the group that February-April is a good time to go.

Another thing to be concerned about is the storm season in the Pacific runs from late November until mid March. An operation in February could be somewhat dangerous. It will be interesting to see what actually happens. Keep an eye on your favorite DX bulletin for further updates.

P5—NORTH KOREA

Members of a multinational group of Amateur Radio operators met Thursday, October 19 in Seoul, South Korea, in preparation for a trip and possible demonstration operation of Amateur Radio in North Korea. Approximately six to eight hours before the team was to take a bus ride north to P5, North Korean authorities informed them that permission to operate Amateur Radio would not be granted. They were, however, given a new date of January 7, 2001, for possible Amateur Radio operations. Team members returned home on the morning of October 21. Due to the sensitive nature of this operation only certain details could be presented to the public at that time.

Readers should understand that some aspects of these negotiations are delicate and only carefully worded statements, such as the above, are authorized by the organizers. Keep an eye on your favorite DX bulletin. This is one we're all watching closely! Meantime, circle January 7 in red on your calendar.

HOW'S DX 2001 SURVEY

Everyone is reminded to please turn in your How's DX 2000 Survey, which appeared in last month's column (December, page 82), by February 28, 2001. You can do it online at **www.dailydx.com/howsdx.html**. Whether you read this column every month, or just stumbled across the December survey, please take the time to complete the form and submit it. Results will be published in a future "How's DX?" column.

ERITREA—E3

On September 23, 2000, members of the Northeast Wisconsin DX Association (NEWDXA) voted to buy the ARRL "Library" for Eritrea in an effort to help Eritrean nationals to become ham radio operators. NEWDXA members have also donated Morse code training materials and study guides, as well as some reference materials. The group is working with the licensing authority to establish rules governing the service in addition to test materials and procedures. [Hats off to the NEWDXA. Is your club doing something to promote DX in another country?—*Ed*]

T98P DX-CONTEST CLUB

Friends of the late Pero Simundza, 9A4SP/T98P, have established the new memorial Pero Simundza DX and Contest Club—T98P. This call sign will be used during major contests and future DXpeditions. A Web site has been created at **www.qsl.net/t98p/**.

DXCC

The ARRL Web site now has a Web page that confirms receipt of your DXCC submission. Submissions made September 1, 2000, and after can be found at **www.arrl.org/awards/dxcc/appstatus.html**. In early November 2000, the turn-around time for DXCC applications was about 7 weeks.

ARRL OUTGOING QSL BUREAU

Martin Cook, N1FOC, from the ARRL Outgoing QSL Bureau reminds everyone when sending QSL cards to the ARRL Outgoing QSL Bureau to make sure that the cards are sorted in alphabetical order by "Country Prefix". Note: Some countries have a parent prefix & use additional prefixes, i.e., "G, GI, GM, GW" (Parent Prefix) = M, MI, MM, MW, 2E, 2I, 2M, 2W.

INCOMING QSL BUREAU REMINDER

US Postal Service rates increase in January 2001. Please remember to send your incoming QSL Bureau additional postage or money credits.

CORRECTION

In the November 2000 column I mentioned that TS7N would be the first IOTA DXpedition to Kerkennah Island (AF-073). However, Giovanni, I5JHW, reports that 3V8BT was the first from this IOTA Group, which was manned by an Italian and Tunisian team. My sincere apologies to the 3V8BT team.

FUTURE HAMS IN BHUTAN—A5

Two of the A52A team members will be returning to Bhutan for six weeks. Glenn (W0GJ) and Mark (N0MJ) Johnson will be traveling Christmas Day enroute to Bhutan with the rest of the Johnson family (Vivien, KL7YL, Melissa, N0MAJ, Paul, W0PRJ, and Carrie, N0CMJ). Glenn's mission will be working and teaching at the National Hospital in Thimphu. This is Glenn's primary interest in Bhutan and it placed him "in the loop" for activation of ham radio in the Kingdom of Bhutan earlier this year.

In addition to his hospital duties, Glenn will be teaching Bhutan's first Amateur Radio class. The class is reported at full capacity and will meet several times a week. Radio theory, regulations and CW will be taught with exams at the end of the stay. The goal will be to license several hams with the equivalent of a General Class ticket. The CW requirements have been recently reduced to 5 WPM for HF operation.

There is a lot of interest in bringing Amateur Radio into the school classrooms. Mark (age 14) and Melissa (age 16) will be working with high-school-age kids to demonstrate Amateur Radio.

During this visit, the emphasis will be on getting the adults licensed first. When the Johnsons return in the future, they hope to license the high school kids. Once an initial group of adults is licensed, the plan would be to have them teach others.

Glenn and Mark are already licensed in Bhutan as A52GJ and A52MJ respectively. The other Johnson family members are expected to have their A52 licenses by the time they arrive. In fact, Melissa is hoping to be the first YL on the air from Bhutan.

The Johnsons will be active on all bands and modes, with an emphasis on the low bands and digital modes on the higher bands. PSK31 and Hellschreiber will be given special attention. QSL to home calls.

Contest activity is planned for the ARRL RTTY Roundup and the CQWW 160 CW Contest from the A51AA Bhutan Club Station. For more information on the A51AA Club Station and the Bhutan Ham Center, see **www.sophun.com.bt**. Bhutan is now "open" for visiting hams and contesters, as we've seen in the past several months. Follow the links on the Web site for more information about visiting The Kingdom of the Thunder Dragon and operating from the nice facilities of the Bhutan Ham Center.

DX EXTRAVAGANZA

The Lone Star DX Association (Austin) in conjunction with the Texas DX Society (Houston), Central DX & Contest Club (Austin), DX Amigos (San Antonio) and the West Texas DX Society will join together in sponsoring a DX Extravaganza at HamCom in June 2001. There will be DX seminars, DX Talks, DX Hospitality Suite and a Major DX luncheon. HamCom 2001 will be held at the Arlington Convention Center June 8-10. Mark your calendars now!

WRAP UP

That's all for this month. Happy New Year 2001 and may each of you work many new ones this year. Keep those surveys, letters, pictures, questions and newsletters coming. This month I would like to thank the following people for helping to make this column possible: 9A4NA, AA9OZ, DC3MF, DJ6SI, DJ9ZB, I5JHW, K5AT, KE3Q, KN2N, N1FOC, N7NG, SM6CAS, SM7PKK, *The Daily DX*, W0GJ, VK4FW and YS1RR. Until next month, see you in the pileups!—*Bernie, W3UR*

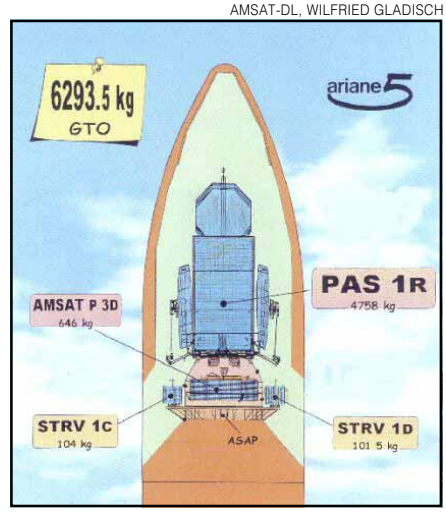
AMSAT-OSCAR 40 in Orbit!

The hair on the back of my neck stood at attention at 0107 UTC on November 16, 2000, as I listened to the countdown (in French) to the launch of Ariane Flight 135. The Internet video feed from the launch site was a bit jerky thanks to my dial-up connection at home, but the audio was loud and clear.

The Ariane 5 was a fabulous sight as it soared into Kourou's night sky, solid-rocket boosters spewing flame and smoke on either side of the blue-white torch of the Vulcan main engine. It was fingernail-biting time until the announcement, at about 0153, that the Phase 3D satellite—soon to be named AMSAT-OSCAR 40—had successfully separated from the Ariane rocket. I jumped up and yelled, "Yes!", which brought my wife and daughter running into the room to see why Dad was so hysterical. You can hear audio clips from the launch at my personal Web site at **home.att.net/~wb8imy/oscar40.htm**.

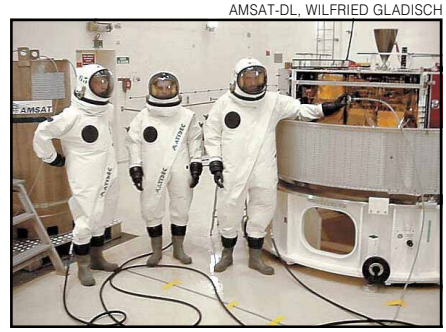
When I attended my first AMSAT-NA meeting in Washington, DC in 1991, this satellite was just a concept on so many reams of paper and computer disks. Some doubted that hams could build such a sophisticated spacecraft, or if built, that it would ever fly. There were serious setbacks over the years, but the AMSAT teams kept their eyes doggedly on the prize. Through almost 10 years of sweat and tears, they brought this magnificent creation to reality. The AMSAT organizations worldwide deserve our praise. This was their Mt Everest, and they conquered its summit.

AMSAT-DL, WILFRIED GLADISCH



Phase 3D sat directly below the giant PAS-1R satellite in the payload section. It was the last "passenger" to leave the rocket.

AMSAT-DL, WILFRIED GLADISCH



Posing in their hazardous materials suits, the fueling team (Dick Daniels, W4PUJ, Thomas Maier and Martin Riehle) prepares to pump the toxic fuel into the satellite.

First Signals

On the morning of November 16, the first signals were heard from OSCAR 40. W1AW station manager Joe Carcia, NJ1Q, picked up its 400-bps PSK beacon on 145.898 MHz. He was astonished by its strength. I went home that evening and fired up my IC-706 and switched in my attic-mounted 2-meter omni antenna. Sure enough, there was the beacon at an S 5 signal level from 35,000 km away!

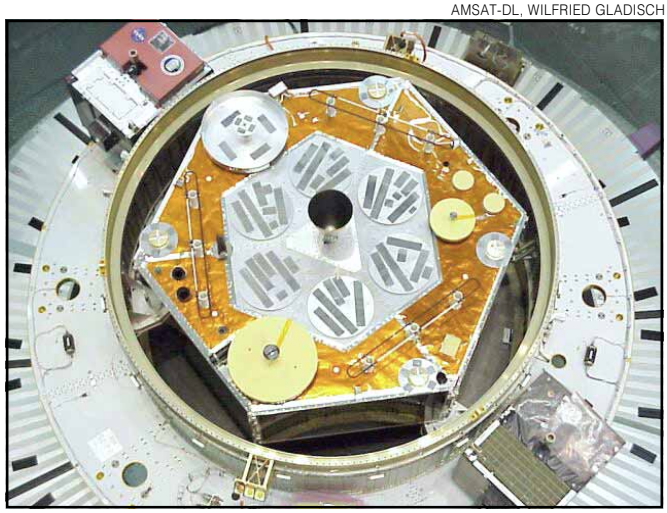
When this issue went to press, the initial checkout had begun. OSCAR 40 is in a geostationary transfer orbit and must be carefully nudged into its final orbit. This requires the onboard arcjet motor to burn intermittently at perigee over a 270-day period, with final inclination and apogee adjustments made by the spacecraft's 400-Newton motor. In fact, the first motor firings should have taken place by the time you receive this issue.

So When Do We Get To Use It?

It is probably safe to say that OSCAR 40 will not be fully operational until sometime next summer. It takes months to check out the complex systems and maneuver the bird into its final position. At that point the solar panels will be deployed and OSCAR 40 will be fully open for business.

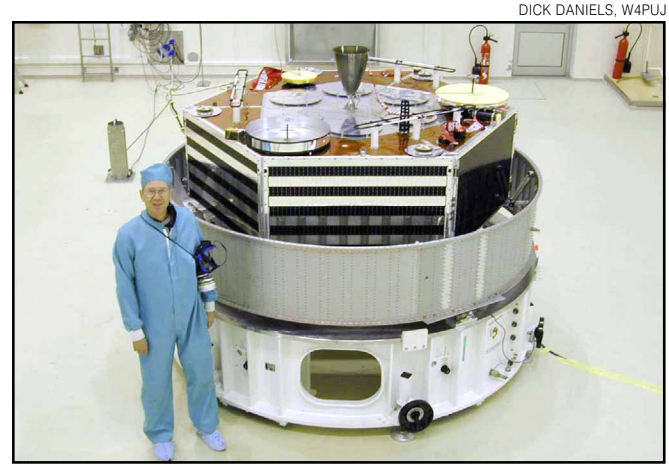
We may have opportunities to use the new satellite before then. AMSAT has indicated that some transponders may be

AMSAT-DL, WILFRIED GLADISCH



Phase 3D ready for launch aboard the Ariane 5.

DICK DANIELS, W4PUJ



Chuck Green, N0ADI, stands next to the spacecraft as it is secured within the carrying structure prior to being integrated into the launch payload stack.

Steve Ford, WB8IMY ♦ QST Managing Editor

switched on for limited use as the power budget permits—possibly before this column goes to press. These transponders would be operating at reduced power, however, so don't be disappointed if signals seem somewhat weak. They'll be up to full output when the solar panels are open.

Your best bet is to keep an eye on the ARRLWeb site (**www.arrl.org**) for late-breaking news concerning OSCAR 40.

Start Shopping

Many have asked me in the past when they should start assembling their station gear for OSCAR 40. I've always answered, "Wait until it makes it to orbit." Well, the bird is in orbit and it appears to be healthy. The time to start shopping is *now*.

I'm willing to bet that used 435-MHz all-mode transceivers are going to suddenly become very attractive. (Of course, that means the prices will skyrocket.) Rumors have it that Mode U/S (435 MHz up, 2.4 GHz down) will be a popular mode.

Already I've seen used ICOM IC-475 UHF all-mode radios on the Ebay auction site (**www.ebay.com**) going for about $400. I have also seen good prices on used multiband satellite rigs such as the Yaesu FT-726, FT-736 and the ICOM IC-820H.

If you go shopping for *new* radios, pick your targets carefully. To compensate for the effects of Doppler shift (which, thankfully, won't be too significant when AO-40 is at the highest point of its orbit), you need to hear your own signal coming back to you through the satellite. Not all radios can pull off the clever trick of transmitting and receiving on different bands at the same time, otherwise known as *crossband duplex*. For example, a lot of ICOM IC-706 MkII Gs and Yaesu FT-100s are out there, but despite having 2-meter and 70-cm all-mode capability, they cannot work crossband duplex.

If you want a new HF radio that will also function as your satellite rig, check out the Yaesu FT-847 or the Kenwood TS-2000. For a new VHF/UHF-only radio with satellite capability, take a look at the ICOM IC-910H. All of these transceivers can operate in full crossband duplex.

If you don't own VHF or UHF gear, you can "get there" with transverters. There are transverters available that will take a 28-MHz signal from your HF radio and convert it to 70 cm or even higher. The output is often about 1-5 W, so you may need an amplifier to boost it up to something more respectable (say, 50 W or more on 70 cm). There are also receive converters that will convert UHF or microwave signals down to HF for you to hear. For more information, I suggest you jump on the Web and check out Hamtronics (**www.hamtronics.com**), SSB Electronic (**www.ssbusa.com**) and Down East Microwave (**www.downeastmicrowave.com**).

AMSAT-DL, WILFRIED GLADISCH

Phase 3D arrives at the Arianespace launch site in Kourou aboard a flatbed truck.

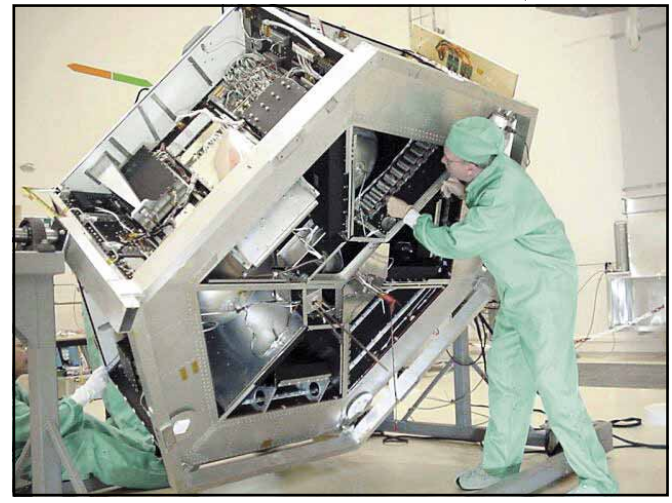
AMSAT-DL, WILFRIED GLADISCH

Dick Jansson, WD4FAB, makes final preparations to the solar panels in Kourou.

AMSAT-DL, WILFRIED GLADISCH

The last solar panel is installed.

AMSAT-DL, WILFRIED GLADISCH

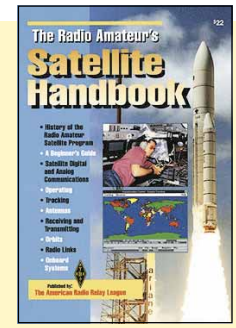


The bottom plates are placed on the satellite.

AMSAT-DL, WILFRIED GLADISCH

The PAS-1R satellite is slowly lowered on top of Phase 3D as the payload "stack" is assembled prior to launch.

Get Ready for AO-40! The Radio Amateur's Satellite Handbook

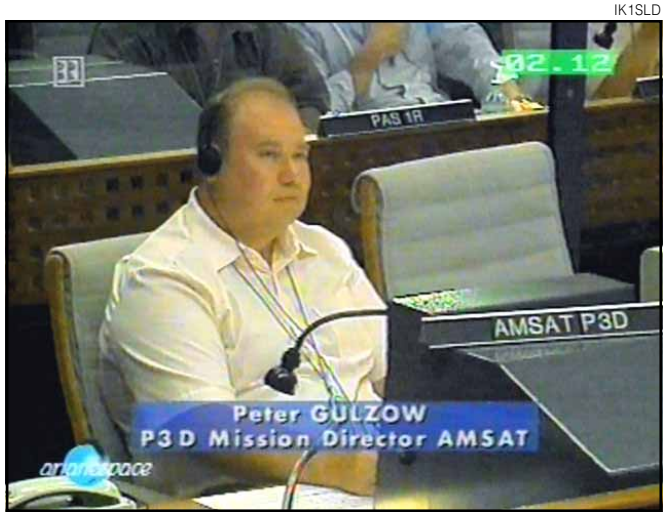


By Martin Davidoff, K2UBC

The most comprehensive book ever written about amateur satellites! Find detailed profiles for active satellites, including AO-40. Covers station setup, antennas, and tracking. Great for all skill levels!

Published by American Radio Relay League, 225 Main Street, Newington, CT 06111-1494; toll-free order 888-277-5289; tel 860-594-0200; **www.arrl.org/shop**. Softcover, 8 x 11 inches, 376 pages. ISBN 0-87259-658-3; ARRL Order No. 6583, $22 plus shipping/handling $6 US/$8 International (surface mail).

IK1SLD



A tense Peter Gulzow, DB2OS, as seen on the live Internet video feed.

IK1SLD

IK1SLD

Those of us watching the launch on the Internet video feed saw a spectacular view of the solid rocket booster separation.

What about Antennas?

Despite the power of AO-40, you'll still need to invest in long-boom Yagis if you're going to be transmitting and/or receiving on 2 meters or 70 cm. I'm talking in the range of eight or more elements on either antenna. That can make for a fairly large antenna on 2 meters, but 70 cm is much more manageable. One of the factors that make the microwave transponders so attractive is that the necessary antennas on the ground can be quite small. I plan to assemble a Mode U/S antenna system with just a small 70-cm Yagi and a 3-foot dish for 2.4 GHz. This is something I could set up in my tiny back yard on a tripod.

Will you need an antenna rotator? Maybe. Antenna rotators that will spin your array up and down, as well as side to side (known as az/el rotators), are not cheap. A brand new az/el rotator will probably set you back more than $500. The good news is that you may not necessarily need it—at least not right away. AO-40's orbit describes a highly elongated circle. This means that from our perspective on the ground the bird will appear to almost hang in the sky for several hours when it is at its highest point. So, you should be able to manually point your antennas at the satellite and leave them for quite a while. An az/el rotator will keep the antennas precisely on target, and the convenience is certainly attractive, but it falls into the "nice-to-have" category.

And Software?

As the saying goes, you can't tell the players without a program. And you can't know when the satellite will be in range without software. Fortunately, satellite-prediction software is readily available—and some of it is even free. My recommendation would be to visit the AMSAT-NA Web site (**www.amsat.org**) and browse their collection of software. The prices are good and you'll have a clear conscience knowing that your investment will help pay for AO-40 (yes, the bills are still coming in).

The Fun is Just Beginning

AMSAT-OSCAR 40 is likely to give an invigorating boost to the amateur satellite community, and it will act as a strong presence on the microwave bands—something Amateur Radio needs at the moment. With the current solar cycle about to begin its decline, AO-40 couldn't have come at a better time. When this big bird is high in your local sky, the "band" is guaranteed to be open—regardless of how the ionosphere is behaving. And if you step up to microwave operating, you'll have DX at your fingertips—even though you wouldn't otherwise have enough room for an HF skywire.

Watch *QST* in the coming months for more articles about how to get started with AO-40. For my part, I have a 2.4 GHz dish, preamp and modified Drake downconverter collecting cobwebs in my utility shed. Looks like I'd better dust it off and inspect the wiring. I've waited 10 years to hear the first QSOs on the "SuperSat." I won't have to wait much longer. QST

The Quest for Power—*Part 1*

Next to finding a place to mount a rig, one of the more daunting challenges facing a would-be mobile ham is connecting and routing the necessary power leads. While one look under the hood or dash of a new auto might leave you convinced there's no way to ever make the necessary connections between the battery and your rig, don't despair. With nothing more than some simple tools and careful planning, you can do it. But first, what about those…

…Accessory Jacks?

Formerly known as cigarette lighter jacks, accessory jacks are found in many new vehicles. Offered as power tap points for various consumer electronics devices, are they an appropriate power source for your equipment? That depends. I've tried powering radios from the older cigarette lighter jacks with consistently poor results. When connected to the lighter jack in my car, my dual-band rig will transmit only on the low power setting unless the engine is running. In addition to the inadequate current capacity of the lighter circuit, I've found the voltage drop through the plug that's inserted into the receptacle only contributes to an already serious lack of electron flow. Obviously, those jacks are suitable at best for temporary, low current use. On the other hand, if your auto has a high-current accessory jack, you might be able to draw power from that circuit —with certain restrictions. Steve, KZ1X/4 shares his experiences…

"There is a marked difference between traditional cigarette lighter wiring and the wiring behind the identical accessory connector in the Chrysler products I've tested. The voltage drop in the accessory circuit is a small fraction of that found in the conventional lighter circuit, due to the use of a heavier gauge wire by the manufacturer. The tap point for this circuit seems to be in a place that conveys less RFI from the ignition, alternator, etc.

"The voltage drop from the cigarette lighter plug is significant, in either the regular lighter circuit, or in the accessory circuit. I can't emphasize enough the need for the ham community to not use cigarette lighter plugs, no matter how ubiquitous they seem to be. Use of a suitably large 'Scotch-Lok' type wiretap on the wire behind the accessory socket is perfectly acceptable."

For the most reliable operation of your radio, especially higher powered (>50 W) rigs, there's just no substitute for connecting directly to the battery. Not only do you guarantee that there won't be excessive voltage drop, a direct connection to battery often works wonders toward suppressing or eliminating vehicle-generated RFI problems.

Holey Business

Obviously, making the battery/rig connection requires a passage through the firewall. You really have only two choices: Use an existing hole, or make your own. Every auto has several holes in the firewall; most aren't suitable for our use, but some are. Using a good light, carefully examine the area of the firewall under the dash. You'll be looking for an unused hole, easily identified by a rubber or plastic plug. Because of mass production dictates, the firewall for a particular model vehicle will usually have the openings punched for every possible equipment combination. Unused holes are simply plugged. It may be beneficial to pull the carpeting back from the firewall to reveal holes not otherwise visible. (Note that it may be necessary to remove the plastic kick panel(s) or other trim first.) Many autos have sections of sound deadener/insulation held against the firewall with push-in plastic retainers. Those retainers pass through holes in the firewall, and although the diameter of the hole is normally less than 3/8 inch, it can usually be enlarged to the needed size. If you find what promises to be a usable opening, you'll need to determine where it leads. Generally, using known points for reference—the steering column, throttle cable, etc., you should be able to examine the engine compartment side of the firewall and locate the desired hole and its plug. If not, there's a way to simplify your search. First, remove the plug from the hole. Even though they are normally inserted from the engine compartment side, it's usually possible to pull them through from the inside. Then, with your light still shining under the dash, again examine the firewall for the candidate hole.

"I can't emphasize enough the need for the ham community to not use cigarette lighter plugs, no matter how ubiquitous they seem to be."

In some cases you can pass power leads through openings for existing equipment, such as shifter or throttle cables, or steering shafts. Although the main vehicle wiring harness may offer a tempting point of passage with its oversized rubber grommet, it's a poor choice. With the substantial amounts of RFI being generated by modern autos, and with manufacturer's warnings of possible electronic systems damage from radio transmitters, it isn't wise to snuggle your rig's power leads too closely to any vehicle wiring harness.

First, Do No Harm

There's a natural, understandable reluctance to go around drilling holes in a perfectly good automobile. Fact is, it's usually the best way to route power and antenna cables, offering you the chance to take the shortest path to the battery and avoid vehicle electronics. The time-honored maxim to measure twice and (drill) once is profoundly applicable. Yes, you can do serious—read that costly—damage with a misguided bit. That notwithstanding, the average auto offers several square inches of firewall area that's perfectly safe to drill; it's simply a matter of choosing the right square inch. Use common sense, be sure where and what you're drilling, and don't assume anything. Closely inspect both sides of the firewall for electrical, fuel, braking or heat/air conditioning components in the area where you intend to drill. Make the first hole with a 1/8-inch bit and be sure to use a stop collar or wrapping of tape to allow the bit to penetrate no more than 1/4 inch. Once you're satisfied with the location, use a larger bit or hole saw to bring the hole to the desired size. Even though you'll de-burr the hole with a rat-tail file, you must use a grommet in the hole to prevent a future short circuit. A short piece of rubber fuel hose makes an excellent feedthrough bushing and is available at auto parts stores in various sizes. Use a little RTV to seal the hose to the firewall and the wires inside the hose

Stay Tuned. . .

That's all the room we have for now. Next time, we'll wrap up with a look at cable routing and connections. QST

Roger Burch, WF4N ♦ Box 100, Island, KY 42350 ♦ wf4n@arrl.org

AT THE FOUNDATION

Realities of Healthy Club Coffers

We've received many questions over the years asking how clubs can raise funds for their activities or special needs. We've addressed this in *QST* feature articles and in this column from time-to-time, with specific suggestions and tips. Still, questions come up about what it takes to keep a club financially healthy. Your club might want to set a few resolutions to grow a healthy treasury this year using what we've found to be consistent initiatives among successful clubs:

(1) **Every member matters.**

Financially successful clubs come in all sizes, but one strong characteristic stands above all others: Club members are loyal, long-term and active. Members make membership meaningful and help those members who are ill, disabled or financially strapped.

(2) **The club constitution addresses fund-raising.**

Financially successful clubs know that sources must be found beyond membership dues to permit continuous support of club projects. Their club constitution may instruct that a specific officer(s) or committee be appointed and that revenue generating activities will occur at specified times throughout the year.

(3) **Club members seek professional advice about fund-raising activities in their state**.

Financially successful clubs do not rely on hearsay or third-hand advice on what they might do to raise funds. State and federal laws are ever changing and often complex. Clubs consult their state's Department of Public Charities for guidance on activities they might be considering. They may also consult a tax-attorney who has worked with another Amateur Radio club in their state, especially if hamfest or convention activities need permits or special licensing.

(4) **Use of funds for projects require a majority vote of the club membership**.

Financially successful clubs make sure that their activities are supported by the bulk of their membership. They care about cooperation and meeting positive club goals. They seek consensus. When disputes arise, they work to resolve them quickly while allowing differing opinions to be heard and tempers to cool. They move forward when a consensus has been reached.

(5) **An investment in good public relations**.

Financially successful clubs make friends in the community. Not only are their hams available for public service activities, they share their hobby with family and friends who express an interest. They publicize their activities in local media and purchase club supplies, station equipment and even refreshments for club meetings from local sources whenever possible. Out of this community cooperation often comes spontaneous donations of cash, supplies or co-funding for amateur radio emergency communications efforts that benefit that community.

DEDUCTIVE REASONING

Are you frantically looking for tax receipts and all manner of other "deductibles" you stashed away in a desk drawer this past year? Are you disappointed that you can't claim more deductions to offset investment gains? Don't put yourself through this again next year. Make as many tax-deductible donations in 2001 as you wish to the programs of The ARRL Foundation. For each contribution (of any size) you'll receive not only our heartfelt thanks but an acknowledgment you can attach to your 2001 tax returns. The ARRL Foundation is a 501(c)(3) charitable entity and all contributions to it are tax deductible to the extent of IRS rules. Send your contribution today to: The ARRL Foundation, Inc, 225 Main Street, Newington, CT 06111. QST

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Program Fund

Lois J. Knabel in loving memory of Ronald G. Knabel

The Francis Walton Memorial Scholarship Fund

In fond memory of James A. Daniel, N9QOI are:
Lavina Walton
Carol Walton Hutton
Gareld Ruth
Mary Margaret Devlin
John A. Dixon
Albert M. Gray
Dwight R. Baker

The Chicago FM Club Scholarship Fund

Chicago FM Club, Inc (Illinois)

The IDEA Scholarship Fund

Indiana Digital Experimenters Assn (Indiana)

The PHD ARA Scholarship Fund

PHD ARA, Inc (Missouri)

The General Fund

John T. Jones, Jr, W3NTD, in fond memory of William J. Ludes, K3BWZ, and Raymond Craig, W7LBY
Valerie Biel in loving memory of Robert J. Biel, KB3LQS
Macalee Hime, AB5TY, in fond memory of Suzanne Strickland, W9JTH
Ridgetop ARC (New York) in fond memory of Giles "Ted" Blossom, N2GMB
Dr Nathaniel D. Robinson, Jr, K1ANT, in fond memory of Frederick J. Coyle, Jr, W1MZB

As received and acknowledged during the months of **September** and **October**.

STRAYS

LOOKING FOR *NETMEETING* SERVERS

◊ Do any *Netmeeting* servers exist for Amateur Radio exchanges? I would like to experiment with audio and video conferencing. Contact Rick, VE7WF, at **rickr@smartt.com**.

THE CRYSTAL RADIO BUILDING CONTEST

◊ The Crystal Radio Building Contest is now underway and runs through February 2001. The contest objective is to demonstrate innovation and craftsmanship in the design and construction of homemade crystal radio receivers.

The contest is open to everyone worldwide. There are two entry classes, Master and General, and three categories of design: General, 100% Homebrew and Free Style. A contest Web site has been set up where you can find the detailed rules and information: **w3.one.net/~charlie/contest/**. If you do not have Internet access, send an self-addressed, stamped envelope to: Crystal Radio Building Contest, c/o Lawrence A. Pizzella, WR6K, 856 Ironwood Dr, San Jose, CA 95125-2814.

Previous Strays

Mary E. Lau, N7IAL ♦ Secretary, ARRL Foundation Inc

CONTEST CORRAL

Feedback

In the **2000 ARRL International DX Phone Contest**, **WQ7B** should be listed in the MT section, making him the winner in the Single-Op All-Band High-Power category in that section. **WB2ZTH** should be listed as Single-Op All-Band Low-Power in the NLI section with a score of 341,109 with 453 QSOs and 251 multipliers. **AA9DM** should be listed as Single-Op Low-Power in the IL sections instead of High Power. The DX Single-Op Low-Power winner listed in the write-up should be **VP6BR (OH2BR, op)**. **T77W** should be listed as a checklog in both the CW and Phone portions of the International DX Contest. **W8WA** should be listed in the Single Assisted Category in the DX Phone results rather than as a Single-Band 10-Meter entry.

In the **2000 Field Day Results**, **K7EAR** should be listed in the 2A Battery category, making the **Radio Amateurs of Northern Vermont, W1NVT,** the top-scoring 2A station. **KW8N** should be listed as category 2B1 with a score of 6,374 and is a new high score for the category. This makes **N3IXR (+WA3SES)** the top score in the 2B2 category. A scoring correction for **W0CQC** adjusts their score to 17,410 and establishes a new high score for the 2AB category. **VE7LMB** was incorrectly entered as VE7LMR in 4A. **KH7YD's** call was mistyped as KH7TO in the 2B2B category. A score recalculation changes the **K3SS/7** score in the 1B2B category to 1,940. **K8AJR** should have been listed in the 3E category with 4,146 points.

In the **1999 Ten Meter Contest**, **MU0C (G0OFE, op)** should be listed from the entity of Guernsey.

W1AW Qualifying Runs are 10 PM EST, Thursday, January 4, and 9 AM EST Friday, January 19. The K6YR West Coast Qualifying Run will be at 9 PM PST on Wednesday, January 3. Check the W1AW schedule for details.

1

ARRL Straight Key Night. See the December 2000 *QST*, page 99.

The CCCC Millenium Contest, sponsored by the Chautauqua Contest Club, 1200Z Jan 1 to 1200Z Jan 2. 80 40 20 15 10 meters. PSK31, RTTY, THROB, MFSK16, Hellschreiber or ALE. No operation over 100 W. Power classes: LP = 30 W or less; HP = 31 W to 100 W. Entry classes: Single-op all-band LP, Single-op all-band HP, Single-op single-band LP, Single-op single-band HP. Only one transmitter and one band permitted during the same time period. Once a station has begun on a band it must stay on that band for at least 10 minutes. Listening time counts as operating time. A given station may be contacted only once per band, per mode. Additional contacts are allowed with the same station on each of the other bands as well. Stations may solicit mode changes. Exchange: RST and serial number. Count 2 pts PSK31, 2 pts RTTY, 3 pts MFSK, 4 pts THROB, 5 pts Hellschreiber, 7 pts ALE contacts. Multipliers are DXCC entities (including the WAE entity list) and states/Canadian provinces. Count multipliers per band. Final score is total QSO points × total multipliers. Use a separate log sheet for each band. Send logs by Feb 15 to PSK Millennium Contest, c/o Andrew O'Brien KB2EOQ, 9082 Concord Dr, Fredonia, NY 14063; **obrienaj@netsync.net**; **www.netsync.net/users/obrienaj/cccc2.htm**.

5-7

ARRL RTTY Roundup. See the December 2000 *QST,* page 111.

Japan International DX Contest, CW, low-band portion. Sponsored by *Five Nine Magazine*, from 2200Z Jan 5 until 2200Z Jan 7 (high-band CW portion is 2300Z Apr 6 until 2300Z Apr 8; SSB Nov 9-11) Work JAs only. Low bands are defined as 160/80/40; high bands are 20/15/10. Operate no more than 30 hours (JAs operate full 48). Single operator multi/single band, high (>100 W) or low (<100 W) power, multi-single, or maritime mobile. Exchange RS(T) and CQ Zone; JA stations exchange prefecture number (1-50). Score 4 pts/QSO on 160; 2 pts/QSO on 80 and 10; and 1 pt/QSO on 40, 20 and 15. Multipliers are JA prefectures worked per band (max 50). Final score is QSO points × multipliers. Electronic entries accepted. Awards. Send logs postmarked by Feb 28 (high-band, May 31; phone, Dec 31) to JIDX Contest, c/o *Five-Nine Magazine*, PO Box 59, Kamata, Tokyo,144 Japan, or e-mail them to **jidx-log@dumpty.nal.go.jp**; **www.jzap.com/je1cka/jidx/jidxrule-e.html**.

13-14

North American QSO Party, CW, sponsored by the *National Contest Journal*, from 1800Z Jan 13 until 0600Z Jan 14 (phone is 1800Z Jan 20 until 0600Z Jan 21). Single op (no spotting nets or Packetclusters) and multi-two. Single ops may have only one transmitted signal at a time; multi-twos have a 10-minute rule. All entries must use <150 W output power. Multiops may operate for the full 12 hours, Single ops may operate 10 hours, with off times at least 30 min long and marked in the log. Work stations once per band. CW in CW subbands only (phone in phone sub bands only). Exchange name and state/province/DXCC entity. If your name or location change during the contest the change must be clearly marked in the log. Multipliers are states (including KL7/KH6), provinces, and other North American entities. Non-North American stations may be worked for QSO credit, but not multipliers. Final score is QSOs × multipliers. Team competition. Awards. Electronic awards accepted. Send CW logs to Bob Selbrede, K6ZZ, 6200 Natoma Ave, Mojave, CA 93501; **cwnaqp@ncjweb.com**. Send phone entries to Bruce Horn, WA7BNM, 4225 Farmdale Ave, Studio City, CA 91604; **ssbnaqp@ncjweb.com**; **www.ncjweb.com/**.

Hunting Lions in the Air Contest, sponsored by the International Association of Lions Clubs, from 0900Z Jan 13 until 2100Z Jan 14. Single op all band and multi-single. 80 40 20 15 10 meters. Work stations once per band, regardless of mode. Exchange RS(T) and serial no. Lion/Lioness/Leo Club members will also send name, district and QTH of the club, and must sign "/L" or "Lion"; members of the Melvin Jones Memorial RC must sign "Melvin"; the Melvin Jones Memorial station will sign W7YU/MJM. Score 1 pt/QSO w/own DXCC entity; 2 pts/QSO w/other entity in same continent; and 3 pts/QSO w/different entities. Bonus points: Add 5 pts/QSO w/Lion members in the same DXCC entity and 10 pts/QSO w/Lion members outside own entity; 5 pts/QSO w/Melvin Jones Memorial RC members; and 5 pts/QSO w/W7YU/MJM. Multiplier is the total of different prefixes worked × 2. Final score is QSO points × multiplier. Awards. Send logs by Jan 31 to Lion Rad Handfield-Jones ZS6RAD, Lions Club of Midrand, PO Box 1584, Halfway House 1685, South Africa; **sarl.org.za/public/contests/lionita.htm**.

20-22

ARRL January VHF Sweepstakes. See the December 2000 *QST,* page 112.

North American QSO Party, phone. See Jan 13-14.

26-28

CQ WW 160-Meter DX Contest, CW, sponsored by *CQ Magazine*, from 2200Z Jan 26 until 1600Z Jan 28 (phone is 2200Z Feb 23 until 1600Z Feb 25) Single op and multi-single. Single ops can be QRP (<5 W), low power (<150 W), or high power (>150 W). Use of spotting nets or PacketCluster makes you a multiop. Exchange RS(T) and state/province/DXCC entity. Score 2 pts/QSO w/own entity; 5 pts/QSO w/entities on same continent; and 10 pts/QSO w/different continents. Maritime mobiles count 5 pts/QSO, but do not count as multipliers. Multipliers are US states (48), Canadian call areas (13), and DXCC entities. KH6/KL7 are considered DX. US and VE do not count as entities. Final score is QSO points × multipliers. Awards. Electronic entries accepted. Club competition. Send logs by Feb 28 (Mar 31 for phone) to David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092; **cq160@contesting.com**; **www.cq-amateur-radio.com/160rules99.html**.

REF French Contest, CW, sponsored by Reseau des Emetteurs Français, from 0600Z Jan 27 until 1800Z Jan 28 (phone is 0600Z Feb 24 until 1800Z Feb 25). Work French, French military, French overseas territorial and department stations. Single op all band/single band, and multi-single and SWL. 80 40 20 15 10 meters. Exchange RS(T) and serial number; French stations give RS(T) and department number or prefix (for territories and overseas department stations). Score 1 pt/QSO w/stations in the same continent, 3 pts/QSO w/stations in different continents. Multipliers are French departments, French territory and overseas station prefixes worked per band. Final score is QSO pts × multipliers. Awards. Send logs by Mar 15 (Apr 15 for phone) to Reseau des Emetteurs Français, REF Contest, BP 7429, 37074 Tours Cedex, France; **concours@ref-union.org**.

UBA Contest, phone, sponsored by Unie van de Belgische Amateurzenders and the EC Commission for Communication, Information and Culture, from 1300Z Jan 27 until 1300Z Jan 28 (CW is 1300Z Feb 24 until 1300Z Feb 25). 80 40 20 15 10 meters only. Single op single band, all-band QRP or multi-single. PacketCluster use by single ops is allowed. All stations must remain on a band for 10 minutes. Exchange RS(T) and serial no. Score 10 pts/QSO with ON stations, 3 pts/QSO with other EC member stations, and 1 pt/QSO with stations outside the EC. Multipliers are ON provinces, ON prefixes, and EC-member DXCC entities. Final score is QSO pts × multipliers worked per band. Awards. Electronic entries accepted. Send logs within 30 days after the contest to UBA HF Manager, ON4GO Michel Le Bon, Chaussée de Wavre 1349,1160 Brussels, Belgium; **berger@cyc.ucl.ac.be**; **www.uba.be/**.

Kansas QSO Party, 1800 UTC Saturday January 27 to 1800 UTC Sunday January 28. All amateur bands except 30 17 12 meters. Single Op, Multiop. HF, VHF+ or combined. Kansas stations exchange RST and county on HF or grid square on VHF. Non-Kansas stations exchange RST and state or entity on HF, RST and grid square on VHF. Count HF 1 point for SSB; 2 points for CW; 3 points for RTTY, SSTV, or other digital HF modes. Multiply total points by different states worked (max 48) multiplied by different DX entities worked

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

(DXCC list). VHF+ 1 point per contact on 2 meters, 2 points per contact on 6 meters or 220 MHz. Three points per contact on 440 MHz. Five points per contact above 1 GHz or any contact in the VHF or UHF bands using ATV, digital (including packet) or moonbounce. Multiply total points by number of different grid squares worked. Add HF score to VHF+ score for High Overall Score. Add 1000 bonus points for contact with K0S on each band. Awards. Send logs no later than March 1 to: Kansas QSO Party, c/o Rick Carver, WA0KS, 13425 West 56th Terrace, Shawnee, KS 66216; **www.geocities.com/CapeCanaveral/Hall/7380/contest.html**. QST

SPECIAL EVENTS

Atkinson, NH: Atkinson Amateur Radio Club, K1D, 0500Z **Dec 23** to 0500Z **Jan 7**, as K1MOM and W1DAD present Kid's Day Ham Radio Awareness. 7.230 14.270 21.310 28.400. QSL. Peter Schipelliti, 7 Dearborn Ridge Rd, Atkinson, NH 03811.

Roanoke, VA: Roanoke Valley Amateur Radio Club, W4CA, 2300Z **Dec 31** to 0500Z **Jan 1**, during Roanoke's 2001 First Night Celebration. 7.260 14.250 21.350 28.475. QSL. RVARC, PO Box 2002, Roanoke, VA 24009.

Austin, TX: Austin 3M Amateur Radio Club, K3M, 1200Z **Jan 1** to 1200Z **Jan 8**, to celebrate the offical start of the new millennium and century. 7.230 14.340 21.410 28.350. Certificate. 3M ARC—W3MRC, A147-5S-03, 6801 River Place Blvd, Austin, TX 78726.

West Central Florida Section, FL: ARRL—West Central Florida Section, K4WCF, 1700Z **Jan 14** to 2300Z **Jan 14**, for the West Central Florida Section First Anniversary. 14.271 14.071 21.271 28.371. QSL. WCF-Next Contact, PO Box 8734, Seminole, FL 33775-8734.

Shepherdsville, KY: The Bullitt ARS, KY4KY, 2300Z **Jan 19** to 0200Z **Jan 20**, for a live PSK31 demonstration. 14.070. Certificate. KY4KY c/o Buddy Sohl, 1229 Zoneton Rd, Shepherdsville, KY 40165.

Jean, NV: BioRem Area 3 ARC, AL7LS, 1400Z **Jan 27** to 0200Z **Jan 29**, commemorating of the completion of Salt Lake City to Los Angeles Railroad in 1905. 3.990 7.290 7.091 14.103. Certificate. Bruce Rossi, 2127 Sierra Stone Lane, Las Vegas, NV 89119.

San Diego, CA: Challenger Middle School ARC, KI6YG, 1430 to 2400Z **Jan 28**, commemorating the 14th anniversary of the space shuttle *Challenger* tragedy. 14.250 21.350 28.350 146.52. QSL. Challenger Middle School ARC, 10810 Parkdale Ave, San Diego, CA 92126. QST

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

NEW PRODUCTS

PSEUDO-RANDOM NOISE AND "10-SINE" GENERATOR FROM TDL

◊ TDL Technologies announces the release of their Model 109, a test instrument for audio systems.

The new device incorporates a pseudo-random noise generator for white and pink noise, a "10-sine" generator and an arbitrary waveform generator. The test mode and output level can be set manually using front panel controls or via computer over an RS-232 link.

The internal EEPROM can be programmed by the computer for arbitrary waveforms. Examples of applications include two-tone generation for IM distortion measurement and tone-burst.

The device comes with an 18 V ac wall transformer power supply, a printed users manual and software. The software includes an *MS-DOS* program written in "C" and a *Visual Basic* program for *Windows 95/98*. Audio output is delivered through a front panel BNC connector.

A full data sheet and a *User Guide* in PDF format can be downloaded from the company's Web site.

Price, $289. For additional details contact TDL Technology Inc, 5260 Cochise Trail, Las Cruses, NM 88012; tel 505-382-3173; fax 505-382-8810; **RTipton@zianet.com**; **www.zianet.com/tdl**.

2001 CALENDAR FOR COLLINS FANS

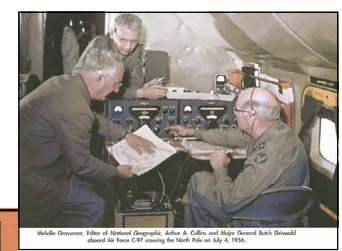
◊ Jay Miller, KK5IM, has selected several of the full-color photographs that appear in his popular book "A Pictorial History of Collins Amateur Radio Equipment" (ARRL order #7830) and has put together a 15-month calendar titled "2001—A Collins Odyssey to the New Millennium."

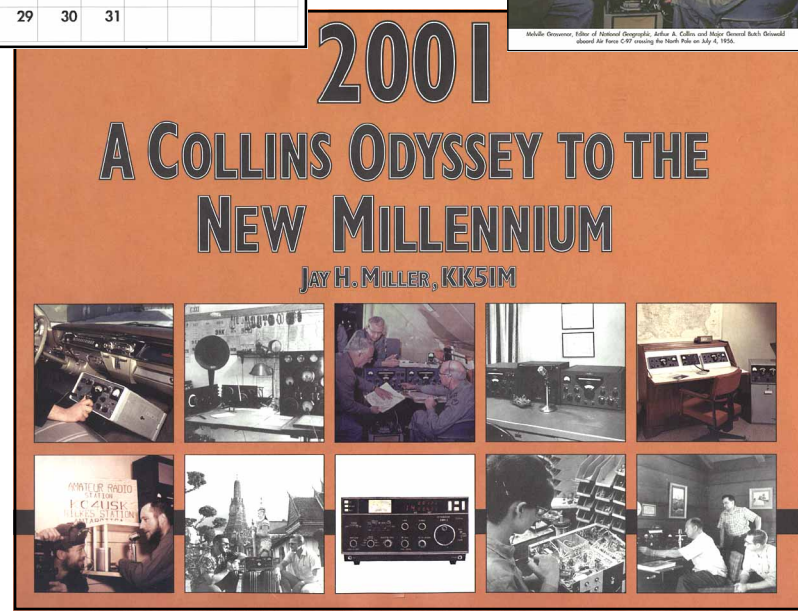
The calendar features a collection of images of company founder Art Collins and other famous—and not so famous—characters, the manufacturing facilities and, of course, the Collins equipment itself. Notable dates in radio history, important holidays and even the dates for the Dayton Hamvention and Arlington's Hamcom are shown.

Lithographed on 100-pound stock paper, the calendar is similar to a 1997 edition created from photographs that were used in Jay's first book, the "Pocket Guide to Collins Amateur Radio Equipment."

Price, $14.95 (US postpaid, add $4 for overseas delivery). The calendar is available from Trinity Graphics Systems Inc, 5402½ Morningside Dr, Dallas, TX 75206; tel 214-828-1908; fax 214-828-2952. Additional information can be found on Jay's Web site, **www.kk5im.com**. QST

Previous • Next New Products





COMING CONVENTIONS

NEW YORK CITY/LONG ISLAND SECTION CONVENTION

January 21, North Babylon

The New York City/Long Island Section Convention, sponsored by the Great South Bay ARC, will be held at the Babylon Town Hall Annex, Phelps Ln; Southern State Parkway E to Exit 37 S (Belmont Ave), continue straight across Belmont Ave onto Sylvan Rd, turn right on Miller, turn left at stop sign into Town Hall Annex parking lot. Doors are open 8 AM to 4 PM. Features include "Ham Radio University 2001," technical education with 20 forums about different aspects of Amateur Radio, booths (club information, ARRL, QCWA), DXCC/WAS card checking, VE sessions (3:20 PM, all classes of license). Talk-in on 146.685. Admission is $2, spouses and under 12 free. Contact Phil Lewis, N2MUN, 22 Belle Terre Rd W, Lindenhurst, NY 11757, 631-226-0698, **n2mun@optonline.net**; **www.arrlhudson.org/nli/hru2001.htm**.

VIRGINIA SECTION CONVENTION

January 21, Richmond

The Virginia Section Convention (Richmond Frostfest), sponsored by the Richmond Amateur Telecommunications Society (RATS), will be held at The Showplace, 3000 Mechanicsville Tpke; I-95, Exit 75 to I-64 E, then Exit 192 (Rte 360), go 1/2 mile on left. Doors are open 8:30 AM to 3:30 PM. Features include Amateur Radio and Computer Show, electronics, indoor national and local vendors, major manufacturers, flea market, forums (FCC with William Cross, W3TN, ARES/RACES, MARS, APRS, Antique Radios), free parking, handicapped accessible, refreshments. Talk-in on 146.88. Admission is $6 (online tickets: **tickets.frostfest.com**); special VIP tickets before Dec 31 for early admission and special entrance. Reservations: 804-330-3165. Tables are $15 to $70. Contact Jim Clark, N3JJF, Box 14828, Richmond, VA 23221-0828, 804-739-2269 (ext 3378), **jim@compudata.net**; **frostfest.rats.net**.

MISSISSIPPI STATE CONVENTION

February 2-3, Jackson

The Mississippi State Convention (Capital City Hamfest 2001), sponsored by the Jackson ARC, will be held at the Mississippi State Fairgrounds Trade Mart Building, NE of the Coliseum; exit I-55 at High St (Exit 96-B), go W to second traffic light, turn left into main entrance of Fairgrounds, Trade Mart is first building on left. Doors are open for dealer setup Friday at 1 PM, non-dealer setup at 3 PM, Saturday 7 AM; public Friday 5-8 PM, Saturday 8 AM to 4 PM. Features include flea market; dealers; forums (MARS, Baptist Ham Fellowship, APRS, ARES, QRP, DX, ARRL, satellite, traffic nets); test bench; special guest Riley Hollingsworth, K4ZDH (FCC Special Counsel for Amateur Radio Enforcement); "Introduction to Ham Radio" (Friday, 6 PM); VE sessions (Sunday, Feb 4, 1:30 PM, Red Cross Building, 875 Riverside Dr, Jackson; all classes); RV camper space available on fairgrounds (hook-ups $10). Talk-in on 146.76. Admission is $5, under 13 free. Tables are $15 (non-dealer flea market), $20 (dealers). Contact Ron Brown, AB5WF, Box 55643, Jackson, MS 39296-5643, 601-956-1448, fax 601-982-3385, **ab5wf@arrl.net**; **www.jxnarc.org**.

2001

February 24
Vermont State, Milton

FLORIDA STATE CONVENTION

February 3-4, Miami

The Florida State Convention (41st Annual "Tropical Hamboree"), sponsored by the Dade Radio Club of Miami, will be held at the Dade County Fair and Exposition Center, 10901 SW 24th St (Coral Way). Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 4 PM. Features include Communications and Computer Show, major manufacturers, exhibits, 850 swap tables, commercial booths, dealers, vendors, demonstrations and forums (troubleshooting, digital communications, satellite communications, continuous technical tips, basic webpage design, live "how-to" for new and seasoned hams, IARU/WRC 2003 Report), transmitter hunts (both days), organizational meetings (DX, Repeaters, QCWA, ARRL Appointees), featured speakers (Jim Haynie, W5JBP; Rod Stafford, W6ROD; Larry Price, W4RA; Ed Hare, W1RFI; Bill Moore, NC1L; Press Jones, N8UG; Kay Craigie, WT3P; Bill Pasternak, WA6ITF; and many others),VE sessions (Sunday, two exam sessions for all licenses), on-site campground with full hookups ($21 per night). Talk-in on 147.0, 442.35 (94.8 Hz), 147.315 (94.8 Hz), 443.225 (94.8 Hz), information loop 147.555. Admission is $6 in advance, $8 at the door. Contact Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125-5059, 305-642-4139, fax 305-642-1648, **w4wyr@arrl.net**; or John Hall, WD4SFG, 305-226-5346, **wd4sfg@bellsouth.net**; **www.hamboree.org**.

NORTHERN FLORIDA SECTION CONVENTION

February 9-11, Orlando

The Northern Florida Section Convention (54th Orlando Hamcation Show), sponsored by the Orlando ARC, will be held at the Central Florida Fairgrounds, 4603 W Colonial Dr (Rte 50); 3 miles W of I-4. Doors are open Friday noon to 8 PM, Saturday 9 AM to 5 PM, Sunday 9 AM to 3 PM. Features include Amateur Radio and Computer Show, 400 swap tables and 150 commercial booths, largest tailgate in the SE, RV camping with electricity and water ($16 per night in advance, $20 per night at the door), VE sessions (must preregister, Gil Lineberry, N4VOX, 407-843-4122), foxhunt (must register by 4 PM at info booth), forums (DX, satellite demonstrations, Phase 3D, PSK-31, APRS), special guest speaker Ed Petzolt, K1LNC (1999 ARRL International Humanitarian Award Winner). Talk-in on 146.76. Admission is $7 in advance, $9 at the door. Tables are $35 in advance, $45 at the door (first-come, first-served; 407-847-0650). Contact Ken Christenson, AF4ZI, 5548 C Cinderlane Pky, Orlando, FL 32808, 407-291-2465, **af4zi@juno.com**; **www.oarc.org/hamcation/hamcat.html**.

TENNESSEE STATE CONVENTION

February 10-11, Memphis

The Tennessee State Convention ("2001: A Hamfest Odyssey"), sponsored by the DixieFest Committee, will be held at the Shelby County Building, Mid-South Fairgrounds. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 2 PM. Features include flea market, dealers, forums, auction (both days; items will be accepted for registration at 10 AM with auction beginning at noon), DXCC QSL card checking, VE sessions (Sunday morning), camping. Talk-in on 146.85, 146.82. Admission is $5, under 12 free (good for both days). Tables are $20 (non-commercial flea market, power extra), $40 (dealers, includes power) up to 2 weeks before the event, $45 last 2 weeks, $50 Feb 9-11. Contact Ben Troughton, KU4AW, 901-372-8031 or 901-365-8088, **ku4aw@arrl.net**; **www.dixiefest.org**.

Attention Hamfest and Convention Sponsors: ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **January 1** to be listed in the **March** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

†ARRL Hamfest

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

Alabama (Greenville)—Jan 27. Jerry McCullough, KE4ERO, 334-382-7644.

Arizona (Phoenix/Sun City)—Feb 5. Ron Rasmussen, K6OP, 623-546-5710. (Auction)

†**Florida (Arcadia)—Jan 27**, 6 AM to 5 PM. *Spr:* DeSoto ARC. DeSoto County Fairgrounds, 100 Heard St; 1/2 mile S of Hwy 70 on Hwy 17. Vendors, VE sessions, RV parking (no hookups), refreshments. *TI:* 147.075. *Adm:* $4. Tables: $10 (8-ft, with electricity). Doug Christ, KN4YT, Box 1352, Nocatee, FL 34268, 863-494-5070; **kn4yt@arrl.net**.

†**Florida (Ft Myers)—Jan 12-13**; set up Friday noon to 4 PM, Saturday 7-9 AM; public Friday 4-9 PM, Saturday 9 AM to 3 PM. *Spr:* Fort Myers ARC. Shady Oaks Community Center, 3280 Marion St; Exit I-75 at No 25, W 3 miles on Rte 80, left on Palmetto Ave, right on Marion St, center on left. Hamfest/Computer Show, vendors, tailgating ($10 for first space, includes 1 admission; $5 per extra space), free parking, handicapped

Gail Iannone ♦ Convention Program Manager

parking, refreshments. *TI:* 146.88. *Adm:* $5 (good for both days), under 13 free with adult. Tables: 8-ft $15, electricity $5 (2 days). G. E. Sammons, WA4DQE, 941-936-1431, **wa4dqe@juno.com**.

Florida (Miami)—Feb 3-4, Florida State Convention. See "Coming Conventions."

Florida (Orlando)—Feb 9-11, Northern Florida Section Convention. See "Coming Conventions."

Florida (Sarasota)—Jan 20-21. Eddie Martin, KI4ZJ, 941-378-8371.

†**Illinois (Cicero)—Jan 28**, 8 AM to 1 PM. *Spr:* Wheaton Community Radio Amateurs. Hawthorne Race Track, 3501 S Laramie. Ham Radio/Computer/Electronics flea market, commercial booths, VE sessions, free parking, handicapped accessible. *TI:* 145.39. *Adm:* advance $5, door $7. Make check payable to WCRA and send with business size SASE by Jan 1 to WCRA, Box QSL, Wheaton, IL 60189. Don Motz, N9NYX, 630-545-9950, **info@wheatonhamfest.org**; **www.wheatonhamfest.org**.

†**Indiana (Goshen)—Jan 14**, 8 AM to 2 PM. *Spr:* Michiana Valley Hamfest Assn. Elkhart County Fairgrounds, 17746 CR 34; US 33 to Goshen High School, go E for 0.8 mile. Free parking. *TI:* 145.29. *Adm:* advance $4, door $5. Tables: $10 (electricity $10). Denny Denniston, KA9WNR, 21970 Kern Rd, South Bend, IN 46614-9295; 219-291-0252 (7-10 PM EST).

†**Kansas (LaCygne)—Feb 3**, 9 AM to 1 PM. *Spr:* Mine Creek ARC. LaCygne Community Building on Broadway; 5 miles W of US 69, on K 152 Hwy. Contests, bring your QSL card, refreshments. *TI:* 147.285. *Adm:* Free. Tables: $10. Ron Cowan, KB0DTI, 913-757-4455; **kb0dti@arrl.net**.

†**Louisiana (Hammond)—Jan 20**, 8 AM to 4 PM. *Spr:* South East Louisiana ARC. SLU Center, W University Ave; I-55 N to Exit 32, go E 1¼ miles, University is on N side of road. Swap tables, vendors, dealer displays, electronics, computers, forums, VE sessions, free parking. *TI:* 147.0. *Adm:* Free. Tables: swap $10; dealers $15. Bill Borstel, KB5SKW, Box 1324, Hammond, LA 70404, 225-695-6414; **wborstel@aol.com**; **www.selarc.org**.

†**Maryland (Odenton)—Jan 28**; set up 6 AM; public 8 AM to 2 PM. *Spr:* Maryland Mobileers ARC. Odenton Volunteer Fire Department Hall, 1425 Annapolis Rd (Rte 175); 9 miles E of I-95/MD 175 interchange, midway between Baltimore and Washington DC. VE sessions, free parking, refreshments. *TI:* 146.805 (107.2 Hz). *Adm:* $4. Tables: $10. Gary Johney, N3BYN, 410-437-4285, **w3cu@arrl.net**.

Michigan (Hazel Park)—Jan 21. Tom Krausnick, WC9F, **wc9f@arrl.net**.

†**Michigan (Negaunee)—Feb 3**, 10 AM to 2 PM. *Spr:* Hiawatha ARA. Negaunee Township Hall, 42 M-35; 8 miles W of Marquette on US-41 to M-35, S on M-35, 1 mile to Township Hall. Swap and Shop, refreshments. *TI:* 147.27. *Adm:* $2. Tables: $6. John Veiht, N8RSE, 906-228-9417; or Bob Serfas, N8PKN, 906-226-9782, **n8pkn@aol.com**; **www.qsl.net/k8lod/**.

Michigan (Traverse City)—Feb 10. Joe Novak, W8TVT, 231-947-8555.

Mississippi (Jackson)—Feb 2-3, Mississippi State Convention. See "Coming Conventions."

†**Missouri (St Joseph)—Jan 20**, 8 AM to 3 PM. *Sprs:* Missouri Valley and Ray-Clay ARCs. Ramada Inn, I-29 and Frederick Ave (Exit 47 off I-29), just 47 miles N of Kansas City. VE sessions, free parking. *TI:* 146.85, 444.925. *Adm:* advance $2 each or 3 for $5; door $3 each or 2 for $5. Tables: $10 each (first 2 tables), $20 each (tables 3 and up). Carlene Makawski, KA0IKS, 3704 Meadow Oak Ln, St Joseph, MO 64503, 816-279-3406, **nem3238@ccp.com**; **www.kc.net/~oconnor**.

†**Missouri (St Louis)—Jan 27**, 8 AM to 2 PM. *Spr:* St Louis Repeater. St Charles Expo Center, NW corner of Hwy 270 intersection. Manufacturers, computer-related gear. *TI:* 146.94, 146.91. *Adm:* $5. Tables: $15 (electricity $15 extra). Jim Glasscock, W0FF, 3416 Manhattan Ave, St Louis, MO 63143, 314-647-9458, **jimfoxfox@aol.com**; **www.stlrepeater.org**.

New Mexico (Albuquerque)—Jan 27. Tom Ellis, K5TEE, 505-291-8122.

†**New York (Lockport)—Jan 27**; set up 6 AM; public 7 AM to 4 PM. *Spr:* Lockport ARA. Eagles Hall, 6614 Lincoln Ave, corner of Davison Rd. Vendors, auction (12:30 PM), refreshments. *TI:* 146.82. *Adm:* $5. Tables: 8-ft $5. Duane Robinson, W2DLR, Box 142, Ransomville, NY 14131, 716-791-4096; or Bob Radmore, N2PWP, 716-778-5058, **n2pwp@arrl.net**; **lara.hamgate.net**.

†**New York (Marathon)—Jan 13**, 7 AM to 1 PM. *Spr:* Skyline ARC. Marathon Civic Center; I-81, Exit 9, drive to four corners of Marathon, Rte 221 W, turn left just before steel deck bridge, go 1 block past fire station to Civic Center. VE sessions. *TI:* 147.18. *Adm:* $2. Andrew Slaugh, KB2LUV, Box 5241, Cortland, NY 13045, 607-753-0597; **kb2luv@arrl.net**.

New York (North Babylon)—Jan 21, New York City/Long Island Section Convention. See "Coming Conventions."

†**New York (Yonkers)—Jan 21**, 9 AM to 2 PM. *Spr:* Metro 70cm Network. Lincoln High School, Kneeland Ave; NY State Thruway, Exit 2 to Yonkers Ave, W to St Johns, 2 blocks to Teresa Ave, right to Kneeland Ave. Giant electronics flea market, vendors, unlimited free coffee. *TI:* 146.91, 440.425, 145.27. *Adm:* $6. Tables: $15 (admit 1 free for each table rented). Otto Supliski, WB2SLQ, 53 Hayward St, Yonkers, NY 10704, 914-969-1053, **wb2slq@juno.com**.

†**Ohio (Dover)—Jan 28**; set up 6 AM; public 8 AM to 1 PM. *Spr:* Tusco ARC. Ohio National Guard Armory, 2800 N Wooster Ave; exit I-77 at Exit 87 (Strasburg), turn right at exit stop sign, head S on County Rd 74 to first traffic light, continue through traffic light intersection, Armory is on right. Dealers, ARES forum, refreshments. *TI:* 146.73. *Adm:* $3. Tables: $10 (bring your own extension cords). Gary Green, KB8WFN, 32210 Norris Rd, Tippecanoe, OH 44699, 740-922-4454, **kb8wfn@tusco.net**.

†**Ohio (Middletown)—Jan 13**, 9 AM to 4 PM. *Spr:* Dial RC. Miami University, Thesken Hall; from I-75 exit at SR 122 (Exit 32), go W toward Middletown; continue to Breiel Blvd, turn right (N), continue on Breiel to 6th traffic light; this is entrance to University, second building is Thesken Hall. 15th Annual SW Ohio Digital Symposium (there will be no flea market—this is a technical society conference/seminar only). *TI:* 146.61, 224.96, 444.825. *Adm:* Free. Hank Greeb, N8XX, 6580 Dry Ridge Rd, Cincinnati, OH 45252, 513-385-8363 (after 6 PM), **n8xx@arrl.net**; **w3.one.net/~rkuns/swohdigi.html**.

†**Ohio (Nelsonville)—Jan 14**; set up Saturday 7-10 PM, Sunday 6 AM; public 8 AM to 2 PM. *Spr:* Sunday Creek AR Federation. Hocking College, Hocking Parkway; from N take Rte 33E to Nelsonville, turn right at second light; from S take Rte 33W to Nelsonville, turn left on State Rte 691 (first light), follow signs to College. Flea market, VE sessions (noon, walk-ins accepted). *TI:* 147.15, 147.225. *Adm:* $5, under 12 free. Tables: first table is free, $5 for each additional (first-come, first-served). Russ Ellis, N8MWK, 8051 Oregon Ridge, Glouster, OH 45732, 740-767-2226; **SCARF@hocking.edu**.

Pennsylvania (Philadelphia)—Jan 10. Russ Stafford, W3CH, 610-631-3401, No 4. (Auction)

South Carolina (Greenwood)—Jan 13. Frank Kolar, WA9FWO, 864-229-5639.

†**South Carolina (North Charleston)—Feb 3**, 8:30 AM to 4 PM. *Spr:* Charleston ARS. R. B. Stall High School Gym, 7749 Pinehurst St; located near I-26 and Ashley Phosphate Rd. Forums (ARRL, weather), VE sessions. *TI:* 146.79, 145.25. *Adm:* $5, under 12 free. Tables: $8. Jenny Myers, WA4NGV, 2630 Dellwood Ave, N Charleston, SC 29405-6814, 843-747-2324; **brycemyers@aol.com**; **www.qsl.net/wa4usn/index.html**.

Tennessee (Gallatin)—Jan 20. John Hermon, WB5OOL, 615-451-0213.

Tennessee (Memphis)—Feb 10-11, Tennessee State Convention. See "Coming Conventions."

†**Texas (Canyon/Amarillo)—Feb 10**, 8 AM to 4 PM. *Spr:* Potter/Randall County ARES/RACES. Cole Community Center, 300 16th St; S on I-27 from Amarillo, take US 87, exit at Canyon, turn W on 3rd Ave to 16th St. *TI:* 145.35 (88.5 Hz), 444.2 (88.5 Hz). *Adm:* advance $5, door $7. Tables: $5. Ben Pollard, WS5R, Box 5378, Amarillo, TX 79117, 806-381-8810, **ws5r@arrl.net**; **www.qsl.net/nwtx-ares**.

Texas (Georgetown)—Feb 4. Jeff Schmidt, N5MNW, 512-255-6753.

Texas (San Antonio)—Jan 13. Royce Taylor, KA5OHJ, 210-680-0432.

Virginia (Richmond)—Jan 21, Virginia Section Convention. See "Coming Conventions."

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support.

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111. Or send e-mail to **giannone@arrl.org**. QST

NEW PRODUCTS

KLINGENFUSS 2001 FREQUENCY GUIDES

◊ Klingenfuss Publications has released printed and CD-ROM versions of their 2001 frequency guides.

The *2001 Shortwave Frequency Guide* is a soft cover publication containing the latest schedules for clandestine, domestic and international broadcast stations worldwide. The guide features an extensive broadcast frequency list with 10,378 entries and an alphabetical listing as well. More than 10,694 utility station entries are also provided.

The *2001 Super Frequency List CD-ROM* includes entries with information on clandestine, domestic and international broadcasting and utility stations—and even includes entries for radio services such as the International Red Cross, the United Nations, maritime, military and police. You'll also find lists of 920 abbreviations and 17,894 formerly active frequencies—all on one CD for *Windows 3.1*, *95* and *98*.

You can browse through the data quickly and use a search feature to locate specific frequencies, countries, stations, languages, call signs and times.

Klingenfuss Publications, Hagenloher Str 14, D-72070 Tuebingen, Germany; tel +49-7071-600849; fax +49-7071-62830; **klingenfuss@compuserve.com**; **ourworld.compuserve.com/homepages/Klingenfuss**.

These items are available through the ARRL. Price: *2001 Shortwave Frequency Guide* (ARRL order No. SFG1), $34.95; *2001 Super Frequency List CD-ROM* (ARRL order No. SFC1), $24.95. Shipping is additional. ARRL, 225 Main St, Newington, CT 06111; tel 860-594-0355; fax 860-594-0303; **pubsales@arrl.org**; **www.arrl.org**. QST

Previous • Next New Products

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

N1ASO, John Kohler, Avon, CT
W1AYJ, Walter P. Hoffman, Ashland, OR
KA1BJR, John F. Brennan, Stratford, CT
WA1EVH, Frank J. Rosato, Lexington, MA
N1HLW, Roger A. Cates, Limerick, ME
W1KRF, Gerald W. Mason, Freeport, ME
W1MZB, Frederick J. Coyle, Bristol, RI
W1NMP, Stanley G. Best, Manchester, CT
K1QM, Joel H. Malman, Concord, MA
W1YMS, Richard A. Carocari, Manchester, CT
K1YZG, Lucius A. Hurlbut, Tustin, CA
W1ZPA, Henri J. Chapdelaine, Manchester, NH
WD2ADT, Julian Heilbroner, Rye, NY
KA2AMG, Henry R. Deckhut, Cranford, NJ
KB2ASH, Everett C. Obenhein, Turnersville, NJ
W2BAV, Noel J. Lituchy, New Rochelle, NY
*W2FG, Ted M. Marks, Kendall Park, NJ
WA2OZG, Thomas Petruzzi, Villas, NJ
W2QD, John Serafin, Basking Ridge, NJ
KB2QPV, William H. Drobness, Landing, NJ
W2ROT, Harold S. Walker, Syracuse, NY
W2VKY, George E. McGrath, Evansville, IN
K2VNP, Charles S. Haynes, Ballston Lake, NY
W3CVC, Sterling E. Schaefer, Westminster, MD
N3DFL, John F. Cremers, Pottstown, PA
WB3DGD, Ernest G. Whitney, West Springfield, PA
N3DJA, Jack Brubaker, Lancaster, PA
K3GQX, James M. Waldron, Lockport, NY
W3KQR, William H. Boalich, Clearfield, PA
W3PJD, James A. Currie, Erie, PA
NO3R, John E. Wilcox, Wellsboro, PA
W3SKK, Harold E. Archer, Fallston, MD
WA3UFV, Serge H. Aronovici, Pebble Beach, CA
W3WSM, Earl L. Lentz, Lock Haven, PA
*KE4A, Wayland M. Watts, Blairsville, GA
K4ALW, Gerald G. Wichner, Hollywood, FL
W4AYF, William C. Pease, Columbus, GA
W4ILA, Ben F. Hurt, Park Hall, MD
W4IWZ, Francis G. Harper, Nokesville, VA
W4JDB, Winton E. Teston, Thomson, GA
KA4JZO, R. D. Zepp, Clarksville, TN
W4KQK, Richard H. Bush, Louisville, KY
KC4LF, Lyle F. Shaw, Bradenton, FL
KR4M, Cliff Watson, Milledgeville, GA
WD4PQK, Edward Sarratt, Gaffney, SC
K4RA, Andrew F. Young, Zelienople, PA
KD4UIP, Anthony Arrington, Bowdon, GA
KB4VKK, Edwin G. Hartley, Memphis, TN
KE4VP, Madison Farrell, Walterboro, SC
KE4XD, George W. Rinker, Orlando, FL
KQ4ZL, Kramer C. Robinson, Mobile, AL
N4ZXL, Harold E. Strader, Kingston, TN
WD5BOW, Vera Woodland, Arlington, TX
K5CEX, Darryl L. Hankins, Crossett, AR
KC5DUT, John J. Benson, Albuquerque, NM
KC5ERA, Jeri S. Bauman, Elephant Butte, NM
N5FFY, Charles R. Button, Temple, TX
W5FMM, Leonard F. Dodds, Albuquerque, NM
K5GCK, H. M. Mullins, Freer, TX
K5GV, Peter P. Buyaki, Harrison, AR
NR5H, Joe Curtis Woosley, Greenwood, AR
KC5JIP, Lyle G. Myers, San Antonio, TX
NN5J, Len Sykora, Mabank, TX
W5JWL, Joseph B. Harwell, Gurdon, AR
WD5KBA, Anthony J. Kirsch, Chalmette, LA
KA5LDT, Earl C. Saxton, Albuquerque, NM
W5LJ, Carroll C. Collier, Ada, OK
*W5OLN, Eugene F. Carter, Albuquerque, NM
*KZ5Q, D. C. Bradford, Denham Springs, LA
W5QN, Wilbur Dearing, Bonham, TX
W5RZV, Robert E. Holler, Austin, TX
*KB5SV, George D. Bretz, Fort Worth, TX
N5YPN, Victor V. Sandoval, Clovis, NM
K6AHF, Charles H. Lindahl, Hermosa Beach, CA
KF6AUE, Timothy S. Smith, Rancho Santa Margarita, CA
W6CNP, Glynn E. Absher, Foss, OK
KB6CU, Edwin J. Dudek, Apache Jct, AZ
*K6CV, Joseph G. Bastow, Jr., Plantation, FL
W6DLY, Guy M. Martin, Glendora, CA
W6FTJ, John T. Gilcrest, Canoga Park, CA
W6GKO, Lillian M. Malm, Mountain View, CA
W6HCP, Charles W. Sullivan, Bakersfield, CA
W6HZX, Theodore A. Seel, Las Vegas, NV
*K6ITL, James D. Knochenhauer, San Mateo, CA
W6IXZ, Robert A. Reimus, Yerington, NV
WB6LFI, Jerry Weaver, Norwalk, CA
WA6LUQ, Edward H. Wall, San Jose, CA
N6SBN, James Giardina, San Diego, CA
KA7AKG, Leonard F. Hennan, Cucamonga, CA
N7APX, Guy H. Stewart, Seattle, WA
KA7CNR, Thomas J. Benitscheck, Clovis, NM
KD7DK, Joe Wentworth, Missoula, MT
N7DWX, Ronald G. Knabel, Apache Junction, AZ
KC7IXJ, Frances L. Barnett, Tillamook, OR
W7LYO, Donald L. Eggebrecht, La Grande, OR
WB7NCJ, Robert J. Nichols, Kent, WA
*KA7PMD, Stephen F. Paulsen, Seattle, WA
K7QCS, Richard B. Howe, Isabella, MO
WA7QEW, Laurence F. Seaman, Tacoma, WA
N7TXJ, Holger Theobalt, Florence, OR
KC7UQW, Todd S. Evans, Bothell, WA
K7XYL, Joanne W. Pattin, Tucson, AZ
KA8BAI, Andrew D. Rado, Dayton, OH
K8DCD, David C. Doubleday, Portage, MI
WB8DRE, Kenneth F. Horsley, Urbana, OH
N8EAG, Archie W. Jenkins, Monongah, WV
KC8NYB, Samuel A. Martorello, South Euclid, OH
W8RAK, John R. Esterly, Westlake, OH
N9BVI, Sam Richards, Mishawaka, IN
W9FZC, John P. LaBlonde, Elkhorn, WI
K9HGZ, George F. Slad, Williamsburg, NM
K9HQJ, Pearl M. Johnson, Sterling, IL
W9MGP, Ralph W. Shannon, Madison, WI
W9NXA, Edward J. Kehoe, De Pere, WI
W9QI, Hardin Stratman, Long Beach, CA
W9WQC, Harold A. Pride, Evansville, IN
K0AFY, Wilfred B. Spencer, Jefferson City, MO
K0BO, Robert B. Olsen, Lakewood, CO
K0BVD, Ramie A. Maggard, Holden, MO
K0GP, Ivan T. Schultz, Humboldt, IA
W0IQK, Donald E. Millsap, Kansas City, KS
*W0JBT, Ed Nohava, St Paul, MN
K0JGI, G. Paul Kesselring, Ottumwa, IA
WB0JJJ, Hugh T. Harlin, Gainesville, MO
W0KIO, Duane Runyan, Wichita, KS
K0KKT, Wayne Van Riper, Omaha, NE
K0RDJ, Richard A. Connolly, Waynesville, MO
WA0TRB, Ronald L. Bryant, Lakewood, CO
W0VQC, Frank L. Curtis, Virgil, SD
KS0Z, Bobby J. Potter, Saint Francis, KS
VE3CBB, Ralph Westhouse, North York, ON, Canada
ZL2TT, Ron E. Wills, Lower Hut, New Zealand
ZL3GF, W. Bool, Kaikoura, New Zealand

*Life Member, ARRL

‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator

NEW PRODUCTS

ANTEX SOLDERING STATION

◊ M.M. Newman Corp now offers a temperature-controlled soldering station with a static dissipating iron.

The Antex Model 690SD features a 24 V, 50 W iron, a digital temperature readout that can be set to display in centigrade or Fahrenheit, positive tip temperature feedback and a two-level temperature memory system.

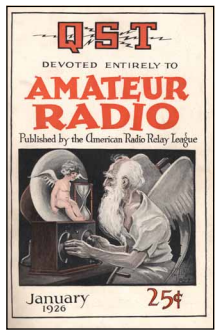
The station is available with a variety of tip styles for specialty assembly and repair applications and comes complete with a bench stand that includes a tip cleaning sponge and a holder for extra tips.

The list price for the Model 690SD Soldering Station is $270.18. For additional information contact M. M. Newman Corp, 24 Tioga Way, Marblehead, MA 01945; tel 800-777-6309/718-631-7100; fax 718-631-8887; **mmn@mmnewman.com**; **www.mmnewman.com**. QST

Previous • Next New Products

75, 50 AND 25 YEARS AGO

January 1926

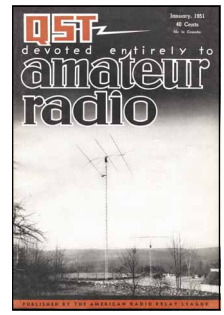


◊ Clyde Darr, 8ZZ, provides another nice piece of cover art, this one showing bewhiskered Old Man 1925 sitting at the receiver, introducing Baby New Year 1926 to the miracle of modern radio! The lead editorial reports on the influx of letters from broadcast listeners, responding to an earlier editorial appeal to bring more BCLs into Amateur Radio. As the editor says, "They have called us and now it is up to us to deliver." K. B. Warner also reminds ARRL members to be ready to provide emergency communication for the railroads.

Traffic Manager F. H. Schnell reports on "The cruise of NRRL aboard the U.S.S. *Seattle*," describing the ship's station that he manned on its recent South Pacific cruise. L. W. Hatry describes "A New Reflex Circuit" for receiving. "Practical Crystal-Controlled Transmitters" provides a forum for William Lee, 4XE, and Assistant Technical Editor John Clayton to tell the readers how they each did it. Harry Lyman describes "Getting Down Below 5 Meters" and making plans to "go into the 77 centimeter band and find something out about it." A. H. Waynick describes "A Portable Transmitter" that he took to the recent ARRL convention in Chicago.

K. B. Warner reports on "The Fourth National Radio Conference," in which hams "retain [their] wave bands [with] only trivial changes." A 100 kc. phone band was opened from 3500 to 3600 kc., to be shared with naval aircraft and the naval vessels they are communicating with.

January 1951



◊ The cover photo shows the potent 14-Mc. beam antenna of W1ATE, installed atop a 75-foot tower in rural Connecticut. The editorial takes an overview of ham radio during the first half of the 20th century, looking at its successes (such as the Amateur Radio Emergency Corps) and its problems (such as TVI). The editorial reports that the current ham population of the US is "90,000, with the possibility of reaching six figures in 1951 if the Novice license becomes a reality…."

Richard Smith, W1FTX, tells about designing and building "A Single-Control Low-Power Transmitter" that uses bandpass coupling and TVI-reduction measures. "The Case for Homemade Receivers" tells the stories of three hams—W8DX, W3FYS, and W6MX—who each built *exactly* what he wanted in a receiver. Durham Ipock, W4EFX/3, tells the humorous story of how he got back into ham radio after giving it up for three years while attending college. He bought a used Hallicrafters S-41G for $10, unwound a transformer for antenna wire, and built a simple crystal-controlled oscillator rig for 80 meters. By Goodman, W1DX, describes how to build "A Sensitive Field-Strength Meter."

Julius Galin, W1LOP, tells about "A Wide-Range Test Oscillator" that covers 50 cycles to 500 kc. A photo in the column "Military Amateur Radio System" shows Major General S. B. Aiken, Chief Signal Officer of the Army, demonstrating the MARS headquarters station in the Pentagon to Lieutenant General Matthew Ridgeway. Ed Tilton, W1HDQ, explains the upper realms of the spectrum in "V.H.F.: Why—How—When?"

January 1976

◊ Good grief! Is this a *QST*?! Instead of the age-old format, the magazine is suddenly a monstrous $8^1/_2 \times 11$ inches! Is *nothing* sacred? The cover photo—full color, no less—shows an HQ staffer making measurements on the 432-MHz amplifier described in this issue. The editorial discusses *QST*'s "New Look," explaining the history of the old and smaller size, and how the new, standard size will save more than $100,000 a year, mainly because of less paper-trim waste.

"A Tramplifier for 432 MHz," by Thomas McMullen, W1SL, and Clarke Greene, WA1JLD, describes a table-top unit that the ham can use for Oscar 7, Mode B. Robert Dome, W2WAM, explains the "Impedance of Short Horizontal Dipoles." Jay Rusgrove, WA1LNQ, tells about "A 15-Meter Goober Whistle." Jerry Sevick, W2FMI, discusses "Simple Broadband Matching Networks." Also for the low-power fans, Gene Hinkle, WA5KPG, presents "An Accu-Keyer for QRPp Operation."

Jerry Hall, K1PLP, and Charles Watts, WA6GVC/1, write on a hot new topic, "Learning to Work with Integrated Circuits." Doug DeMaw, W1CER, provides "Some Capacitor Basics." "Hams at Headquarters" shows candid photos of many of the HQ staffers. "I Wish I Had Known," by Edward Durnall, K1BYE, attempts to help the reader calm his pre-exam jitters. QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM - 1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	TELEPRINTER BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	TELEPRINTER BULLETIN				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, $7^1/_2$, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ **Teleprinter transmissions:**

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

By Dan Henderson, N1ND
Contest Branch Manager

2000 ARRL June VHF QSO Party Results

Sunset at the W6TOI site at the 6532-foot level on Mt Gleason in DM04 makes all of this madness worthwhile.

Remember back to the days of your youth. As summer approached, just like Tom Sawyer, Becky Thatcher and Huck Finn, you started getting that special twitch, longing to be outside. Instead of being stuck in the classroom for a few more days of book learning, you were drawn to the out of doors. Swimming in the creek to beat the heat, skipping rocks across the still, flat surface of the pond, and exploring new wonders sure were a more desirable destination for the day than those last few days studying the three "Rs."

So when the second weekend of June is approaching, VHF/UHF/microwave contesters can relate to the need to head into the fresh air and participate in the ARRL June VHF QSO Party. After a two-year decline in total participation, we saw a small increase in the number of entries for this year's contest. Being the first year with separate Single Operator Low- and High-Power categories may have increased participation. One other factor for the declining numbers may be the increase in Multioperator and Limited Multioperator entries. The number of logs received has been down until 2000, but based on the number of participants listed in those categories, the number of participants has remained about the same.

VHF contesting offers sometimes different, sometimes similar challenges from its HF counterpart. Good 6-meter activity may affect the outcome, but strong efforts on the UHF/Microwave bands (where QSO points are higher) can offset a good 6-meter opening. How you balance your efforts on each band will be a significant factor in how you finish. Location makes a difference in VHF contesting, just as it does during HF events. Proximity to good population centers will mean the difference in where you finish in VHF/UHF contests, whether you are competing for overall, divisional or sectional honors.

With the separation of the Single Operator category into High- and Low-Power categories, all previous Single Operator records were transferred to the High Power category. That means that in the 2000 ARRL June VHF QSO Party each Single Operator Low Power Division winner set the initial standard upon which all subsequent competitors will take aim. The initial overall Single Operator Low Power record was set by K9PW, with a score of 351,918, which is also the Central Division record. Congratulations also go to the

Region Leaders

Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

WA2FGK	105,133	A
WB2VVV	73,700	A
W1PM	54,383	A
N1DPM	51,030	A
W1BQ	49,276	A
K1TEO	370,728	B
K1RZ	231,623	B
K2SMN	92,056	B
AF1T	84,455	B
K1GX	75,790	B
N3FTI	29,304	Q
K1ZE	20,519	Q
NA2T	18,509	Q
WB2AMU	2,822	Q
K2QO	171	Q
W2SZ/1	1,651,461	M
W3CCX	754,364	M
K3MQH	733,005	M
N2PA	520,149	M
K1WHS	400,752	M
K3YTL	437,000	L
KB2DMK	249,917	L
N2NK	157,677	L
WB1GQR	142,040	L
N3II	136,183	L
W2FU	212,704	R
N1MJD	168,338	R
N1QVE	21,708	R
WA2IID (+KB2SSS)	21,580	R
N1MU	15,785	R

Southeast Region (Delta, Roanoke and Southeastern Divisions)

N4IS	109,026	A
N4JK	78,948	A
KD5HPT	78,760	A
K0VXM	76,145	A
KU4WD	59,130	A
WB2WIH	252,945	B
WD4MGB	153,800	B
K9HUY	144,336	B
K4QI	123,646	B
NW5E	120,903	B
W4RXR	14,678	Q
N3AWS	525	Q
K8JWT	230	Q
K8GP	1,876,364	M
KF4DGS	101,436	M
K4RF	88,894	M
W4IY	365,560	L
AA4ZZ	268,548	L
W4NH	212,852	L
AC5TM	104,346	L
KA4DON	65,940	L
N4OFA	38,868	R
W4VHF	34,884	R
W3IY	19,764	R
K9OYD	10,693	R
KS4S	8,496	R

Central Region (Central and Great Lakes Divisions; Ontario Section)

K9PW	351,918	A
W0UC	160,284	A
K8MR	85,808	A
N9GH	53,448	A
K9VHF	52,128	A
N2BJ	253,761	B
KE8FD	208,504	B
WB9Z	173,514	B
K8TQK	161,760	B
K2DRH	123,224	B
K9AKS	39,932	Q
N9LAG	20,750	Q
N8XA	10,990	Q
W9GKA	7,198	Q
N9MYK	3,978	Q
WW8M	293,045	M
N8KOL	116,600	M
NI9E (at N9FH)	113,280	L
N8BJQ	69,551	L
N9REP	31,400	L
KU8E	19,190	L
K8WW	79,788	R
WB9SNR	76,300	R
VE3NPB/R	47,128	R
K0PG	42,051	R
KF9US	40,656	R

Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

N5OLS	182,784	A
KC5FP	151,107	A
W5SXD	144,281	A
WD5K	139,568	A
N5NJ	124,836	A
K5IUA	373,626	B
N5WS	348,750	B
N5HHS	334,080	B
K5AM	297,579	B
W5UWB	272,916	B
K7VNU	13,752	Q
N0JK	3,675	Q
K0BJ	775	Q
WA5VKS	396	Q
W1XE/0	265,356	M
N0UK	239,148	M
K5LLL	195,489	M
KK5IH	181,440	M
W5KFT	490,194	L
W7XU	403,560	L
W0KVA	66,960	L
N7VM	42,510	L
WB6DTA	34,220	L
AB5SS	217,729	R
WB5VYE	135,994	R
AL1VE	103,136	R
KF0UK	81,783	R
N0YVY	28,220	R

West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)

WB6AAG	91,290	A
KE6FCT	62,720	A
N7IR	43,875	A
KF6GYM	42,483	A
K6MI	32,277	A
N6EQ	135,605	B
AA7A	131,068	B
N6PI	120,156	B
WB6NTL	114,009	B
NU6S	104,832	B
K6LMN	16,549	Q
VE7DXG	16,014	Q
W7/JR1NKN	2,784	Q
AC6XK	2,500	Q
KQ6EE	1,800	Q
W6TOI	194,598	M
N7LQ	185,758	M
W6MMM	178,794	M
W6YM	124,410	M
W6FM	122,661	M
W2ODH/6	605,143	L
W3SE	263,057	L
KF7NP	175,187	L
K7KX	126,000	L
K7XC	99,510	L
N6TEB	143,956	R
N6DN	86,884	R
K6FZZ	51,595	R
KB6FYG	36,418	R
WB7DHC	27,150	R

other Low Power divisional winners: WA2FGK (Atlantic), KB0ZEV (Dakota), KD5HPT (Delta), K8MR (Great Lakes), WB2VVV (Hudson), NE0P (Midwest), W1PM (New England), N7DB (Northwestern), KF6GYM (Pacific), AF4HX (Roanoke), W6OAL (Rocky Mountain), N4IS (Southeastern), KE6FCT (Southwestern), and N5OLS (West Gulf) who also finishes as runner-up in the overall category. The Canadian Single Operator Low Power record is set by VE9AA, while the first DX record was established by CO2OJ.

The Single Operator High Power category, while not seeing an overall record set, did provide us with the tightest finish among the categories. K5IUA was edged by K1TEO by a single QSO, but won the

Top Ten

Single Operator Low Power

K9PW	351,918
N5OLS	182,784
W0UC	160,284
KC5FP	151,107
W5SXD	144,281
WD5K	139,568
N5NJ	124,836
W6OAL	113,645
N4IS	109,026
WA2FGK	105,133

Single Operator High Power

K5IUA	373,626
K1TEO	370,728
N5WS	348,750
N5HHS	334,080
K5AM	297,579
W5UWB	272,916
N2BJ	253,761
WB2WIH	252,945
W8CM	237,412
K1RZ	231,623

Plaque Sponsor

W2SZ/1 Mt. Greylock Expeditionary Force
K9NS, Mt. Frank Contesters
Ed Parsons, K1TR
W1TKZ Wellesley ARS – Mt. Equinox Contesters
N0KQY, W0LD, N0JK, WB0DRL, N0LL
K3MQH, South Mountain Contest Team
In Memory of John Chambers, W6NLZ
AB4CR Rover Team
Southeastern VHF Society

QRP Portable

K9AKS	39,932
N3FTI	29,304
N9LAG	20,750
K1ZE	20,519
NA2T	18,509
K6LMN	16,549
VE7DXG	16,014
W4RXR	14,678
K7VNU	13,752
N8XA	10,990

Plaque Sponsor

West Coast VHFers
Robin Gist, K4VU

Multioperator

K8GP	1,876,364
W2SZ/1	1,651,461
W3CCX	754,364
K3MQH	733,005
N2PA	520,149
K1WHS	400,752
WW8M	293,045
W1XE/0	265,356
N0UK	239,148
K2TVI	227,953

Plaque Sponsor

Randy Stegemeyer, W7HR
N2LIX & Ten—X Group
Mt Airy VHF Radio Club
Rochester VHF Group
George Noyes, W1XE
K2AE, Schenectady ARA
In memory of Sid Krauss, WA2VNK

Limited Multioperator

W2ODH/6	605,143
W5KFT	490,194
K3YTL	437,000
W7XU	403,560
W4IY	365,560
AA4ZZ	268,548
W3SE	263,057
KB2DMK	249,917
W9ICE	229,356
W4NH	212,852

Plaque Sponsor

W3EP, K9AKS, W9IP
K1TEO, W2GKR, W2GKO, KA1FVG

Rover

AB5SS	217,729
W2FU	212,704
N1MJD	168,338
N6TEB	143,956
WB5VYE	135,994
AL1VE	103,136
N6DN	86,884
KF0UK	81,783
K8WW	79,788
WB9SNR	76,300

Plaque Sponsor

In Memory of Dick Goodman, WB1HIH, by W2SZ/1
Wayne King, N2WK
Northern Lights Radio Society and W0UC
Southeastern VHF Society

DX Single Operator Low Power

CO2OJ	36,852

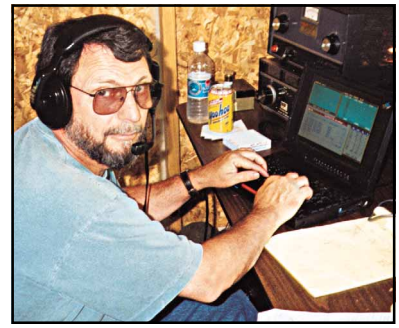
Plaque Sponsor

K8GP & C3I

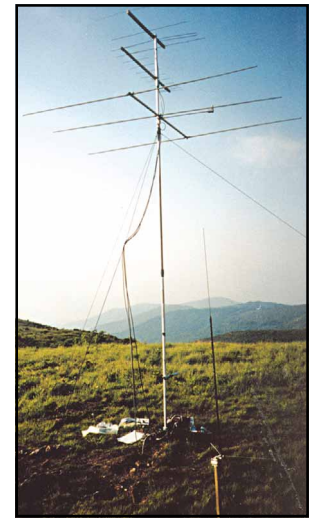
DX Single Operator High Power

XE2HWB	4,876

K8GP & C3I



Ken, K4DXA, operates on 50 MHz at the AA4ZZ limited multi-operator station in North Carolina.



W4RXR's QRP Portable site (right) in EM85 in the Great Smoky Mountains.

QSO Leaders by Band

Single Operator Low Power

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
N5OLS	760	K9PW	188	K9PW	63	KE6GFF	186	WA2FGK	23	K9PW	33
KC5FP	717	WA2FGK	133	KE6AXJ	50	K9PW	101	K9PW	22	K6MI	23
WD5K	671	K8MR	132	K6MI	47	WA2FGK	62	N1DPM	17	W0UC	21
N4IS	660	WB2CUT	129	WA2FGK	44	K5MA	57	WB2VVV	17	N1DPM	21
W5SXD	604	KN6VR	119	K5MA	44	W0UC	57	WA8RJF	11	WA2FGK	21
								K6MI	11		

Single Operator High Power

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
N5HHS	1077	W3EME	412	K1TEO	74	K1TEO	113	K1TEO	37	K1TEO	45
K5AM	1020	K1TEO	302	K1RZ	67	K1RZ	103	K1RZ	35	K1RZ	41
WB2WIH	991	W8ULC	234	KE8FD	64	N2BJ	98	N2BJ	21	K2TXB	32
W5UWB	975	K1RZ	224	N2BJ	62	K2TXB	86	KE8FD	20	KE8FD	31
N5WS	877	NC1I	221	K8TQK	52	KE8FD	84	AF1T	20	N6AJ	30
										K6TSK	30

Multioperator

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
W5KFT -L	1104	K8GP	655	K8GP	202	K8GP	308	W2SZ/1	98	W2SZ/1	121
K8GP	809	K3MQH	643	W2ODH/6 -L	178	W2SZ/1	289	K8GP	85	K8GP	100
W2SZ/1	781	W2SZ/1	549	W2SZ/1	175	K3MQH	275	N2PA	44	N2PA	47
W3CCX	749	K3YTL -L	508	K3MQH	147	K3YTL -L	229	K3MQH	42	W3CCX	45
W2ODH/6 -L	735	W3CCX	451	K3YTL -L	133	W2ODH/6 -L	207	W3CCX	37	WW8M	45
W7XU -L	677	W4IY -L	414	W3CCX	131	W3CCX	197	K1WHS	29	K3MQH	43
W1XE/0	659	W2ODH/6 -L	392	N2PA	121	N2PA	156	WW8M	28	W6MMM	42
K1WHS	586	N2PA	311	KB2DMK -L	96	KB2DMK -L	140	K2TVI	16	W6TOI	39
W4NH -L	558	W1QK -L	309	W4IY -L	94	W4IY -L	133	W6TOI	15	K1WHS	36
W3SE -L	546	N2NK -L	297	W6TOI	89	W6TOI	130	N0UK	11	W1XE/0	23

-L denotes Limited Multioperator

Multiplier Leaders by Band

Single Operator Low Power

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
N5OLS	231	K8MR	41	K8MR	26	K9PW	32	K9PW	14	K9PW	19
WD5K	208	W7DMN	40	K9PW	23	K8MR	28	WA2FGK	13	N9GH	13
KC5FP	205	K9PW	40	WA2FGK	22	WA2FGK	25	WB2VVV	10	WA2FGK	12
W5SXD	200	WA2FGK	36	N9GH	20	WA3EOQ	23	N1DPM	9	WA8RJF	11
N5NJ	187	KG4BMH	35	WA8RJF	19	N9GH	22	WA8RJF	8	W0UC	10
						W0UC	22			WA3EOQ	10
										WB2VVV	10

Single Operator High Power

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
N5HHS	262	W8ULC	68	KE8FD	41	KE8FD	44	K1TEO	19	K1TEO	20
K5AM	260	KE8FD	63	K1TEO	33	K8TQK	39	K1RZ	14	KE8FD	20
N5WS	245	W3EME	60	K8TQK	32	K1TEO	38	KE8FD	14	K1RZ	19
W5UWB	239	K8TQK	55	WB9Z	27	WB9Z	36	K8TQK	12	W9GA	13
K5IUA	219	K1TEO	52	K1RZ	26	KM0T	31	K5IUA	10	K4QI	13
						K2SMN	31	K2YAZ	10		
								K2UOP	10		

Multioperator

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz	
W5KFT -L	260	K8GP	86	K8GP	62	K8GP	63	K8GP	37	K8GP	40
W7XU -L	242	W7XU -L	66	K3MQH	53	K3MQH	53	N2PA	26	W2SZ/1	28
W2ODH/6 -L	208	K3MQH	65	N2PA	49	K3YTL -L	50	W2SZ/1	24	N2PA	24
K5LLL	198	W4IY -L	64	K3YTL -L	47	N2PA	48	K3MQH	19	WW8M	23
W1XE/0	197	N0UK	64	KB2DMK -L	44	KB2DMK -L	44	WW8M	18	K3MQH	18
KK5IH	195	AA4ZZ -L	62	W3CCX	40	W3CCX	43	W3CCX	15	W3CCX	17
N7LQ	193	W3CCX	61	W2SZ/1	39	W4IY -L	43	K1WHS	11	W6MMM	15
AC5TM -L	190	W2SZ/1	60	W4IY -L	38	W2SZ/1	40	W6TOI	9	K1WHS	13
KF7NP -L	188	K3YTL -L	59	W9ICE -L	37	W7XU -L	38	K2TVI	8	K7KX -L	12
W4NH -L	184	W9ICE -L	59	W2ODH/6 -L	35	W9ICE -L	37	N0UK	8	W1XE/0	10

-L denotes Limited Multioperator

multiplier battle and thus won the war 373,626 to 370,728. N5WS, N5HHS and K5AM also posted Strong scores in the Texas-New Mexico area.

The QRP Portable overall category was won by K9AKS with a score of 39,932. Finishing second in the category was N3FTI with 29,304 while N9LAG edged out K1ZE by 231 points for third place. Starting in 2001, this category has been renamed as Single Operator Portable. The requirements will remain the same: a station operating away from home with portable power sources and antennas while running 10 W PEP or less. Remember: this category must comply with the 500-meter rule—all transmitters must remain within a 500-meter circle.

As usual, there were strong efforts turned in for the Multioperator category. The crew at K8GP won the category and broke the one-year-old category record set by W2SZ/1. These heavyweights are always in close competition and provide a good training arena for many up-and-coming VHF/UHF enthusiasts. If you get the opportunity to work with one of these "superstations," or to study their planning, setup and strategies, you can't help but pick up a few tricks of the trade that will improve your operating skills.

The Limited Multioperator category continues to be a popular category. Leading the way in 2000 was W2ODH/6 who parlayed their population density advantage in Southern California into a win over W5KFT in south Texas—605,143 to 490,194.

Rovers continue to make up about 9% of the total logs received. In this year's contest we had an interesting rover issue arise. W1LP operated aboard their boat and submitted a unique Maritime Mobile rover entry. The score of 218,385 points would have won the Rover category, but according to the rules, Maritime Mobile entries are considered separate and compete against themselves.

A close race remained with the Rovers who competed under the category standards. In the end AB5SS edged W2FU by a little over 5,000 points. By activating 15 grids during the contest, AB5SS was able to work enough additional multipliers to offset the 153 QSO advantage enjoyed by W2FU. AB5SS also utilized two additional bands. Studies show that the more bands you utilize in VHF/UHF contesting, the better your score. When planning your next Rover effort, consider adding an additional UHF/Microwave band as a means to further bolster your QSO point and Multiplier totals.

The multiplier battle tells the tale of this contest for many of the closest competitive categories. K5IUA and K1TEO posted comparable totals on many of the higher point bands, with both edging the other on a few of the microwave bands. However K5IUA's victory came thanks in large part to the additional 62 multipliers he worked – including an outstanding 219 on 50 MHz to K1TEO's 87 on the same band.

The same situation occurred when perennial top gun W2SZ/1 was outdistanced by K8GP. While winning the QSO and QSO point battles, Mt Greylock was not able to make up the additional 133 multipliers worked from the mountains of West Virginia. The VHF bands were a strong component in the K8GP victory, holding off the advantage that W2SZ/1 held on the microwave bands. Six meter conditions were great in most areas of the country – and held the key to victory for many section and division winners as well.

With the addition of the Single Operator Low Power category, a new series of Top Ten Plaques are now available for sponsorship by interested participants or groups. Plaques are available to the Top Ten finishers in each of the six entry categories. As always, winners may purchase unsponsored plaques for $60. Contact the Contest Branch to find out more about plaque sponsorship opportunities or to order your unsponsored Top Ten plaque.

The 2001 ARRL June VHF QSO Party is set for June 9–11, 2000. It's just in time to float with Jim and Huck down a lazy river as a unique Rover. Perhaps you'll climb a mountain peak with Tom and Becky to try your luck…instead of whitewashing a fence.

Scores

Each line score lists call sign, score, stations worked, multipliers, Entry Class, number of grids activated (if Rover), and bands (A= 50 MHz, B = 144 MHz, C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, I = 10 GHz). For entry category, A = Single Operator Low Power, B = Single Operator High Power, Q = Single Op QRP Portable, L = Limited Multioperator, M = Multioperator, R = Rover. Band wins for Single Operator Low Power and Single Operator High Power are in Bold.

1

Connecticut

N1JMM	10,011	180	47	A	A**BD**
W1AW (N4QX,op)					
	5,217	129	37	A	ABCD
K1WVX	4,370	85	38	A	ABC**DE**
NT1N	4,070	110	37	A	**A**
K5GMX	1,625	65	25	A	A
K1RO	1,320	55	24	A	AB
KE1LE	1,220	61	20	A	AB
N1QVQ	48	11	4	A	BD
K1TEO	370,728	909	271	B	**ABCD9EFG**I
K1GX	75,790	374	130	B	ABCD9EFG**HI**
N1NQD	11,648	127	64	B	ABCD9E
K1ZE	20,519	214	71	Q	ABCD9E
W1QK (+AA1MY,K1XS,K1PHG,KA1SYG)					
	123,849	777	139	L	ABCD
KB1H (+KB1DFB,N1XS,KE1LI,N7PRD)					
	23,048	294	67	L	ABD

Eastern Massachusetts

W1PM	54,383	332	119	A	ABCD**9E**
K5MA	47,008	351	104	A	**ABCD**
WG1Z	24,120	263	67	A	ABCDE
N1GJ	22,977	208	69	A	ABCD9**EF**
K1UR	7,200	152	40	A	ABCD
KA1EKR	6,253	102	37	A	BCDE
W1DYJ	5,265	135	39	A	AB
N1RHS	5,054	99	38	A	ABCD
K1NU	4,746	108	42	A	ABD
K1YZ	2,640	88	30	A	A
N1VQR	1,444	67	19	A	ABD
K1QM	539	43	11	A	ABD
N1KQW	504	36	14	A	A
N1BC	308	25	11	A	ABD
WA1OFR	50	10	5	A	AB
W1GHZ	67,976	426	116	B	**ABCD9E**
N1EKV	2,782	83	26	B	ABCD
K1DAT	1,474	67	22	B	A
AD1B	615	41	15	B	AB
W1XM (+ops)					
	36,344	398	77	L	ABCD

Maine

KQ1V	6,384	112	57	A	**AB**
KV1J	819	39	21	A	AB
N1YIS	6	3	2	A	B
N1RWY	20,400	196	85	B	**ABCDI**
K1WHS (+K1CA,K1DY,K0ZK,K1BX,N1LBI)					
	400,752	1119	264	M	ABCD9EFGHJ

New Hampshire

WA1HOG	32,943	298	79	A	**ABCD9E**
NM1W	1,782	81	22	A	A

W1DAD 650 50 13 A A
K1MOM 154 22 7 A A
AF1T 84,455 450 127 B **AB**CD9**EFGI**
KU2A 66,105 355 117 B **AB**CD9**EFG**
K2HZN 24,400 229 80 B ABCDE
N1NUM 2,828 88 28 B ABCD
K1NKR 2,599 57 23 B BCDEFG
N1JHJ 1,872 62 26 B ABCD
W1OA 1,430 51 26 B ABCD
W1ZC 884 34 13 B D

Rhode Island

KM1X 35,280 337 90 A **ABD**
KB1LN 300 25 12 A B
W1BAT 1,403 60 23 B ABD
W1CPC 576 34 16 B **ABD**

Vermont

K1LPS 21,384 208 81 A **ABCD**
N1ZUK 3,348 89 36 A ABD
W1AIM 37,323 258 117 B **ABCD**
KT1VT 3,420 76 45 B AB
WB1GQR (W1SJ,N2YHK,ops)
142,040 857 134 L ABCD

Western Massachusetts

N1DPM 51,030 302 105 A **ABCD9EFG**
WA1MBA 33,825 220 75 B B**D9EFGHI**
NC1I 14,256 259 48 B **BD**
KC1OM 1,250 37 25 B **AB**CDE
N1MHH 192 14 12 B ABCD
W2SZ/1 (K1DH,K1EP,K2AD,K2JJB,K2TR, KA1DZV,KB0WJO,KB2YQE,KC1ZN,KE2TP, N2BNY,N2XRE,N2YCA,N2YZO,W1SZ, W1VE,WA1ZMS,WA2AAU,WA2SPL,WA8USA, WS2B,ops)
1,651,461 2319 399 M ABCD9EFGHIJK

2

Eastern New York

N2UZQ 13,008 220 48 A A**BCD**
N2TMT 4,998 147 34 A **A**
W2VDI 1,121 47 19 A ABD**9E**
WB2YAF 1,064 50 19 A ABD
WA2YEI 434 25 14 A ABD
WA2BAH 114 15 6 A ABD
KA2MCU 80 12 5 A ABD
W3HHW 23,838 203 87 B **AB**CD**9E**
K2ZZ 11,703 229 47 B A**B**D
W2IR (W2JHO,op)
2,980 120 20 B ABD
WA1RKS 2,970 79 33 B ABCD
AB2I (+WN2Y,WU2S,WC2J,WB2DVV,N2BZP, K2KJ,KC2CRO,KC2DMH,K2CSS)
74,061 523 117 L ABDE
W2MU (KY2J,K2ETA,KG2DB,WB2AQU,WA2MMX, W2XL,W2ENY,KD2NE,K4HA,N2SA,N2MCI,ops)
42,434 353 98 L ABCD
K2TVI (K2ZVI,WB2NHC,WB2NVR,WB2VVS, N2DHH,N2FMC,N2GDY,N2GKM,N2NWZ, N3EMF,ops)
227,953 918 187 M ABCD9EFGHI
K2CT (K2EP,K2BX,K2ZP,K2SIG,W2FWS,ops)
14,136 201 57 M ABCDJ

NYC-Long Island

KB2WVG 10,441 164 53 A **ABD**
K2OVS 9,360 153 52 A **AB**D
KF2XF 1,386 77 18 B **B**
WB2AMU 2,822 73 34 Q ABD

Northern New Jersey

WB2VVV 73,700 356 134 A **ABCD9EFGI**
K2KIB 22,161 205 83 A ABCD9E
K2YSY 3,630 121 30 A AB
WB2CUT 2,838 129 22 A B
W2UDT 2,697 87 31 A AB
WA2BKN 990 44 22 A ABD
N2ZAK 615 34 15 A BD
W2CVW 300 25 12 A A
WA2ASQ 240 20 12 A A
W1BQ 49,276 376 97 B **ABCD9EF**
W2JEK 108 12 9 B AB
N2NK (K2BM,N2WM,WD3R,K2BJG,N2HMM, KB2LHH,KC2DLD,WB2UFF,N2BIM,ops)
157,677 782 169 L ABCD
K2BAR (K2AMI,N2PBY,WA2LXE,WA2QHL, K1YLH,KC2HL,KO2OK,NA2AA,W2MSK, K2UFM,KC2FBK,NX2Q,WK2M,KA2NJP,KF2ID, KC2DTA,K2ZB,KC2CLH,KC2AWX,ops)
66,992 536 106 L ABCD

Northern New York

WA2AEY 20,256 185 96 A **ABD**
WZ2T 1,600 50 32 A AB

Southern New Jersey

N2SCJ 25,205 263 71 A **ABCDE**
N2RF 2,496 73 32 A ABCD
K2SMN 92,056 428 148 B ABCD**9EF**
K2TXB 41,496 311 84 B **BDEI**
KD2KS 21,060 228 81 B ABCD
KB2TIS (+K2UHY)
969 38 19 L BDE

Western New York

W6XR 7,808 124 61 A ABD
K2OEQ 3,237 68 39 A ABD**9**
W2WGL 2,772 66 33 A **BD**
N2ODU 75,348 546 138 B **A**
K2AN 44,640 237 120 B **ABCD9EFG**
N2WK 17,640 210 84 B A
WA2ZNC 1,392 42 24 B ABCDE
K2QO 171 16 9 Q ABI
KB2DMK (+N2HLT,N2JDQ,N2HQW,N2OLB,NS9E)
249,917 801 241 L ABCD
N2PA (N2KG,N2JQR,W3OAB,N2YB,ops)
520,149 1038 329 M ABCD9EFGHIJP
K2AMB (+N2MRE,KC2GIW,AC1M,W2YPP)
1,269 35 27 M ABCDE

3

Delaware

W3OR 3,234 50 49 B AB**CD9EFG**
WA3BZT 2,856 68 42 B **AB**

Eastern Pennsylvania

WA2FGK 105,133 405 161 A **ABCD9EFG**
NA2T 18,509 186 83 A ABD
K3XF 5,928 87 52 A ABCD9E
WT3P 3,914 102 38 A ABD
K3ARR 1,836 54 34 A AB
WS3C 1,643 44 31 A ABD
W3JS 1,113 51 21 A ABD
N3NYC 176 16 11 A B
N3NGE 47,524 258 109 B AB**CD9EFGH**
W3EME 24,720 412 60 B **B**
N3XJX 10,176 122 64 B ABCD
WA4GPM 3,900 100 39 B **AB**
W3SZ 2,646 53 27 B BCDEF
WA3CSP 2,015 65 31 B A
K3TV 1,898 69 26 B BD
N1XKT 1,296 39 18 B ABCD9EFG**IP**
K3NAT 814 36 22 B ABD
K3KEL 176 11 8 B D
N3FTI 29,304 254 88 Q ABCD9EF
K3YTL (K3MKZ,K3TOW,KA3EEO,KA3ZHT, KB3CBF,KB3QI,KE3OA,N3FA,N3PBH, N3RN,N3TKK,W3DZH,WA1HHN,WA1MKE, WA3NVS,WB3FKQ,ops)
437,000 1386 250 L ABCD
W3HZU (AD3E,N3NBT,N3BQB,N3VQH,N3ZCW, K3JAW,ops)
13,826 210 62 L ABD
KF3DT (+KB3CPL)
4,368 95 42 L ABD
W3CCX (AA3GN,K1JT,KB3XG,KU3T,NE3I, N3EW,N3FUJ,N3ITT,W2SJ,W2SK,W3DFM, W3KM,W3RJW,WA3DRC,WA3GFZ,WA3NUF, WA3RLT,ops)
754,364 1663 326 M ABCD9EFGHIJP
K3MQH (K3RA,K3UG,AI3W,AI3M,N3EAB, W3EKT,N3ZTZ,ops)
733,005 1621 315 M ABCD9EFGHIJ

Maryland-DC

K3IXD 21,655 237 71 A ABCDE
WA3EOQ 19,360 146 80 A **BCDE**
K3HCE 15,300 170 75 A ABD
N3VOP 6,118 110 46 A ABD
N3UM 4,440 111 40 A **A**
N3SOK 3,680 89 40 A ABD
WA4PRR 903 39 21 A ABD
AC3P 624 39 16 A AB
AA3S 570 38 15 A AB
WA3GYW 405 27 15 A AB
K3CHP 312 26 12 A A
KB3DMN 168 21 8 A B
K1RZ 231,623 741 203 B **ABCD9EFI**
K3ZO 41,195 385 107 B **AB**
N3HBX 18,060 216 70 B ABCDE
W3VRD 15,312 180 66 B ABCD9
KA3TCC 7,535 121 55 B ABCD
W3GN 2,975 85 35 B AB

Western Pennsylvania

KA3SDP 24,210 199 90 A **ABCD**
AA3GM 4,592 67 56 A ABCD**E**
W3ZZO 1,566 54 29 A AB
W3ZA 108 12 9 B **AB**
W8IJ 88 10 8 Q ABD
WB0IWG 24 6 4 Q AB
N3II (+K3DNE)
136,183 556 191 L ABCD
W3SO (+WR3Z,K4VV,W3YOZ)
41,285 316 115 L ABD
K3MJW (KA3WSW,N3GJ,N3NOS,ops)
21,311 184 101 L ABD

4

Alabama

KU4WW 13,908 149 76 A A**BCD**
KM4LK 2,898 69 42 A **A**
W4OZK 1,400 49 28 A ABD
WA5JWU 456 24 19 A A
WB4WXE 20,196 198 102 B **AB**
N4ION 15,272 160 92 B A**B**D
AJ4W 1,271 40 31 B ABD
KU4IU (+KT4XA)
50,887 325 151 L ABD
KF4DGS (+KS4YT,KV4T,K4WI,KG4HKE)
101,436 448 214 M ABCDE

Georgia

K4BAI 7,598 131 58 A **A**
WK4E 4,752 85 54 A AB**D**
N4WD 3,444 82 42 A A**B**
KV1E 1,696 53 32 A A
NY4F 966 39 23 A AB**C**
KD4K 43,250 320 125 B **AB**CD
W4EUH 38,499 272 123 B **AB**CD
K4KAZ 10,944 143 64 B ABCD**E**
K4SZ (+K4PTT,W4RLW)
13,104 159 72 L ABCD
K4HUM (KF4VBR,W4GCL,KE4KQB,KF4HQV, KG4CFP,KE4SLO,ops)
5,805 122 45 L ABD
K4RF (+KK4ND)
88,894 448 169 M ABCD9EFGI

Kentucky

W4FVQ 8,908 104 68 A **ABCD9E**
AD4ZW 33,408 262 116 B **ABCD**
K4LYN 1,364 44 31 B A
KD4EVB 589 31 19 Q AB

North Carolina

AF4HX 22,848 268 68 A A**BCD**
KD4HLG 15,753 177 89 A **A**
WB4U 4,005 89 45 A AB
K2IUK 777 37 21 A A
K4DAM 308 22 14 A A
K4QI 123,646 449 211 B **ABCDE**
W4DEX 23,644 176 92 B ABCD9EFG**HI**
W4VHH 7,150 76 50 B BDE**FG**
N4AJF 7,018 119 58 B ABD
W4WSR 5,120 88 40 B BD9EF
KF4LVF 2,166 57 38 B A
W4RXR 14,678 156 82 Q ABCD
AA4ZZ (+AA4S,K2SD,K4DXA,W4MW,W4SI)
268,548 809 276 L ABCD
W4ATC (N3QYE,NA3T,N3NPQ,KF4RDN,ops)
2,590 70 37 L AB
W4NH (K4EA,KB4IDC,KF4DZV,NX9O,W4ATL, W4KXY,ops)
212,852 779 254 M ABCD9E

Northern Florida

N4JK 78,948 459 172 A **AB**
KU4WD 59,130 431 135 A AB**D**
KE4YYD 860 42 20 A **BD**
NW5E 120,903 628 191 B **ABC**
W2BZY 84,645 472 171 B AB**CD9E**
KA4DON (+N4VHF)
65,940 416 157 L ABD

Puerto Rico

WP4LNY 14 7 2 A **B**

South Carolina

N4JZH 20,000 200 100 A **AB**
N4UFP 13,148 161 76 A AB**CD**
N1BOY/4 322 23 14 A A
K4WJV 273 21 13 A A
K4YTZ (WA2EMF,op)
72 9 8 A B
W4KSC 4,472 77 52 B **ABCD**

Southern Florida

N4IS 109,026 673 162 A **AB**
K0VXM 76,145 445 157 A **ABCD9EF**
WC4H 39,516 356 111 A A
KF4FAJ 26,418 238 111 A AB
W2DGJ 2,650 53 50 A A
WB6XQ 2,132 52 41 A AB
W4SLR 504 28 18 A A
WB2WIH 252,945 1061 231 B **ABCD**

Tennessee

KV4EB 23,278 219 103 A A**B**D
KD4HIK 17,108 174 94 A AB**CD**
KG4BMH 2,660 76 35 A **B**
AE4HG 374 22 17 A AB
AD4F 9,504 140 66 B **ABCD**
K5OGF 160 16 10 B AB

Virginia

AD4TJ 11,328 159 64 A **AB**D
KC4AUF 7,504 121 56 A ABCD
N4MM 7,200 136 50 A ABD
K4FJW 5,292 126 42 A AB
AD4DG 5,000 76 50 A AB**CD9E**
KE4BVP 2,706 80 33 A ABD
KC4B 2,108 68 31 A AB
N4EUK 364 28 13 A A
K4SO 13,398 203 66 B **AB**
WF4R 1,375 48 25 B A**B**D
W4IY (W4AD,W4RM,W4NF,W4CE,WA0DYJ, W4DAV,N1TXI,W4MFM,NL7TK,K4RG, KG4DFJ,K8MLM,ops)
365,560 1179 260 L ABCD
W4COV (AD4HG,KC4ZTE,KD4UJI,KE4DZY, KE4UUH,KF4CWM,KF4YLM,KG4DYX,KN4FT, KQ4NW,VE2HX,WA4PGI,ops)
38,295 292 115 L ABD
WA3OFC (+N3ZYU)
820 37 20 L ABD

West Central Florida

WD4MGB 153,800 765 200 B **ABD**
K9HUY 144,336 742 194 B ABD

5

Arkansas

KB5YUA 5,336 92 58 A **A**
N5QYC 1,728 48 36 A **AB**
AC5DK 1,440 48 30 A A
W5HUQ 54,670 353 154 B **ABD**
K5WC 28,304 244 116 B A

Louisiana

KD5HPT 78,760 425 179 A A**B**D
K5ER 20,241 164 117 A A**B**D
WA5KBH 15,958 158 101 A A
N5ASA 14,833 160 91 A ABD
K5CZD 10,795 118 85 A ABD
K5QR 5,952 90 64 A ABD
W5CTV 2,655 59 45 A AB
WA5RT 86,668 454 188 B **ABD**
N5HMH 4,104 76 54 B AB
AC5TM (N9MQU,KC5ZOC, KD5BKW,ops)
104,346 524 198 L ABD
WM9M (+WD8LLR)
4,503 79 57 L AB

Mississippi

KJ5RC 15,862 154 103 A **A**
KF5AU 943 41 23 A A
N3AWS 525 25 21 Q A

New Mexico

K9RU 98,556 572 172 A A**B**D
N6ZZ 79,826 478 167 A A
N9KUW
35,280 289 112 A A**BD**
KD5JAA 5,100 92 51 A ABD**E**
W5DO 4,158 77 54 A AB
K5AM 297,579 1049 281 B ABCD
N5XZM 15,096 174 74 B **ABCDE**

North Texas

W5SXD 144,281 635 223 A ABCD**E**
WD5K 139,568 671 208 A **A**
N5NJ 124,836 592 206 A **ABD**
K5LOW 45,530 305 145 A ABD
KB5OAI 32,512 254 128 A A
W5BNH 9,875 125 79 A A
W5USJ 6,984 97 72 A A
KC5IIT 380 20 19 A A
W8CM 237,412 864 244 B **ABCDE**
WA5M (+ops)
25,122 237 106 L AB
KC5ADG (+W5JDS)
23,115 189 115 L ABD
KB5VPR (+ops)
19,822 187 106 L AB

Oklahoma

K5HP 77,604 441 174 A **ABD**
K5SW 6,800 91 68 B A**BC**
KD5DLL 6,405 105 61 B **AB**
KN5TTN 1,026 38 27 B A
WA5VKS 396 21 18 Q ABC

South Texas

N5OLS 182,784 768 238 A **AB**
KC5FP 151,107 722 209 A ABD
KM5RG 83,694 481 174 A A**B**
AJ4F 25,185 219 115 A AB
KC5YOV 20,792 191 92 A ABC**DEIJP**
KM5TU 14,670 163 90 A A
KA5GLX 13,440 151 84 A ABD
KZ5E 11,398 139 82 A A
N5BA 7,844 98 74 A AB**CD**
N5IW 6,767 99 67 A ABD
W8ZSX 4,785 80 55 A ABCD**F**
K5IUA 373,626 908 333 B **ABCD9EFGHIP**
N5WS 348,750 1018 310 B ABCD9**E**
N5HHS 334,080 1141 288 B **ABD**
W5UWB 272,916 1017 266 B ABC
K5VH 166,362 613 233 B **AB**CDEF
W3XO/5 49,005 327 135 B ABCDEF
W5KFT (+K5NA,KE5C,K5TR)
490,194 1354 339 L ABCD
K5LLL (+NN5DX)
195,489 645 261 M ABCD9EF

West Texas

W7ANA 5,481 87 63 A **A**
N5XYO 5,100 85 60 B **A**
KK5IH (+KK5KK)
181,440 625 270 M ABCDE

6

East Bay

KF6GYM 42,483 282 119 A **ABCDE**
K6JAT 2,059 59 29 A ABD
W6OMF 18,760 200 56 B **BCDE**
KE6QR 912 48 16 B A**B**D

Hawaii

KH6HME 204 28 6 A **ABD**
NH6YK 234 28 6 B **ABD**

Los Angeles

KE6FCT 62,720 345 160 A **AB**CD
W7IXL 18,428 224 68 A ABCD
W6IST 13,384 178 56 A ABC**D**
KE6AXJ 7,015 204 23 A AB**CD**
K6HLH 5,883 132 37 A B**DEFG**
KD6KHJ 2,242 100 19 A ABC
W6EZB 2,200 67 25 A ABD
N5BF/6 189 21 9 A A
KD6RUH 24,120 269 60 B **ABCDE**
N6KN 22,848 213 102 B **AB**CD
K0DI/6 2,528 79 32 B A
K6LMN 16,549 206 67 Q ABCD
KQ6EE 1,800 73 18 Q ABCDE
W3SE (+N6OPR,K7LA)
263,057 960 233 L ABCD
W6TOI (KB6WKT,KE6HPZ,KB6ATT,AD6HT,ops)
194,598 796 171 M ABCD9EFI

Orange

K6IBY 12,360 149 60 A AB**CD**
KE6GFF 7,068 186 19 A **D**
W6ZN (W6ZQ,op)
6,560 156 40 A A**B**D
K6PF 4,669 121 29 A BD
KN6VR 3,772 134 23 A **BE**
KE6QCB 252 31 7 A BD
N6EQ 135,605 581 185 B **AB**CDE
WB6FCS 73,870 366 178 B ABCD
K6TSK 62,602 375 113 B **ABCDE**
KC6UIX 20,176 192 97 B ABD
KI6FF 15,300 208 60 B ABD
KE6GFI 3,720 107 31 B ABD
KE6WYM 3,636 89 36 B ABCD
AC6XK 2,500 85 20 Q BCD

Santa Barbara

N6ZE 12,282 167 69 A AB**DE**
KC6NBI 8,236 113 71 A A**B**D
KE6RCI 2,286 102 18 A B**D**
W9EC 1,682 49 29 A AB**CDE**
KF6OIF 682 31 22 A AB
N6PI 120,156 510 186 B **ABCD9E**
WB6AAG 91,290 407 179 B AB**CDE**
WH6CPT 5,704 124 46 B A
W2ODH/6 (+W6PPT,WA6DJS,K6KWQ,N6RMJ)
605,143 1512 319 L ABCD
K6WLC (AB6CF,K6NDZ,ops)
31,416 265 84 M ABCD9EJP

Santa Clara Valley

W6IT 30,969 223 111 A **ABCD**
WA6HRK 9,920 120 64 A ABCD**E**
KF6MXK 5,396 117 38 A ABD
W1QT 1,271 39 31 A ABD
K6EXE 1,197 57 19 A ABD
KF6IIU 32 8 4 A B
N6JET 44,974 309 113 B **ABCDE**
K7KX (+N6RZ,KO6RS,W6WO,AA6EG,WC6DX)
126,000 633 168 L ABDE
W6FM (+W6NS)
122,661 513 189 M ABCDE

San Diego

W6EEB 4,214 83 49 A **ABD**
KB5MY 37,878 321 118 B **AB**
KF6JBB 25,852 230 92 B **ABCD**
WA6HXD 4,998 102 49 B AB
WB6AXW 4,905 91 45 B ABCD
NF6L (+K6FQ,WN6K)
39,330 345 114 L A
WB6DTA (+K6DYD)
34,220 241 118 L ABCD

San Francisco

WN6W 3,024 72 42 B **A**
W6MMM (WD6HDY,WA6KLK,KD6LTB,WB9NJS, K7WWA,ops)
178,794 648 198 M ABCDE

San Joaquin Valley

K6MI 32,277 238 87 A AB**C9EF**
K6YK 29,268 215 108 A **ABCD**
KF6IRZ 20,995 195 85 A ABCDE
NT6K 5,490 90 61 A A
KM6WO 2,205 63 35 A AB
WA6QYR 264 22 12 A B
N6AJ 67,210 322 130 B **ABCD9EF**
N6MI (at N6NB)
37,875 263 101 B ABCD**E**
KF6CNV 1,700 90 17 B ABD
KF6KDA (+KE6ZAK,KF6ARN,KF6HNH)
17,100 182 76 L ABCD

K6ARP (WB6GBS,KB6HRB,KF6ICI,N6JXL, KF6KDC,KB6LQV,KD6MQG,AD6OL,W6PSQ, KB6QNP,KC6QPO,KQ6TG,KC6UCP,KE6YCZ, KE6YIX,KE6YLR,KE6YLS,N6ZGY,KF6ZQY,ops)
25,908 254 68 M ABCDEI

Sacramento Valley

N6AFI	5,814	102	57	A	**AB**
WB6NTL	114,009	443	183	B	**AB**CD**E**
NU6S	104,832	483	182	B	**AB**CD
N6KBX	67,824	342	144	B	ABCDE
KC6ZWT	20,680	254	55	B	**BCD**
W6YM (+K6KLY,K6FEE)	124,410	571	165	M	ABCDE

7

Arizona

N7IR	43,875	325	135	A	**AB**
W7ZT	9,920	124	80	A	AB
WB6CGZ	418	22	19	A	A
AA7A	131,068	568	217	B	**ABD**E
KE7NR	19,602	171	99	B	**AB**CD**E**
WB7OHF	7,504	106	67	B	ABCD
KF7JS	3,621	69	51	B	ABD
KB7YEL	2,340	65	36	B	A
W7MD	1,320	40	33	B	A
KF7NP (+NU8I,KE7OT)	175,187	665	239	L	ABCDE
N7SQN (N6ETA,KC7KKV,ops)	30,629	263	109	L	ABDE

Eastern Washington

N7AU	4,263	86	49	B	**ABC**

Idaho

W7USB	6,741	101	63	A	**ABD**
K7SMA	2,242	59	38	A	A
N7EIJ	23,280	232	97	B	**AB**D
K7MAC	7,006	108	62	B	**AB**C
W7ID	6,600	95	60	B	**AB**D**E**

Montana

KB7PMW	500	25	20	A	**A**
WA7PDC	15,486	175	87	B	**ABD**

Nevada

N7WVZ	6,420	103	60	A	**ABD**
K7ICW	80,105	393	185	B	**ABCD**E
NW7O	8,118	113	66	B	ABCE
KC6UCN	1,815	50	33	B	ABCD
WA9TKK	240	17	8	Q	ABCDE
K7XC (+W7KK)	99,510	449	214	L	ABDE
N7LQ (+K7UI,KB7UIF,KB7UEA)	185,758	641	262	M	ABCDE

Oregon

N7DB	25,850	259	94	A	**ABC**D
AH6LE	6,496	112	58	A	AB
WB7RSG	6,106	130	43	A	**ABD**
K7HSJ	5,232	101	48	A	ABCD**E**
KK7E	290	58	5	A	B
W7EW	98,610	551	173	B	**ABD**
KA7V	1	1	1	B	B
WB7TSO	209	19	11	Q	A

Utah

KE7NS	41,261	320	121	A	**AB**DE
NJ7A	37,290	284	113	A	AB**CD9E**
WA0YPL	399	21	19	A	AB
K7LNP	24,948	239	84	B	**ABCD9E**
N7VM (+KD7GVF)	42,510	313	130	L	ABD
N9SP (+KD7GVR)	510	34	10	L	BCD

Western Washington

N7MWV	21,508	246	76	A	**ABD9EF**
K7WTG	7,208	136	53	A	A
W7DMN	5,060	115	44	A	**AB**
KB7PKC	4,968	98	46	A	ABD
W7FKI	2,880	82	32	A	ABD
W3JPT	2,553	104	23	A	ABD
WD5JMC/7	2,272	70	32	A	ABD
K7CW	45,344	416	109	B	**A**
KE7SW	41,202	309	109	B	**AB**CD**9EFGH**
K7XD	29,939	297	91	B	**AB**CD
W7FI	20,250	225	90	B	AB
K1CT	1,012	46	22	B	A
W7/JR1NKN	2,784	87	32	Q	A
NL7RR/7 (+W7QC,KB7ZFO,K1LOG,KB7N)	3,604	106	34	L	AB
WB7FJG (N4SL,KD7BZX,N7TPY,KC7KLZ,ops)	2,310	87	22	L	ABD
K7VHF (K7ND,KD7TS,N7EPD, NU7Z,ops)	29,540	304	70	M	ABCD9EFGHI

Wyoming

AC7AF	10,878	147	74	A	**AB**
N7JT	1,512	56	27	A	A
WA7KYM	72,072	383	156	B	AB**CDE**
W0ETT/7	56,832	360	148	B	**ABC**D**9**
KI7WB (+K7KMT,N7NPC)	32,736	242	132	L	ABD

8

Michigan

N4SC	36,400	233	130	A	**A**BC**D**
KF8QL	14,592	147	76	A	ABCD**9**
K8KD	12,382	143	82	A	ABD
N8IVW	6,600	131	40	A	**BD**
K8NFT	4,794	92	47	A	ABD
N8ZVB	4,089	87	47	A	A
N8SDQ	2,232	62	36	A	AB
N8AIA	1,155	35	21	A	A**BC**
N8XTM	1,066	41	26	A	AB
KC8NAH	405	27	15	A	AB
WA8YLZ	66	11	6	A	AB
KB8TWM	9	3	3	A	B
KB8U	114,823	508	199	B	**AB**CD
K2YAZ	102,243	358	197	B	**ABCD9EFHI**
K8MD	68,425	380	161	B	ABC9E
WD8KUF	12,090	134	78	B	ABD
W8WNX	2,494	58	43	B	A
N8PVT	345	23	15	Q	A
WW8M (+K8DAZ,NE8I,WA8VPD)	293,045	651	235	M	ABCD9EFGHIJK

Ohio

K8MR	85,808	404	173	A	**ABCD**
WA8RJF	50,688	233	144	A	ABCD**9EFGH**
W8CAR	12,719	142	79	A	ABD
K8FFO	12,393	153	81	A	AB
W8DD	10,640	140	76	A	AB
KB8VUJ	6,480	100	60	A	ABD
KC8CSD	6,148	91	53	A	ABCD
K5ZG/8	3,952	104	38	A	AB
KC8CUI	2,898	69	42	A	A
W1FEZ	1,922	50	31	A	BD
AA8WJ	950	38	25	A	AB
W9VHF	736	32	23	A	A
KE8FD	208,504	516	268	B	**ABCD9EF**
K8TQK	161,760	440	240	B	ABCD9**EFG**
W8ULC	15,912	234	68	B	**B**
KB8RZV	13,104	138	78	B	ABD
N8GHZ	11,050	120	65	B	ABCD
KB8VAO	2,088	43	36	B	ABDE
N8WEL	40	8	5	B	A
N8XA	10,990	118	70	Q	ABCD9E
N8BJQ (+N9AG,N8NR)	69,551	443	157	L	AB
KU8E (+K9NW)	19,190	190	101	L	AB
N8KOL (+KA8ROX,KC8AQF)	116,600	473	200	M	ABCD9EF

West Virginia

K8KFJ	4,784	92	52	A	**A**
KC8EMQ	1,890	54	35	A	**AB**
K2UOP	95,284	417	166	B	**ABCD9EF**
N8XUR	31,740	240	92	B	ABCD9E
WA8WV	368	23	16	B	B
K8JWT	230	23	10	Q	B
N1ISB (+KB2SAE)	299	22	13	L	ABC
K8GP (K8ISK,K6LEW,W4XP,N4UK,W3CMP, W3ZZ,K3SX,K1HTV,K1TR,K1RA,ops)	1,876,364	2281	532	M	ABCD9EFGHIJKP

9

Illinois

K9PW	351,918	791	294	A	**ABCD9EFGHI**
N9GH	53,448	269	136	A	ABCDE
NN9K	23,345	203	115	A	A
N9OBE	9,801	121	81	A	A
KG9PF	6,204	106	47	A	ABCD
N9XHU	5,060	88	55	A	ABD
W9SE	2,320	58	40	A	A
K9PG	2,146	74	29	A	AB
KG9PQ	1,056	47	22	A	ABD
N9NW	48	8	6	A	A
N2BJ	253,761	755	251	B	**ABCD9E**
WB9Z	173,514	560	239	B	**ABC**DE
K2DRH	123,224	483	211	B	ABCD
K9YR	30,080	248	94	B	ABCD
W9IIX	20,500	201	82	B	ABCD
W9OBG	17,472	142	96	B	ABCDE
WA6TMJ	4,674	82	57	B	AB
N9MBK	2,331	111	21	B	B
W9VA	2,244	68	33	B	A
N9MBR	728	28	26	B	AB
N9LAG	20,750	196	83	Q	ABCD
W9GKA	7,198	99	59	Q	ABCD
N9REP (+KB9JZY,K9TMS,N9KVT,KB9VRW, KB9KKN,KB9WEJ,N0XMT,AA9IL)	31,400	274	100	L	ABCD
W9RM (+packet)	10,414	127	82	L	A

Indiana

WB9DRB	7,416	89	72	A	**ABCD**
K8LEE	54,944	404	136	B	**A**
K9EA	54,774	295	153	B	**ABC**D
KA9QFL	37,278	271	109	B	**ABCDE**
AA9LT	21,010	177	110	B	ABCD
KB9SSS	1	1	1	B	A
W9ICE (WB9YCZ,WB8ERB,N8NQG,N9QQY, K9YDO,N8JLZ,WB9OPR,KE4OED,K9ZX, KA9BFM,KB9NWP,WA0JTL,WE8N, KA8STM,ops)	229,356	697	277	L	ABCD

Wisconsin

W0UC	160,284	552	222	A	**ABCD9EFGHI**
K9VHF	52,128	304	144	A	ABCD
WA1UJU/9	23,460	230	102	A	AB
KA9UZW	18,525	168	95	A	ABD
KB9UPI	7,315	133	55	A	AB
K9UUT	6,776	142	44	A	ABD
N9UDX	2,920	65	40	A	ABD
KB9Q	2,480	69	31	A	ABCD
N9NDP	2,001	68	29	A	ABC
W9YCV	735	34	21	A	ABD
KB9RLB	480	24	20	A	AB
KB0LGB	360	20	18	A	AB
W9AKS	30	6	5	A	A
W9GA	100,359	409	189	B	**ABCD9E**
N0AKC	52,038	281	147	B	ABCD9E
N9DG	46,980	286	145	B	ABCD
W9JN	31,773	229	119	B	ABCD
WA9LZM	27,240	204	120	B	ABD
ND9Z	25,047	185	99	B	ABCDE
KB9TLV	8,760	118	73	B	ABD
WA9PWP	1,230	41	30	B	AB
N9LIA	972	35	27	B	ABD
K9AKS	39,932	228	134	Q	ABCDE
N9MYK	3,978	96	34	Q	ABDE
KF0GX/9	620	28	20	Q	AD
NI9E (at N9FH) (+KA9WXN,KB9KBK,KB9LYL, N9FH,N9LLT,N9VA,WB9UAI)	113,280	555	177	L	ABCD

0

Colorado

W6OAL	113,645	509	191	A	**ABCD9EFGH**I
K0CS	63,200	380	160	A	ABD
N0KM	33,625	245	125	A	ABC**D**
NN7DJ	12,814	146	86	A	ABDE
N0UGY	10,660	110	65	A	**ABDEFI**
KA0MWA	1,612	51	31	A	ABD
K0YW	114,654	591	194	B	**A**
W7SAO	924	42	22	B	**B**
K7VNU	13,752	191	72	Q	A
W0KVA (+N0WBW,W0KU)	66,960	390	155	L	ABCD
W1XE/0 (+N0KE,WB0GAZ,N0HF,KR0U, WS9O,AA0RS)	265,356	838	273	M	ABCD9EI

Iowa

NE0P	17,670	175	93	A	**ABD**
AB0HF	4,480	80	56	A	AB
KM0T	136,408	433	236	B	**ABCD9E**
K0VSV	25,648	186	112	B	ABCD
K0MQS	15,912	221	72	B	B
K0CNN (+KC0AYG,KC0CKU)	1,760	44	40	L	AB

Kansas

K0LLS	240	16	15	A	**A**
N0LL	154,224	561	252	B	**ABCD**E
N0KQY	47,700	253	159	B	ABCD**E**
W0EKZ	26,108	186	122	B	ABCDE
KA0MR	5,757	85	57	B	ABCD**9**
W0RT	456	22	19	B	ABD
N0JK	3,675	74	49	Q	AD
K0BJ	775	31	25	Q	A

Minnesota

KB0ZEV	31,360	244	112	A	**ABC**D
KC0AKU	15,834	155	87	A	**ABD**
KB0TZA	7,434	118	42	A	ABCD**9**
K0JO	7,208	98	68	A	ABCD
N0UR	6,944	112	62	A	A
KC0P	4,472	74	43	A	ABCD**E**
KB0OBT	3,131	85	31	A	ABD9
KB0LYL	2,955	197	15	A	B
N0AT	1,728	54	32	A	AB
KC0HEW	1,144	44	26	A	AB
WB0TRA	952	34	28	A	A
K0CJ	882	42	21	A	AB
KB0VUK	97,125	378	185	B	**ABCDE**
KA0PQW	71,162	341	182	B	**ABCD**
WA0BWE	20,904	179	78	B	ABCD**9EFHI**
W0AUS	18,942	188	77	B	ABCDE
W0OHU	13,200	139	75	B	ABD
WA2HFI/0	7,140	102	70	B	A
N0UK (KC0FXY,W9FZ,WB0GGM,W0ZQ,N0HJZ, KA0JWC,WA2PHW,ops)	239,148	707	273	M	ABCD9EFIKP

Missouri

KG0TQ	9,605	113	85	A	**A**
W0JRP	6,144	90	64	A	**ABCD**
W0WKG	49	7	7	A	A
W0FY	15,132	146	97	B	**ABD**
KF0K	12,727	143	89	B	**A**
KW0A	2,030	58	35	B	A

North Dakota

W0KFG	5,544	87	63	A	**ABD**
NT0V	4,704	72	56	B	**ABCDE**
WB0OAJ (+KC0HXF)	28,272	223	124	L	ABD

Nebraska

WD0BQM	4,554	64	46	A	AB**CDE**
KA0ABA	4,290	74	55	A	**AB**D
AE0G	2,684	61	44	A	**AB**
K0BWJ	280	28	10	A	B
N0YNP	6	2	2	A	BD
W0BJ	14,705	173	85	B	**AB**

South Dakota

WB0ULX	13,559	135	91	A	**ABD**
KI0BV	456	24	19	A	AB
WA0TDK	285	19	15	A	AB
KA0ZEE	270	18	15	A	AB
WB0HHM	8,379	105	63	B	**ABCD**
W7XU (+W0SD,W0DB,WD0T,N0GX)	403,560	947	380	L	ABCD

VE

New Brunswick

VE9AA	35,334	293	117	A	**ABD**

Nova Scotia

VE1ZJ	6,858	126	54	B	**ABD**

Quebec

VE2ZP	1,904	56	34	A	**AB**
VE2CUA	1,045	48	19	A	AB**CD**

Ontario

VE3KZ	24,794	237	98	A	**A**BD
VE3TMG	23,229	223	89	A	**AB**D
VA3FIN	16,016	162	77	A	**ABC**DE
VE3FHU	9,240	116	66	A	ABCDE
VE3SXE	4,032	84	48	A	AB
VE3DBF	3,948	68	47	A	ABD**E**
VE3CWJ	2,067	48	39	A	ABCD
VE3VHB	943	41	23	A	B
VE3CVG	416	28	13	A	ABD
VE3OJN	16,524	155	81	B	**ABCD9EI**

Manitoba

VE4KQ	1,734	43	34	A	**ABCD**

Saskatchewan

VE5CEM (+VE5MX)	6,600	120	55	L	A

Alberta

VA6AN	24,300	243	100	A	**AB**
VE6TA	10,434	139	74	B	**AB**E
VE6NNT	3,792	76	48	B	**AB**D
VE6JW (+VE6JY,VE6LDX,VE6MAA,VA6DX)	23,736	233	92	L	ABDE

British Columbia

VE7XF	14,328	188	72	A	**AB**D**E**
VE7XO	1,376	43	32	A	A
VE7HPS	1,200	79	15	A	**ABC**
VE7BDQ	735	35	21	A	A
VE7IN	500	25	20	A	AB
VE7DXG	16,014	257	51	Q	ABCD

DX

Cuba

CO2OJ	36,852	332	111	A	**A**

Guatemala

TG9AJR	6	3	2	A	**A**

Costa Rica

TI5KD	8,544	178	48	A	**A**
TI2ALF	144	16	9	B	**A**

Mexico

XE2HWB	4,876	106	46	B	**A**
XE2EED (+XE2QU,XE2XC,JE6JYT,N6CA,N6XQ)	87,482	474	166	M	ABCD9EF

Rovers

Atlantic

W2FU (+K2CS)	212,704	671	184	R	7	ABCD9EFGHI
N1MU	15,785	133	55	R	9	ABCD9EFGH
N3RBW	4,712	101	38	R	6	ABD
K1DS	735	20	15	R	2	ABCD9EFGIP

Central

WB9SNR	76,300	370	109	R	7	ABCD9EFGHI
K0PG	42,051	242	131	R	8	ABCDE
KF9US	40,656	288	84	R	8	ABCD9EF
N9KS	7,350	176	35	R	8	ABD

Dakota

KF0UK	81,783	465	117	R	12	ABCD9E
WV0H	666	32	18	R	2	ABD

Delta

N4OFA (+KB4NVD)	38,868	352	82	R	6	ABCDEF
W4VHF (+K4MQG)	34,884	271	114	R	6	ABD
KD4NOQ (+N4GLY)	7,515	129	45	R	5	ABCD

Great Lakes

K8WW	79,788	451	109	R	7	ABCD9E
AA4R	24,910	207	106	R	4	ABD
K8DOG (+KC8LZK)	7,749	107	63	R	6	ABD
NE8I	5,000	50	25	R	4	FGHIJK
KC2EBH	2,788	55	41	R	8	ABD

Hudson

WA2IID (+KB2SSS)	21,580	238	52	R	6	ABCDEFGHIJ

Midwest

N0YVY (+N0LNO)	28,220	250	83	R	12	ABCDE
N0DQS	17,528	228	56	R	14	BD
KB0YFN (+KB0WPY)	5,734	93	61	R	7	ABD

New England

N1MJD	168,338	748	146	R	14	ABCD9EF
N1QVE (+N1SFE)	21,708	210	67	R	4	ABCD9EI
KJ1K (+WB2VVQ)	12,328	154	46	R	5	ABCD9EFG
KE3HT	7,854	116	33	R	6	ABDEFGHIJ
K1SAV	5,880	98	28	R	6	ABD9EFGHIJ
K2LDT	1,680	43	24	R	4	ABD9EFH
W1AIM/R	1,323	55	21	R	4	ABD

Northwestern

WB7DHC	27,150	307	75	R	9	ABCDE
N7CFO	22,320	292	62	R	8	ABCDE
K7VK	9,768	132	74	R	6	A
W7DSA	3,910	85	46	R	2	AB
N7YAP	196	14	14	R	3	A

Pacific

KB6OLL	24,055	195	85	R	22	ABCD
KE6BZY	21,112	252	52	R	10	ABCDE
WA6OEM	10,192	154	43	R	6	ABCD
NI6G (+N1VM)	5,568	103	32	R	5	ABCD9F
KA6AMD	4,700	94	50	R	2	AB
KF6UEF	4,680	102	39	R	3	ABD

Roanoke

W3IY	19,764	162	61	R	4	ABCD9EFGHI
K9OYD	10,693	143	37	R	5	BCD9EFI
KS4S	8,496	144	59	R	4	AB
W4LLK	1,936	72	22	R	4	ABD
N4IWI	1,045	49	19	R	1	ABD

Rocky Mountain

AL1VE	103,136	507	176	R	11	ABCDE
KB0CY	9,144	104	72	R	13	ABD
K7VE	5,586	101	49	R	5	ABD

Southeastern

WB0QGH	1,740	49	30	R	4	ABCD

Southwestern

N6TEB (+WB6JDH)	143,956	602	146	R	12	ABCD9E
N6DN	86,884	507	107	R	11	ABCD9E
K6FZZ	51,595	401	85	R	10	ABCDE
KB6FYG (+AD6NH)	36,418	211	139	R	16	BCD
N6VHF	25,134	294	72	R	7	ABD
AD6AF	2,862	117	18	R	4	ABC
KE6LEA	625	19	25	R	7	ABCD

West Gulf

AB5SS (+W5DF)	217,729	518	239	R	15	ABCD9EFGHIJP
WB5VYE (+K5OT)	135,994	597	194	R	8	ABCD9EF

Canada

VE3NPB (+VE3OIL)	93,148	432	146	R	9	ABCD9EFGIJN
VE3OIK	31,410	220	90	R	5	ABCD9EFGIJ
VE4DS	696	29	24	R	6	A

Maritime Mobile

W1LP/MM	218,385	1048	207	R	6	ABD

Checklogs

NI6FW/R, N9TF, W1XX, KV8X, VE1SKY, W3RJW, K5DGU, VA3RU, KJ5CI, VE7AGG, KB0N, K5IX

By Lew Malchick, N2RQ

The 15th Annual School Club Roundup: 2001

The Council for the Advancement of Amateur Radio in the New York City Schools (CAAR/NYCS), the ARRL and its Hudson Division Education Task Force sponsor School Club Roundup (SCR). The purpose of the event is to foster contacts with and among school radio clubs.

The SCR is a great way to get young operators on the air. Very often, a new operator will be intimidated by the fear of not knowing what to say to the stranger on the other side of the radio. The simple SCR exchange helps to overcome this fear in a low-pressure contest format. Of course, operators are encouraged to take some time to chat beyond the contest exchange.

Award certificates will be issued for separate Elementary, Middle/Intermediate/Junior High School, High School and College/University levels for USA and DX entries.

SCR Rules

1. Object: All stations exchange QSO information as described below with as many other stations as possible, especially school clubs.

2. Contest Period: Monday through Friday in the second full week in February. **Start 1300 UTC on Monday, February 12 and end 0100 UTC on Saturday, February 17, 2001, (8 AM EST Monday through 8 PM EST Friday, February 12-16).** Operate no more than 24 of the possible 108 hours. Operate a maximum of 6 hours in any 24-hour period. Logs must clearly show on and off dates and times. Off periods must be at least 30 minutes.

3. Entry Classes, single transmitter only:

(I) Individual or Single Operator (nonclub)

(C) Club or multioperator group (nonschool)

(S) School club or group (grades K-12, colleges and universities). This category includes any station operated at a school for the contest period. This includes any group formed for the sole purpose of participating in the SCR.

4. Exchange: Your call sign, RS (T), entry class ("I," "C" or "S"), US State or DX entity. For example, W2CXN answers N2RQ's call by sending "N2RQ DE W2CXN 57(9) S NY." (Multioperator group stations must choose one and only one call sign to use for the whole contest.)

5. Scoring: Stations may be contacted once each on phone and CW (packet, RTTY and other data modes count as CW). No repeater contacts except satellite and "real time" packet. One point for each phone QSO. Two points for each CW QSO.

Multiplier: [Number States plus DXCC entities] plus 2× ["C" class QSOs] plus 5× ["S" class QSOs]. School stations receive a multiplier of 5, which should make them the most desirable stations to work. Contacts with Marty, KA2NRR, will also count as a 5× multiplier. (KA2NRR was the founding Chairman of the CAAR/NYCS and creator of the contest that became the SCR.)

Final Score: Multiply QSO points by multiplier. *Please use our summary form to avoid errors*, especially if this is your first time in the SCR. (See item 7 below.)

6. Suggested frequencies: All amateur bands except 30, 17 and 12 meters are permitted. On VHF and UHF, repeaters are not to be used. Only recognized simplex frequencies may be used, such as 144.90-145.00; 146.49, .55, .58; and 147.42, .45, .48, .51, .54 and .57 MHz. The national calling frequency, 146.52 MHz, may not be used (see Table 1).

The Carl Hayden Community High School Amateur Radio Club, KC7KFF, of Phoenix, Arizona.

Table 1

Frequencies (kHz)

CW	Technician CW
1800-1810	
3530-3580	3685-3705
7030-7080	7110-7130
14,030-14,060	
21,050-21,080	21,110-21,130
28,050-28,080	28,110-28,130
Phone	**Technician Phone**
1855-1865	
3850-3880	
7225-7255	
14,250-14,280	
21,300-21,330	
28,550-28,580	28,350-28,400

7. More info: Sample log and entry forms are available for a large, self-addressed stamped envelope (SASE) or a label and postage. The latest version of *SCR-LOG* written by AD8B is included with e-mail requests to: **caarnycs@aol.com** or **caarnycs@juno.com**. It is available for download from **www.egroups.com/community/SCR-L**. Also, check **www.arrl.org/contests**. Subscribe to SCR-L list by sending a message to **SCR-L-subscribe@egroups.com**.

8. Reporting: Logs must include exchange information, bands and signatures of all operators (and authorized club official or trustee). Indicate the number of hours and operators/loggers and type of school and entry class. Dupe check sheets are *required* for entries over 100 QSOs. (Computer entries on disk are appreciated. Use *SCR-LOG* or follow the ARRL Cabrillo format. Please include a printed summary sheet and instructions including file names and formats. If you are not sure if we can handle your files, call or write and ask us.) Entries should be mailed to School Club Roundup, c/o Lew Malchick, N2RQ, Brooklyn Technical HS, 29 Fort Greene Place, Brooklyn, NY 11217. Entries must be postmarked by March 20, 2001.

9. Awards: 8.5 × 11-inch certificates for the top three entries in each class. The school club class will be divided into elementary, middle, high school and college/university. DX will be listed separately at the end of US entries in each category. A certificate is issued for any station contacting ten or more school clubs. Send a large (9 × 12 inch) SASE or a mailing label and sufficient postage or IRCs for complete results. (Note: We have always sent a certificate for each entry. We will try to continue that practice, but because of increased participation and the associated workload, those who do not send appropriate postage or IRCs and an envelope or mailing label cannot be assured of getting a certificate.) QST

By Dan Henderson, N1ND
Contest Branch Manager

2000 ARRL August UHF Contest Results

Stacked Yagis on 15 meters fixed on Europe…a 160-meter Four Square…Beverages laid out to maximize the listening potential…a great network of radials laid out for the vertical… HF contesting has a lot of strategies and techniques that quickly allow one to separate the serious contester from the casual guy.

The same can be said about the UHF enthusiast. But instead of long runs of coax running to multiple towers with a trusty antenna switch box to swap between fixed beams and the low and high stacks, you will find the shortest possible runs of coax, dish antennas, transverters, Gunnplexers and about anything else imaginable. The ability to squeeze out a few additional tenths of a dB of signal often means the difference between a completed QSO and another futile effort to copy that extremely weak UHF signal that you know is out there.

Each year, during the first weekend in August, you find a couple of hundred UHF/microwave stalwarts venturing into this world of weak-signal strategy and engineering ingenuity. In the 2000 ARRL August UHF Contest, 170 participants tested their skills and strategy in what can best be described as one of the ARRL's most challenging contesting events. Unfortunately, this represents a substantial decrease in participation from 1999's record high number of participants, back to the trend of declining activity.

Following up on the 1999 call for "how do we make this a viable contest," two areas were addressed to aid the UHF contester. The Single Operator category was separated into High and Low power divisions. Also, a new technical on-line resource was added in 1999 to provide information and ideas for low-cost involvement in this area of the hobby. The ARRL Lab staff developed and has maintained an outstanding UHF/Microwave resource center on line at **www.arrl.org/tis/info/microwave.html**. Whether you are an old timer to the UHF/microwave spectrum, or are just developing an interest, this Web resource is certain to become a valuable asset as you explore this area of the hobby.

Don, W6GYD, is poised over the Santa Clara Valley section, as he worked his way to second place in the Pacific Division.

Top Five

Single Operator Low Power

W0UC	34,452
W6OAL	11,322
N8XA	10,575
W0ZQ	8,910
W6FM	8,772

Multioperator

W2SZ/1	723,828
NU7Z	41,382
WA3UGP	40,257
N2PA	39,114
N4OFA	21,855

Single Operator High Power

WW8M	190,017
K1TEO	93,192
WA2FGK (K2LNS,op)	83,970
W5LUA	72,468
K1RZ	62,196

Rover

N5QGH	237,072
W5ZN	113,004
WB5IGF	95,004
WB9SNR	34,404
KF9US	31,164

Maybe an ethanol-burning generator can be used to power N0QK's portable shack, being used in this contest by Matt, KF0F.

Seventy seven entries—45 % of all contest entries—were received in the Single Operator Low Power category. Each Division winner in the category sets the initial Division record for the category, as all old Single Operator Division records are transferred to the Single Operator High Power category. Setting the very first Single Operator Low Power overall record was Paul, W0UC, with a score of 34,452. Congratulations also go to W3KM, W0ZQ, KD4NOQ, N8XA, N2GKM, W1PM, N7MWV, W6FM, K8DXN, W6OAL, W4EUH, KE6GFF, WA5VKS and VE3OIL who now hold their Divisions' records for the category.

Don, WW8M, turned in the highest score from the 52 Single Operator High Power entries received. Don's score of 190,017 easily surpassed runner-up Jeff, K1TEO. Congratulations also to KE7SW (Northwestern) and WB6NTL (Pacific) who also set new Single Operator High Power Division records.

The W2SZ/1 Mt. Greylock team from the RPI Radio Club again took top honors in the Multioperator category. Though falling short of the category record, they again showed what organization and teamwork does in a contest. NU7Z (operating with KD7TS) also set a new record in the Northwestern Division.

Rovers accounted for a 16% of the total entries received in the contest. Leading the way in the Rover category was a record-setting performance by N5QGH. His 237,072 points eclipsed the old mark by over 83,000. The West Gulf Division was also a hotbed for roving in this contest, as the second and third place finishers—W5ZN and WB5IGF—also hail from the division. NE8I (Great Lakes), AA7VT (Northwestern), K9OYD (Roanoke), KB0G (Rocky Mountain) and K4SZ (Southeastern), all deserve congratulations for setting new Division Rover records.

The 2001 ARRL Contest Calendar shows the ARRL August UHF Contest scheduled for August 4-5.

Scores

Each line score lists call sign, score, stations worked, multipliers, entry category (A = Single Operator Low Power, B = Single Operator High Power, M = Multioperator, R = Rover), ARRL/RAC section, and bands (C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, G = 3456 MHz, H = 5760 MHz, I = 10 GHz. J = 24 GHz, K = 47 GHz, L = 75 GHz, M = 119 GHz, N = 142 GHz, O = 241 GHz, P = 300+ GHz). Band win indicators are listed in boldface type.

Atlantic

W3KM	2,850	30	19	A	EPA	**CD9EF**
WA2AEY	936	26	12	A	NNY	**D**
W8IJ	3	1	1	A	MDC	D
WA2FGK (K2LNS,op)						
	83,970	202	90	B	EPA	**CD9**EFG
K1RZ	62,196	179	73	B	MDC	CD9**EFI**
N3NGE	37,584	129	54	B	EPA	CD9EF**GH**
NQ2O	31,104	108	64	B	WNY	CD9EFG
W2SJ	14,580	70	36	B	SNJ	CD9EFG
NS9E	10,530	55	39	B	WNY	CD9EFG
WA2ONK	9,827	76	31	B	SNJ	CD9E
WA4GPM	7,326	59	33	B	EPA	CDE
N3RN	6,300	53	30	B	EPA	CD9EF
N3FA	5,115	69	33	B	EPA	CD9EF
K3MD	624	13	13	B	EPA	CDE
WB2WPM	63	7	3	B	WNY	D
WA3UGP (+K3YWY)						
	40,257	128	63	M	EPA	CD9EFGHIJ
N2PA (N2KG,N2YB,ops)						
	39,114	122	82	M	WNY	CD9EF
K2IWR (K2AMB,KB2FAF,KB2LUV,N2MRE,ops)						
	528	13	11	M	WNY	CDE
N2JMH (+N2WVK)						
	24,723	144	41	R	WNY	CD9EF
K1DS	16,614	120	39	R	EPA	CD9EFGIP

Central

W0UC	34,452	124	66	A	WI	**CD9EFGHI**
K9YR	6,603	71	31	A	IL	CD
N9TF	3,975	53	25	A	IL	CD
N9LAG	288	16	6	A	IL	CD
KA4CHT	96	6	4	A	IN	DE
KG9PQ	30	5	2	A	IL	D
KB9WSN	12	2	2	A	WI	D
N2BJ	27,492	121	58	B	IL	**CD9E**
KA9QFL	18,550	81	53	B	IN	**CDE**
WB9SNR	34,404	126	61	R	IL	CD9EFGHI
KF9US	31,164	141	53	R	IL	CD9EF

Dakota

W0ZQ	8,910	74	30	A	MN	**CD9E**
WB0LJC	4,131	55	17	A	MN	CD9**EFI**
KB0OBT	432	17	8	A	MN	D9
KC0AKU	231	11	7	A	MN	D
KF0GX	126	14	3	A	MN	D
KC0HEW	72	8	3	A	MN	D
WA0BWE	20,880	111	40	B	MN	CD9**EFGHI**
KF0Q	14,310	82	45	B	MN	**CD9E**
WB0GGM	5,796	51	28	B	MN	CDEF
WA2VOI	4,788	52	19	R	MN	CD9EFI
KB0N	2,340	34	10	R	MN	CDE
KB0ZEV	1,209	25	13	R	MN	CDE
N0USE	12	2	2	R	MN	D

Delta

KD4NOQ	165	11	5	A	TN	**CD**
KD4HIK	120	8	5	A	TN	**CD**
AD4F	75	5	5	A	TN	D
W4ZUG	30	5	2	A	TN	D
AA4H	2,052	32	18	B	TN	**CD9E**
N4OFA (+W4KXY,AF4HX,KE4WFT)						
	21,855	136	47	M	TN	CDEF

Great Lakes

N8XA	10,575	55	47	A	OH	CD**9I**
KB8U	7,020	60	39	A	MI	**CD**
WB8AUK	2,400	32	25	A	OH	CD
W4FVQ	864	19	12	A	KY	CD9E
N8AIA	663	17	13	A	MI	C
K8NFT	72	6	4	A	MI	D
WW8M	190,017	259	129	B	MI	**CD9EFGHIJK**
K2YAZ	45,816	110	83	B	MI	CD9EFGHI
K8EB	22,878	97	62	B	MI	CD9E
K8TQK	17,160	79	52	B	OH	CD9EF
WA8RJF	6,765	43	41	B	OH	CD9EF
N8GHZ	180	10	6	B	OH	CD
N8PVT (+KC8ALA)						
	510	17	10	M	MI	D
NE8I	19,071	87	39	R	MI	CD9EFGHIJK
KG4ITT	1,584	23	12	R	KY	CDEIJ
AB4CR	1,296	17	10	R	KY	CDEIJ
KF8QL	900	18	15	R	MI	CD9E

Hudson

N2GKM	780	26	10	A	ENY	CD
K2AMI	726	22	11	A	NNJ	**CD**
K2OVS	336	14	8	A	NLI	**D**
K2RI	252	14	6	A	ENY	CD
N2MSS	231	11	7	A	ENY	CD
WB2AMU	96	8	4	A	NLI	D
N2UZQ	54	6	3	A	ENY	D
N1HL	45	5	3	A	ENY	CD
WB2IDV	42	7	2	A	NNJ	D
N3EMF	4,425	43	25	B	ENY	**CD9EFG**
K2ZZ	120	8	5	B	ENY	D
N2MH	4,374	54	27	R	NNJ	CD
W2BEJ	120	6	5	R	ENY	CDE

Midwest

N0KQY	924	18	14	B	KS	**CD**E
KA0MR	602	19	14	B	KS	**CD**E

New England

W1PM	6,045	52	31	A	EMA	**CD9E**
AF1T	4,950	37	22	A	NH	CD9EHI
W1AIM	3,072	28	16	A	NH	**D**FHI
W1GHZ	2,184	20	13	A	NH	**D**HI
W1VT	600	10	5	A	WMA	**I**
AC1J	510	17	10	A	NH	CD
N7IAL	432	9	4	A	WMA	I
K1TEO	93,192	238	88	B	CT	**CD9EFGI**
W1ZC	1,260	35	12	B	NH	D
K1LPS	195	7	5	B	VT	DI
W2SZ/1 (K2JJB,KE3HT,N2SZ,WA1ZMS,K2LDT, N1SAV,N2XRE,WA2AAU,KB0JWO,N1XSY, N2YCA,WA8USA,KB2YQE,N2LBT,N2YZO, WS2B,ops)						
	723,828	554	196	M	WMA	CD9EFGHIJ
N1DGF (+N1KAT)						
	1,150	30	19	M	ME	CD
KJ1K (+WB2VVQ)						
	7,644	42	26	R	WMA	CD9EFGH
K1DY	3,726	43	23	R	ME	CD9EF
WA2IID (+KB2SSS)						
	2,730	30	14	R	VT	CD9EFGHIJ

Northwestern

N7MWV	1,935	25	15	A	WWA	**D9FG**
N7DB	72	6	4	A	OR	**CD**
KK7AT	21	7	1	A	ID	D
KE7SW	19,782	94	42	B	WWA	**CD9EFGH**
K7ND	10,788	76	31	B	WWA	**CD**9EF
N7EPD	9,888	78	32	B	WWA	CD**9I**
K7HSJ	3	1	1	B	WWA	C
NU7Z (+KD7TS)						
	41,382	122	57	M	WWA	CD9EFGHI
AA7VT	22,104	159	24	R	WWA	CD9EFGI

Pacific

W6FM	8,772	71	34	A	SCV	**CDE**
W6GYD	3,510	50	18	A	SCV	CDE
KC6ZWT	2,268	54	14	A	SV	CD
KF6GYM	1,728	28	16	A	EB	CDE
KQ6DI	357	17	7	A	EB	CD
W6ABW	108	12	3	A	NV	CD
WB6NTL	11,448	85	36	B	SV	**CDE**
W6OMF	5,184	51	27	B	EB	CDE
N6JET	1,938	28	17	B	SCV	CDE
KD6RB	108	9	4	B	SCV	D
W6SFH (+WA6KOD)						
	858	15	13	M	SF	CDE

Roanoke

K8DXN	4,284	44	28	A	WV	**CDE**
W4NUS	864	19	12	A	NC	DE
AD4DG	312	11	8	A	VA	CD**9**
W4FAL	240	16	5	A	NC	D
K4QI	23,232	104	64	B	NC	**CDE**
W4RX	16,236	83	44	B	VA	CD**9EF**
W4VHH	2,706	28	22	B	NC	DEF
N4AJF	30	5	2	B	NC	D
K9OYD	5,082	49	22	R	VA	CD9EFI

Rocky Mountain

W6OAL	11,322	62	34	A	CO	C**D9EFGHI**
K5RHR	840	20	14	A	NM	**CD**
K0RZ	9,600	56	32	B	CO	**CD9EI**
WA7KYM	2,700	39	18	B	WY	CDE
KB5ZSK	108	7	4	B	NM	CDE
KB0G (+KC0FTQ)						
	7,458	76	22	R	CO	CD9EF

Southeastern

W4EUH	1,785	35	17	A	GA	**CD**
K0VXM	1,044	17	12	A	SFL	CD**9EF**
K4KAZ	630	19	10	A	GA	CDE
NY4F	135	9	5	A	GA	D
KU4WW	54	6	3	A	AL	CD
K4RF	6,975	48	31	B	GA	**CD9EFHI**
K4SZ	3,060	39	20	R	GA	CD9EF

Southwestern

KE6GFF	3,000	100	10	A	LAX	**D**
W9EC	252	11	6	A	SB	CD**E**
KF6ISR	231	11	7	A	ORG	CD
KE6GFI	204	17	4	A	LAX	D
W6IST	180	10	6	A	LAX	CD
KE6RCI	132	11	4	A	SB	D
KA6TTV	45	5	3	A	LAX	**C**
K6TSK	5,040	61	24	B	ORG	**CDE**
W6TOI (KE6HPZ,WB6JDH,ops)						
	11,970	93	35	M	SB	CD9E
K6OUE (+KF6YYV)						
	3,066	65	14	M	LAX	CDE
N6DN	4,422	56	22	R	ORG	CD9E
KQ6EE	780	24	10	R	LAX	CDE
AD6AF	696	29	8	R	LAX	D

West Gulf

WA5VKS	2,250	47	15	A	NTX	**CDE**
KM5OL	306	17	6	A	NTX	CD
KC5ZZL	165	11	5	A	NTX	CD
N0XLR	42	7	2	A	NTX	D
W5LUA	72,468	147	66	B	NTX	**CD9EFGHIJ**
WA5TKU	10,200	63	34	B	NTX	CDEFGHI
KK5IH (+KK5KK)						
	720	15	15	M	WTX	CDE
N5QGH	237,072	349	88	R	NTX	CD9EFGHIJKP
W5ZN	113,004	178	86	R	NTX	CD9EFGHIJP
WB5IGF	95,004	142	84	R	NTX	CD9EFGHIJP

Canada

VE3OIL	1,428	25	17	A	ON	**CDE**
VE2/N1EKV	216	6	3	A	QC	I
VE9AA	72	6	4	A	NB	D
VE9AAA	18	3	2	A	NB	D
VA3ST	8,712	66	44	B	ON	**CD**
VE3BFM	2,553	31	23	B	ON	CD**9**
VE2/K1NKR (+K1PTF)						
	147	7	7	M	QC	CD
VE7DXG	3,456	64	18	R	BC	CD

NEW PRODUCTS

FAQ ON ANTENNA TOPICS FROM W4THU

◊ Jim Thompson, W4THU, owner of the antenna manufacturer The Radio Works, has recently released a 120-page soft cover publication titled *Frequently Asked Questions About Antenna Systems and Baluns Plus Exploring Popular Antenna Myths*.

A wide range of topics is covered. These include Jim's personal antenna philosophy, a glossary of antenna-related terms, an explanation of the decibel, tips on interpreting computer-generated radiation patterns, popular antenna myths, wire antenna types, wire antenna performance characteristics and baluns. Extensive performance data and comparisons between several types of common wire antennas and The Radio Works' own Carolina Windom and Superloop is provided.

A large portion of the material is presented in a Q & A format. The questions were culled directly from e-mail, mail and telephone communications between Jim and customers—and prospective customers—of The Radio Works' products.

Charts, illustrations and tables are used throughout, and the level of technical complexity is intentionally kept to a minimum.

Price, $12.95. For additional information contact The Radio Works, PO Box 6159, Portsmouth, VA 23703; tel 757-484-0140; fax 757-483-1873; **jim@radioworks.com**; **www.radioworks.com**.

Previous New Products

NEW BOOKS

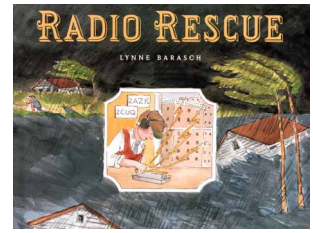
RADIO RESCUE

By Lynne Barasch

Published by Farrar, Straus & Giroux, 19 Union Square West, New York, NY 10003; tel 888-330-8477. ISBN: 0-374-36166-5. First edition, 10½ × 9½ inches, 40 pages, color illustrations. $16.

Reviewed by Margie Bourgoin, KB1DCO ARRL Educational Correspondent

One way to ensure the future of Amateur Radio is to inspire interest in youngsters. *Radio Rescue* is a wonderful tool for this purpose! The author, Lynne Barasch, begins with an introduction to the year: "In 1923, the clothes we wore were proper. The cars we drove looked like boxes on wheels. Telephones had no number buttons to press. You told the operator whom you wanted to call." Barasch introduces the concept of Amateur Radio, then tells the true story of her father becoming a licensed radio operator in 1923 at the age of 11, the youngest licensed Amateur Radio operator at the time. Her father was elmered by his 17-year old neighbor.



Even very young readers will be enthralled by her father's story as he talks about his first radio contacts and aiding in the rescue of a family stranded in the floodwaters of Florida. All sides of Amateur Radio are shown—both as a hobby and as an invaluable form of emergency communication. This book will capture the attentions of young readers, and will have a strong appeal to adults, too, as they read *Radio Rescue* to their children. The story is compelling and the watercolor artwork adds a special charm. (However, the content may be too advanced for some 5 or 6 year olds.) I highly recommend this book as an addition to any school or local library.

Previous New Books

SECTION NEWS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Be sure to mark your calendars for the first full weekend in Feb. (Feb 3 and 4, 2001) This is the date for annual Delaware QSO Party, sponsored by the FSARC. For rules see their Web site at WWW.FSARC.ORG or drop me an e-mail, and I will forward you a copy. The 2001 QSO party will be the 5th since it was re-instituted in 1997 after a long absence. It has a small but growing number of participants. It would be nice to have a really good showing of Delaware Hams on the bands that weekend. If you do work the event, even if only for a couple of contacts, please send in your logs. It's important to show that Delaware hams do participate, and this will help the event grow. Traffic (Oct) DTN: QNI 177 QTC 17 in 22 sess. DEPN: QNI 27 QTC 1 in 4 sess. K3JL 36.

EASTERN PENNSYLVANIA: SM, Eric D. Olena, WB3FPL – SEC: Michael O. Miguelez, N3IRN. ACC: Steve Maslin, N3ORH. OOC Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Robert Josuweit, WA3PZO, Dave Heller, K3TX, George Law, N3KYZ, James E. Bear, WB3FQY, Harry Thomas, W3KOD. What do you say to someone who steps down after many years of service? This is the situate-on in which I find myself when I agreed to fill the remaining year W3TI's Section Manger's term. Having served as EC, DEC and SEC under another SM I must that I was a bit apprehensive about the up coming years. As we progressed through the three years of Al's two terms I came to realize that Al had an enormous amount of knowledge and experience that was beneficial to the Eastern Pa. Section. On behalf of the Eastern Pa. Section amateur community I would like to thank W3TI for all of the hard work and heart felt dedication that he gave to the section. The new Section Emergency Coordinator will be Michael Miguelez, N3IRN. Mike has been EC for Montour County for the past few years. Mike is also active in quite a few RACES nets as well as the traffic nets. EC & DEC reports can be e-mailed to Mike at, n3irn@mail.ptdprolog.net. Recently NM3S became EC in Delaware County and W3MJP became EC in Bucks County. My congratulations to both of these fellows who are building good organizations in two heavily populated counties that had little or no ARES programs in place. West Bradford Fire Company Chester County ARES RACES (CCAR) members KC3XL, KD3OK, N3NQX, N3HLJ, WB3ITC, W3MYP, W3STA, WA3MME, KB3EYQ, K3JV, K3YK, N3VZG, and N3MEL provided excellent communications for the annual Marshalton Triathlon. According to EC KC3XL the bicycle mobile units worked well. Rumor says that hot air balloons are being considered for next year. In the coming year I hope to have two E.Pa. Staff meetings. It is my hope to be able to have these meetings in different parts of the Section. By doing this I hope to encourage additional staff members and other interested amateurs to attend a meeting that is within reasonable distance of their homes. If there are any staff members who are interested in hosting a meeting please advise me as soon as possible. Congratulations to John Winter who has been appointed OES in Lancaster County. Tfc: N3YSI 241, W3IPX 213, N3EFW 179, W3IVS 80, W3UAQ 65, W3JKX 60, W3HK 59, N3SW 55, W3TWV 34, W3NNL 34, KB3CEZ 28, KB3BBR 12, KA3LVP 11, W3TI 9, N3IRN 6, KB3CVO 6, K3ARR 6, KB3DCT 5, KB3CKD 5, N3AT 4, W3ZQN 4, AD3X 4, N3KYZ 4, N3AS 3, N3HR, 2, N3ZXE 1, W3DAB 1, W3BNR 1. Net Reports: EPA 59, PTTN 31, EPAEPTN 31, PFN 31, MARCTN 13, D3ARES 9, SEPPTN 9, LCARES 5, MCOES 5, and D4ARES 5.

MARYLAND/DC: SM: Bill Howard WB3V (410) 551-6775 wb3v@arrl.org. SEC: Mike Carr WA3QAA. MDC Section Web homepage http://users.erols.com/wb3v/mdc. **MC** EC W3CQH reports 89 members, 4 sessions of the Emergency and Public Service Net which meets on 146.955 every Tuesday at 2000 hours local time. MDD NM WJ3K says the SET has shown that daylight 80m ops are difficult. A 40m alternate is in the works. **WA** EC KD3JK reports 38 members, nine sessions of the ARES/RACES Net and Four States Net which maintain liaison with MEPN. **WA** ARES provided communications for the Smithsburg Area Crop Walk. Operating during the event were: KB3AOO N3MVR N3TDN W3YGC N1FBI WA3PTV KB3COE KD3JK K3ABH N3MZB WA3EOP N3ZHI and from FL. KG4AES. Thanks go to KB3AOO, who recruited the net members and did an excellent job as NCS. **HC** RO WA1QAA reports HC RACES members K3BO and WA1QAA participated in the annual HOWA Fire and Rescue Services Exposition. W3WCQ provided a mini xmitter and antenna; W3WVV provided a battery-operated camera. W3BAB provided the TV set and VCR for and KA3UQQ provided pictures from the camera atop the tower at his home QTH. Sincere thanks for providing an excellent demo of ATV for the public and **HC** Office of Emerg Mgt. **PG** EC WI3N sadly reports a decrease of two in membership. During SET, net control was N3IOU N3HJA and KB3FFU. KB3DVC was able to contact KB3DVC on the Kent Island repeater. KA3ITS checked in and Doctor's Hospital was manned by KB3EDH and KB3EBN. KD3JA provided an ICOM-706, Jpole, and marine battery. KB3EBN was also the PG Fire Dept liaison and the CAP liaison. PG Hospital was covered by K3HDM. The Laurel Hospital was staffed by N3TZA and KB3BWR. N3JMK and W3YD provided a message handling discussion. WI3N operated fixed from Landover Hills. Thanks to all who participated in this training exercise. Many MDC clubs have announced new elected officials and congratulations to all! To all, have a safe and happy new year. 73 from Bill Howard, WB3V. Tfc: KK3F 2049, KJ3E 503, N3QA 450, AA3SB 179, KB3AMO 147, AA3GV 109, W3YVQ 104, W3CB 103, N3WKE 76, N3WK 68, KC3Y 48, WA1QAA 39, N3KGM 30, N3ZKP 18, K3CSX 17, N3EGF 15, W3VK 12, KO4A 6.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC, http://www.northnet.org/nnyham. e-mail: kf2gc@arrl.org—NNY-Section met in Norwood, NY on Oct 7, 2000, and it was decided that the NNYARA would pursue having a NNY Hamfest in Lake Placid, NY we decided on the Oct 13, 2001, as the date since there were too many conflicts otherwise. Moreover regular mailings will be done to keep our section informed on the latest news and progress. Many clubs were involved with JOTA this year. Thanks go to the CVARC, MVARC, SCRC and TLARC for continuing to involve youth in Amateur Radio. SKYWARN continues to make meaningful contributions to Emergency Readiness and the NWS. N1OLC – Steve Hogan has contributed to that success here in the NNY- Section by giving presentations in our counties. Recently, Steve spoke to Amateurs of NNY at the EOC in Essex Co. We all appreciate his role in SKYWARN here. WA2NAN. Kerry had 51 out of 55 ARES members participate in the Oct SET in St. Lawrence Co. Way to go guys. Remember MVARC / NNY check ins 9:00 AM Saturday's.

SOUTHERN NEW JERSEY: SM, Jean Priestley, KA2YKN (@K2AA)e-mail ka2ykn@voicenet.com. ASM: W2BE K2WB W2OB N2OO N2YAJ. SEC: KC2GID. STM: K2UL. ACC: KB2ADL. SGL: W2CAM. OOC: K2PSC. TC: W2EKB. TS: W2PAU. WB2MNF AA2BN KD4HZW WB3IJB WA2NBL N2QNX N2XFM. Welcome to 2001! I'm pleased to announce a new traffic net in South Jersey. It's an early net at 8 PM on Mon, Wed and Fridays on Burlington County's repeaters 147.150, 145.47 and 448.325 with a pl of 127.3 for all 3. Net manager, Steve, KB2RTZ is also assistant to Dan, K2UL, STM. This net is open to all regardless of level of experience or no experience in traffic nets. It is a training net. Rpt for October: Net QNI Report; W2CC NJPN 176;K2PB NJSN 180; WA2OPY NJM 142; AG2R NJN/E 233; AG2R NJN/L 197; KC2ATQ JSARS 385; WB2UVB SJVN 257; KB2RTZ SJTN 49. K2BR 105,WA2CUW 98, KJ4N/2 89, K2UL 80, KB2RTZ 72, AA2SV 56, K2UL-4 56, WB2UVB 35, N2VQA 13, KB2VYZ 12, KA2CQX 11, W2AZ 10, KB2YBM KC2ETU KB2VSR 1. PSHR: KB2RTZ 182, K2UL 175, WB2UVB 140, AA2SV 120, KA2CQX 108, WA2CUW 101, N2VQA 48 Over 300 boy scouts and cubs joined the JOTA experience in Burlington and Camden Counties. More on JOTA in our Feb issue Congrats to the K2BR crew for the great job at the Miss America pageant. Report "your" activities.

WESTERN NEW YORK: SM, Scott Bauer, W2LC— Please welcome our new EC for Madison and Oneida counties, Bill KG2DI. Also, congratulations to new Official Observer Al, N2CCN. New South Towns ARS officers; Pres Gary KB2YJ, VP Rick KD2QV, Sect. Keith KC2DGC, Treas. John KB2ESM, Financial Sect. Judy N2TEZ, Dir's Terri KB2TRS and John KB2VWC. Sad to report passing of Aurora NY's and Auburn ARA's Betty, KB2APM. The Rochester VHF Group is running a VHF Academy, to train and attract new operators. Sounds like a great idea. I hope everyone has a nice Christmas and a Happy New Year. Thank you to everyone for all of your volunteer work over the past year. You are appreciated very much. Keep up the good work. Keep warm and see you in the new year!

Net	*NM*	*Sess*	*QNI*	*QSP*	*Net*	*NM*	*Sess*	*QNI*	*QSP*
BRVSN	WB2OFU	31	108	0	CHN	W2EAG	31	14	225
CNYTN	WA2PUU	31	354	84	EBN	WB2IJZ	22	381	0
ESS	W2WSS	31	348	76	NYPHONE	N2LTC	31	220	285
NYPON	N2YJZ	31	354	189	NYS/E	WB2QIX	31	321	172
NYS/L	W2YGW	31	245	246	NYS/M	KA2GJV	31	153	54
NYSCN	W2MTA	5	15	5	NYSPTEN	WB3CUF	31	359	49
OARCN	N2KPR	4	40	5	OCTEN/E	KA2ZNZ	31	1617	256
OCTEN/L	KA2ZNZ	31	648	235	OMEN	K2DYB	2	15	0
STAR	N2NCB	31	265	11	TIGARDS	W2MTA	5	23	1
WDN/E	N2JRS	31	541	112	WDN/L	W2GUT	31	490	64
WDN/M	KB2VVD	31	533	84					

Tfc (Oct): * indicates PSHR, for BPL: N2LTC* 1100, KA2ZNZ* 632, KA2GJV* 341, W2MTA* 257, W2FR* 184, NN2H* 181, N2KPR* 154, KB2VVD* 132, WB2QIX* 116, WI2G* 115, KC2EOT* 92, KG2D* 92, KA2DBD* 89, N2JRS* 76, W2LC* 73, KC2CWN 62, N2CCN* 59, W2PII* 57, W2GUT* 52, NY2V* 51, WA2UKX* 32, K2GTS 31, KB2ETO* 30, KA2TSC 26, AF2K* 25, N2WDS* 22, K2DN* 19, KA2BCE* 17, KB2WII* 17, AA2ED 10, N2JRS* 10, W2RH 9. Digital; Stn Rx/Tx: N2LTC 273/219, KA2GJV 35/13, NY2V 0/8.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE—SEC: N3SRJ. ASM-ARES: WB3KGT. ASM-Packet: KE3ED. OOC: W3ZPI. PIC: W3CG. STM: N3WAV. TC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. DEC-OES: K3TB. The Simulated Emergency Test was conducted on Saturday October 28. I wish to thank everyone that participated in this year's event. A special thank you to everyone that worked with the scouting JOTA program in October and hope that you will contact schools in your area for the upcoming "School Club Round Up", which will take place February 12-16, 2001. Last year the North Clarion School Amateur Radio Club, W3NCS, won the contest in the elementary school division. Congratulations and good luck this year. This is a wonderful opportunity to introduce many new people to this fine service and help to build the future. Please take part in this event. Thanks to all the volunteers that have helped in various aspects throughout the past year. I look forward to working with you and seeing you at the many upcoming events. I am working on my travel and speaking schedules for this year and still have some openings. If you would like to have myself or other members of the section staff to speak at your club event, please get in touch with me and we can work out a date to attend. Each month I receive newsletters from the various clubs in the section. I would like to share some of these with you in the months coming up. The first belongs to the Wireless Association of South Hills. The URL for this site is http://www.washarc.org/. Be sure to check their excellent newsletter also. 73 John Rodgers, N3MSE, WPA-SM n3mse@arrl.org.

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—Morgan Co EC W9OES reports nine operators provided communications for the Illinois Valley Relay on Oct 14. The 63 mile course took participants through Scott and Greene counties. 14. Members of the Rockford ARA traveled to Milwaukee to see the AREC communications van that was featured in the 9/2000 issue of QST. RARA was offered a delivery truck and is now working on their own communications van. Members of the Fox River Radio League were treated to a program on early telegraph apparatus by K9EUI who has taken up the hobby of restoring and studying the vintage communications equipment. The FRRL also held an auction to dispose of surplus club equipment. The event was well received and may become a new tradition. Get well wishes go out to S/W DEC KB9AIL. We hope the recovery goes well and you can resume your DEC duties soon. The Regional Civic Memorial Airport at Bethalto was the focal point of a large-scale disaster drill Oct. 25. The situation involved an in-bound business jet with 30 passengers and crew. Emergency services throughout Madison County, including ARES participated. The drill allowed the ARES team to practice their staffing procedures and shift transitions. At the September meeting of the Schaumburg ARC members learned about the popular PSK31 digital mode. Some SARC members are looking at the idea of building a 20-meter QRP rig designed for that mode. Egyptian RC member KB9SDX received a $1,000 scholarship from the Quarter Century Wireless Assn. The recipient is studying wireless communications at Rankin Technical College in St. Louis, MO. The Metro AC reports they are teaching ham classes for the first time in many years, started a slow speed code net that runs three times a month, recently updated their club logo, and operated JOTA station W9BSA in Woodstock which exposed ham radio to 500+ scouts and adults. An article on kids and ham radio by MAC member N9BOR was featured on the ARRL Web site. The Six Meter Club of Chicago participated in a special event during September to remember historic Route 66. The SMCC operated under the call sign K6A along with clubs in eleven other cities. The Northern Arizona DX Assn coordinated the special event. October traffic: K9CNP 95, W9HLX-64, WB9TVD-30, N9DT-30, NN9M 29, NC9T-18, W9FIF-10, WA9RUM 8, W9OES 1. ISN report de WB9TVD QNI-213, QTC-89, Sessions-31. 9RN report de KF4UB Sessions held 62, traffic handled 165, average per session 2.66, rate of traffic 4.20, percentage of representation 85%, check-ins W9HLX, NN9M, N9PLM, W9GMO, NS9F. W9VEY Memorial Net report de K9AXS 8 with 225 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—Sympathy extended to the families and friends of Silent Keys: 8/31, Samuel D. Richards, N9BVI, Mishawaka; 9/13, James R. Weldon, N9MFO, Churubusco; 10/17, Garland E. Wadsworth, WA9VAF, Terre Haute; 10/31, Carl W. Vinyard, KB9DV, Fort Wayne. They will be missed. In Legislative matters: K9KXQ of Hobart is working with the IN Legislative Services Agency and IN State Senator Rose Ann Antich, to get a bill passed in the 2001 General Assembly to protect Amateur Radio Operators from restrictive municipal ordinances that prohibit or unnecessarily restrict amateur radio antennas. A copy of the proposed bill is on the IN Website. Congratulations to Natalie Andrews, K9CAT of Terre Haute, who was honored as a 1 Volunteer in the Wabash Valley, for community service as a storm spotter during SKYWARN nets and other emergency communications. The WVARA participated in the second annual Deuces Wild Duathlon. Heading this project was N9YRX and K9DUR assisting were K9CAT, W9EEU, K9ERE, K9HH S, KB9HYH, K9HX, KG9GS, KB9RUP, W9QFE, AA9SP and WB9WVG. Hope everyone had a nice Thanksgiving and a Wonderful Christmas. Time goes too fast. Congrats to the Wabash Valley ARA, Inc officially designated a SSC. The Indianapolis NWS office held its first Spotter Appreciation Day. Marion and Rush Counties were presented awards based on monthly SKYWARN reports. The Indpls SKYWARN Asso also received an award for assistance to the Indpls NWS. Decatur Co. ARA conducted a Boy Scout merit badge program for 13 boy scouts in 2 troops. In Tippecanoe Co 4 hams set up a HF station and 2 hams from Howard Co gave a satellite demonstration for the local Webelos Merit Badge Midway Camp. About 70 scouts visited the set up and 15 boys made contacts with other groups via radio. I wish everyone a Wonderful New Year with lots of wealth, lots of good health and plenty of wonderful radio operating. NM'sITN/W9ZY, QIN/K9PUI/KJ9J, ICN/K8LEN, WN/AB9AA, VHF/N9ZZD.

Continued on page 120.

Steve Ewald, WV1X ♦ Public Service Specialist

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, NF7D, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

Special HRO Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

KANTRONICS

KAM '98

- Single port VHF or HF
- RTTY, CW, Packet, GTOR, AMTOR, WEFAX
- GPS, NMEA-0183 compatible
- 6-16 VDC, DB-9 connector port

Call Now For Your Low Price!

GPS Tracker

- GARMIN X12 GPS Built in, Active GPS antenna, KPC-3 Plus ALL in Single package!

Call Now For Special Pricing! NEW!

KPC-3 Plus/KPC-9612 Plus

High-performance, low power TNC.
Great for packet, and APRS compatible.

Call For Special Low Price!

Detailed illuminated map shows time, time zone, sun position and day of the week at a glance for any place in the world.Continuously moving - areas of day and night change as you watch.• Mounts easily on wall. Size: 34 1/2" x 22 1/2".

Reg $1295. SALE $999.95

CSS

Host mode control program for Kantronics TNCs. Pacterm '98 supports multiple windows for each Packet and HF mode, plus synchronizing with Log Windows. Super support from CSS.

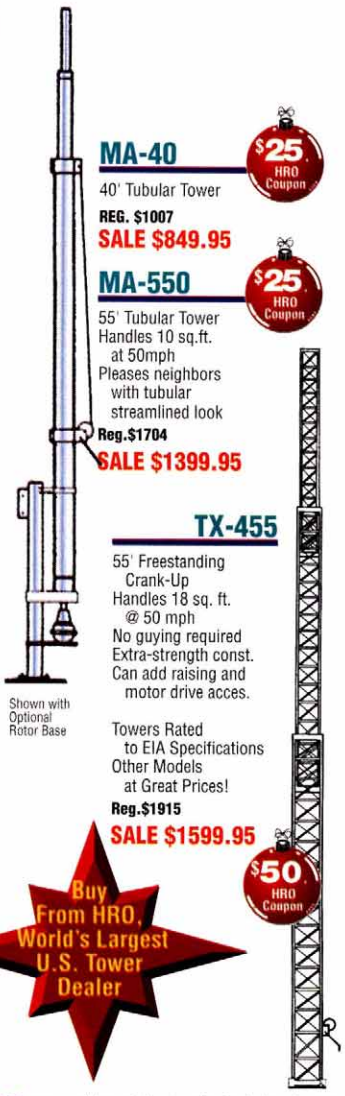
Logwindows The first and best logging program for Windows, Log Windows has been a favorite for nearly a decade. It will be the last logging software you'll ever need. Supports remote antenna switching with TopTen band decoder, TNC control, rotor control, DXCC 2000, DXCC, WPX, WAC, WAS, VUCC, WAS, IOTA Grayline display, Telnet Cluster and more.

Wefax '99 Wefax for your Kantronics KPC or KAM TNCs. Receive real time HF Weatherfax images to keep track of hurricanes, typhoons and other weather events worldwide.

If you're a weather fan, you'll enjoy taking advantage of this on option on your Kantronics TNC. Plus, being able to save the images to Windows bitmap files, do automatic scheduling and more.

Digital Trio Get Pacterm '98, Log Windows and Wefax '99 all in one package for a special price. Great for the ham that requires the best. The Digital Trio lets you do all the popular HF modes, and logs your contacts at the same time.

US TOWER



MA-40

$25 HRO Coupon

40' Tubular Tower

REG. $1007

SALE $849.95

MA-550

$25 HRO Coupon

55' Tubular Tower
Handles 10 sq.ft. at 50mph
Pleases neighbors with tubular streamlined look

Reg.$1704

SALE $1399.95

TX-455

55' Freestanding Crank-Up
Handles 18 sq. ft. @ 50 mph
No guying required
Extra-strength const.
Can add raising and motor drive acces.

Towers Rated to EIA Specifications
Other Models at Great Prices!

Reg.$1915

SALE $1599.95

$50 HRO Coupon

Buy From HRO, World's Largest U.S. Tower Dealer

All US Towers shipped by truck; freight charges add

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!

Special HRO Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

WORK THE "DX" MAGIC WITH ICOM HF

$75 COUPON with purchase of IC-706MKIIG*

$105 COUPON with purchase of AH4 and IC-706MKIIG*

$125 COUPON with purchase of AT180 and IC-706MKIIG*

IC-706MKIIG

Proven Performance

- All mode HF/6M/2M/70CM
- 100W HF/6M, 50W/2M, 20W/440 MHz

• Heil Headset Offer is an Icom mail in offer. Allow 6-8 weeks for delivery. Offer expires 12/31/00.

$10 HRO Coupon

IC-756PRO All Mode Transceiver

- 100W HF/6M
- Newly designed 32 bit DSP
- 5 inch TFT color LCD
- Digital IF filter with 41 passband widths
- 121 microphone equalized audio settings
- Multiple DSP controlled AGC loops
- Advanced CW functions
- Real time spectrum scope

• Free World Time Clock and Service Manual from ICOM until 1000 units are gone.

$25 HRO Coupon

$200 COUPON

IC-746 All Mode 160M-2M

- 100W output for all bands
- IF-DSP+ twin pass band tuning (PBT)
- Large, multi-function LCD with band scope

• Get a FREE Log book with purchase while supplies last

$10 HRO Coupon

IC-2100H 2M Mobile Transceiver

- Cool dual display
- 55 watts
- CTCSS encode/decode
- Backlit remote control mic
- Mil spec 810, C/D/E*1

$5 HRO Coupon

IC-207H Dual Band Mobile

- 2M/440 MHz
- Wide band rx (includes airband)
- 45W VHF (2M), 35W UHF (440 MHz)
- Remote head capable

$5 HRO Coupon

$50 COUPON

IC-2800H Dual Band Mobile

Mounting Kit Included

- 2M/440MHz
- Band scope
- 3" TFT LCD disp
- NTSC video input
- CTCSS encode/decode
- Selectable RF attenuator
- 232 alphnumeric memories
- Remote head included

$10 HRO Coupon

$10 HRO Coupon

IC-718 HF Transceiver

$50 COUPON

- 100W (AM 40W)
- 12V Operation
- Simple to Use
- CW Keyer Built-in
- One Touch Band Switching
- Auto Tuning Steps (TS)
- VOX Built-in
- Large Front Firing Speaker

IC-T7H 6W, Dual Band Transceiver

Dual Bands at a Single Band Price!

- 2M/440 MHz
- 70 memories
- Great audio
- CTCSS encode/decode
- Auto repeater
- Easy operation!
- Mil spec 810, C/D/E*1

$5 HRO Coupon

IC-T2H 6W, 2M Transceiver

Commercial Grade Rugged

- Easy to use
- Customizable keys
- LCD backlight display
- 40 memory channels
- Up to 6W @9.6 V CD
- 500 mW audio
- Mil spec 810, C/D/E*1

$5 HRO Coupon

IC-T81A 4 Band Transceiver

Worlds First 4-bander HT

- 50, 144, 440 MHz & 1.2 GHz bands
- 5 W at 13.5V DC/W/1.2 GHz
- Ni-MH battery standard
- AM, FM, WFM
- "Joy-stick", switch
- CTCSS encode/decode
- RIT and VXO for 1200 MHz

$5 HRO Coupon

IC-Q7A Dual Band Transceiver

- 2M/440 MHz transceiver
- Wide band receiver - 30 to 1300 MHz**
- 200 memory channels
- Ultra compact
- Monitor function
- Large built-in speaker, 100 mW audio
- Tone squelch with pocket beep
- Mil spec 810, C/D/E*1

$5 HRO Coupon

IC-W32A Dual Band Transceiver

- Advanced 2M/440 MHz
- 5W @ 13.5 V
- 200 memories w/alpha naming
- CTCSS encode/decode w/tone scan
- True dual band with V/V, U/U
- Optional PC programmable
- Mil spec 810, C/D/E*1

$5 HRO Coupon

ICOM®

Work the Magic

* The IC-706MKIIG coupon offers may not be used together in any combination. **Cellular blocked, unblocked OK to FCC approved users. Coupons: Check with HRO dealer for details/restrictions. ✦Coupon offers run through 12/31/00. *1For shock & vibration. *Optional.

CALL TOLL FREE

Phone Hours: 9:30 AM – 5:30 PM
Store Hours: 10:00 AM – 5:30 PM Closed Sun.

Toll free, incl. Hawaii, Alaska, Canada; call routed to nearest store; all HRO 800-lines can assist you, if the first line you call is busy, you may call another.

West.....800-854-6046
Mountain.....800-444-9476
Southeast.....800-444-7927
Mid-Atlantic...800-444-4799
Northeast.....800-644-4476
New England..800-444-0047

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
delaware@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, NF7D, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
virginia@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, NF7D, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

Special HRO Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Call For Winter Specials!

YAESU

FT-840
- 100W • 12V DC • DDS
- Gen. Cov. Rx, 100 mem.
- Optional Ext. Auto • Tuners Available

Call Now For Our Low Pricing!

FT-1000MP HF Transceiver
- Enhanced Digital Signal Processing
- Dual RX
- Collins SSB filter built-in
- 100W, Power supply built-in

Call Now For Low Pricing!

FT-100 HF/6M/2M/70CM Transceiver
- Compact Transceiver w/detachable front panel
- Rx 100kHz to 970mHz (cell blocked)
- Tx 100W 160-6M, 50w 2M, 20W 70CM
- Built-in DSP, Vox, CW keyer
- 300 Memories

Call Now For Low Pricing!

FT-817 HF/VHF/UHF TCVR
- 5W @13.8V ext DC • USB, LSB, CW, AM, FM
- Packet (1200/9600 Baud FM)
- 200 mems, built in CTCSS/DCS
- TX 160-10M, 6M, 2M, 440
- Compact 5.3" x 1.5" x 6.5", 2.6 lbs
- 9.6v Nicad or 8 AA battery capable

NEW!

Call Now For Introductory Pricing!

FT-2600M 2M Mobile
- Compact 2M 60W mobile • 12000/9600 baud
- 4 selectable power levels • Built-in CTCSS/DCS
- 175 mems, 8 character alpha-numeric display
- Low intermod Rx, Rugged

Call Now For Low Pricing!

VR-500
Handheld Receiver

- 100kHz - 1300 mHz
- CW, LSB, USB, AM, FM (narrow and wide)
- Cell blocked in USA
- 1000 memory channels
- 8 character alpha-num display

NEW!

Great Sound, Call Today!

VX-5R
50/2M/440HT
- Wideband RX • 6M-2M-440TX
- 5W output • Li-Ion Battery
- 220 mems, opt. barometer unit
- Alpha Numeric Display
- CTCSS/DCS built-in

Call For Low Price!

FT-50RD
2M/440mHz Compact HT
- DVR, Decode, Paging Built-in
- Alpha numeric display
- Wide Band receive
- Battery Saver • 112 Memories
- Mil-Spec • HiSpeed scanning

Call For Your Low Price!

FT-847
Ultimate Base Station, HF, VHF, UHF
- 100w HF/6M, 50w 2M/430 mHz
- DSP • Full Duplex Cross-band
- 1200/9600 Baud Packet Ready

Call for Low Price!

FT-90R
2M/440 Mini Dualbander Transceiver
- 50w 2m, 40w 440mHz
- Wide Rx • Detachable Front Panel
- Packet Ready 1200/9600 Baud
- Built-in CTCSS/DCS Encoder/Decoder
- Less than 4" wide!

Call for Your Low Price!

FT-920 HF+6M Transceiver
- 100w 160-6M, 12VDC
- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
- Computer controllable, CAT System

Call For Low Pricing!

FT-8100R 2M/440 Mobile
- Ultra Compact • 50w/35w 2m/440
- 110 memories • Wide Band RX
- Backlit mic • Remotable front panel w/opt. YSK-8100

Call Now For Special Pricing

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!

Special HRO Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

ALINCO

DJ-195T 2M HT

$5 HRO Coupon

- 5 Watt out • 40 memories
- Alphanumeric Display
- CTCSS/Enc-Decode
- DCS/Enc-Decode
- Theft Alarm
- Auto Dialer

POWER, PERFORMANCE, & PRICE!

$129.95*

* Special price after coupon

DJ-V5TDC 2M/440 HT

$5 HRO Coupon

- 5 Watt out w/optional EBP 46
- Cool Clear Design
- 200 Memories • Dry cell pack incl.
- Rx 76 mHz to 1gHz (cell blocked)
- AM Air Rx • Wide FM Rx

Lowest Price Full Feature Dual Band!

$179.95*

* Special price after coupon

DR-605TQ 2M/440 Dual Band Mobile

$10 HRO Coupon

- 50W 2M, 35W 440
- Built-in Duplexer
- 9600 Baud ready
- 50 Memory chanels
- RX Range 136-174mHz/420-470mHz
- CTCSS built in

Call For Low Pricing!

DR-140TQ 2M Mobile

$5 HRO Coupon

- 50 Watt out • 51 memories
- Alphanumeric Display
- CTCSS/Enc-Decode

$149.95*

!HOT CLOSEOUT SPECIAL!

* Special price after coupon

DR-135TP 2M Mobile

$10 HRO Coupon

NEW!

- 50 Watt out • Alpha Numeric Display
- 100 mems • Built-in TNC 1200 & 9600 Baud
- Front Panel GPS in • Rear DB-9 Port
- CTCSS/DCS Encode/Decode built in

DX-70TH HF Transceiver

$10 HRO Coupon

- 100W 160-10 Mtrs • 100W 6M, Gencov. Rx
- Full QSK, 100 Mems. • Compact, Remotable
- Dual VFO, 12VDC • 6.2 lbs.

Now In Stock! New Low Price!

COMET

SMA-501 Dual Band

$5 HRO Coupon

Dual band "Miracle Baby" style antenna, with a male SMA connector. Shown on the popular FT-50R by Yaesu. The antenna is only 1.75 inches tall, and exhibits surprising performance.

Call For Low Pricing!

UHV-6

40M-70cm Mobile Antenna

$5 HRO Coupon

40/*20/15/10/6/2M/70cm
* optional coil

A 6M/2M/70cm whip that accepts 1.2 or 3 HF coils for up to 6 band operation. Simply screw on any combination of HF coils you choose.

Standard PL-259 connector allows easy mounting. Convenient fold-over hinge for entering garages, parking structures, etc...

HF/VHF/UHF on a single antenna!! Contact any Ham Radio Outlet store for duplexer/ triplexer options.

Call for Low Pricing!

NEW!

High Sunspots= Great HF Mobiling!

MSG Series

2M/70cm Mobile Antennas with spring-loaded whip to absorb impacts. Fold-over hinge included as well.

$5 HRO Coupon

MSG-1000C	MSG-1100C
Length: 39 inches	Length: 43 inches
Max Pwr: 150W	Max Pwr: 150w
Conn: PL-259	Conn: PL-259

NEW!

MH-510

$5 HRO Coupon

NEW!

6/2M/70cm HT Antenna w/SMA Connector
The first aftermarket gain antenna for the YAESU VX-5 and the ICOM T8A.

A dramatic improvement over the stock antenna, 20.75 inches of TRIBAND performance.

Call For Low Pricing!

DAIWA

Proven Reliability for Today's Amateur!

- **CN-410** 3.5-150MHz 150W
- **CN-460M** 140-450MHz 150W
- **CN-465M** 140-450MHz 75W
  - Compact, Mobile Meter
  - Cross Needle Design
  - Mounting Bracket Included

$5 HRO Coupon

- **CN-101** 1.8-150MHz 1.5KW
- **CN-103** 140-525MHz 200W
  - Economy Lighted Bench Meter
  - Large Cross Needle Display
  - Accurate DAIWA Engineering

CALL TOLL FREE

Phone Hours: 9:30 AM – 5:30 PM
Store Hours: 10:00 AM – 5:30 PM Closed Sun.

Toll free, incl. Hawaii, Alaska, Canada; call routed to nearest store; all HRO 800-lines can assist you, if the first line you call is busy, you may call another.

West	800-854-6046
Mountain	800-444-9476
Southeast	800-444-7927
Mid-Atlantic	800-444-4799
Northeast	800-644-4476
New England	800-444-0047

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, NF7D, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, NF7D, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

Special HRO Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET ®

WORLDWIDE DISTRIBUTION

Call For Winter Specials!

KENWOOD

APRS, TNC Features Built In!

NEW!

TH-D7A(G) 2M/440

- 2M/440 Dual Band
- Built-in 1200/9600 Baud TNC
- APRS Compatible
- DX Packet Cluster Monitor
- 200 Mems., CTCSS
- VC-H1 Messaging Control

$5 HRO Coupon

Call Now For Low Pricing!

VC-H1

Visual Communicator

$10 HRO Coupon

Compatible w/all FM VHF/UHF • Transceivers + HF SSB Send/Rec Digital Images • (32 seconds) for download Store pictures in memory • 1.8" Color TFT LCD Display • Built-in speaker + mic • Download to PC • (with special software)

Call For Low Price!

TH-G71A 2m/440

- 2m/440 Dual Band HT
- 200 Mems • PC Programmable
- 6w 2m, 5.5w UHF @13.8 VDC
- Alphanumeric Display
- CTCSS Built It • Backlit Keypad

$5 HRO Coupon

Call For Low Price!

5w High Power Also Avail.

TH-22AT

- Ultra Compact
- 2M HT, 5W optional
- 40 memories
- Encode Built-In

$5 HRO Coupon

TM-V7A 2M/440Mhz

- 50W/35W • 280 Mems • Visual Scan
- Alpha Numeric • Enc/Dec & Duplexer Built-in
- Computer Programmable • 9600 Baud Ready
- Cool-blue Reversible LCD • Backlit Mic

$10 HRO Coupon

Call Now For Low Price!

TS-870S HF Transceiver

- DSP in I.F. Stage! • 100W, 12V DC
- Dual mode noise reduction
- Digital Filtering (no opt. filters req.)
- Built-in RS232,Windows software incl.

$10 HRO Coupon

Great Low Price

$5 HRO Coupon

TM-261A 2M Mobile

- 50W + Mid and Low • Mil-Spec
- 61 Mem. Chanels • Alpha Numeric Function
- Dual Menu, DTMF Memory
- Backlit mic & built-in encode

Call Now For Special Low Price!

TS-570DG/TS-570SG DSP Enhanced

- 100w HF, (100w on 6M TS-570SG only)
- QSK, CW Auto Tune • Autotuner incl 6M
- DSP • Large LCD Display • Elect. Keyer
- RCP2 Radio Control Program Compatible

$10 HRO Coupon

Call Now For Your Low Price!

TM-D700A 2M//440 Dualband

- 50w VHF 35w UHF • Opt. Voice Synthesizer
- Receives 118-1300 mHz (cell blocked)
- Remote Head Inst. only (kit included)
- 200 Memories • Built In 1200/9600 baud TNC
- Advanced APRS Features
- Dx Packet Cluster
- Tone Scan • GPS/VC-H1/PC Ports

$10 HRO Coupon

NEW!

TS-50S HF Transceiver

- TS-50S - World's smallest HF trans.
- SSB, CW, AM, FM, • 12V Gen. Cov. RX,
- 6.4 lbs., 7.16 x 2.4 x 9.32" • 100W out
- 105 db dynamic range, 100 Mems.
- Opt. ext. ant. tuners available

$10 HRO Coupon

Call For Special Low Price!

Optional 1.2GHz, 220 mHz, 6M Modules Available!

TM742AD 2M/440Mhz

- Optional 3rd band available • Back-lit mic
- Up to 303 memories • 101 per band
- PL Encode Built in • Detachable front panel

$10 HRO Coupon

Call Now For Your Low Price!

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!

AMERITRON True Legal Limit™ Tuner

Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

Call your dealer for your best price!

AMERITRON ATR-30

$599

Suggested Retail

- *Handles 1500 Watts carrier*
- *Super High Current edge-wound silver plated Roller Inductor*
- *500 pf tuning capacitors with 6:1 vernier reduction drives*
- *3 core choke balun*
- *6 position antenna switch*
- *True peak reading meter*

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage operates 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier re-duction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-20 Antenna Tuner

ATR-20, $459. Handles full 1.2 kW SSB/600 Watts CW. Handles full SSB power of Ameritron AL-811/811H/80B/ALS-500M/600, other 1.2 kW SSB amps. Roller inductor, turns counter, verniers on capacitors, balun, cross-needle SWR/Wattmeter.

Ameritron has the best selection of *TrueLegalLimit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube

AL-1500

$2945

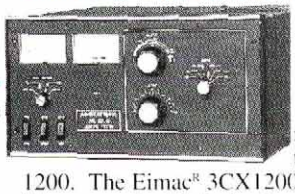
Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube



AL-1200

$2495

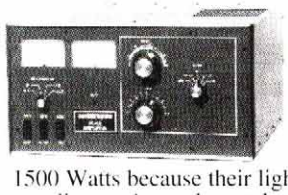
Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes



AL-82

$2395

Suggested Retail

TrueLegalLimit™

Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

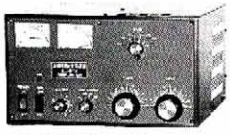
1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

AL-800H, $2495 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1695** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

NearLegalLimit™ Amp

with four 572B tubes



AL-572, $1395 suggested retail. New class of *Near Legal Limit*™ amplifier gives you 1300 Watts SSB PEP power output (70 Watts drive) for 65% of price of full legal limit amps! Instant 3-second warm-up. 40 lbs. 8½Hx15½Dx14½W inches.

1 kW Desktop HF Amp

with Amperex® 3-500ZG tube

AL-80B, $1299 suggested retail. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 8½x14x15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

Precision SWR/Wattmeter

AWM-30, $149 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

Call your dealer for your best price!

Free Catalog: 800-713-3550

AMERITRON®

. . . the world's high power leader!

116 Willow Road, Starkville, MS 39759

TECH (662) 323-8211 • **FAX** (662) 323-6551

8 a.m. - 4:30 p.m. CST Monday - Friday

For power amplifier components call (662) 323-8211

http://www.ameritron.com

Net	Freq	TIME/Daily/UTC	QNI	QTC	QTR	Sess
ITN	3910	1330/2130/2300	2478	486	1701	93
QIN	3656	1430/0000	137	69	665	50
ICN	3705	2315	126	12	351	27
IWN	3910	1310	2255	–	310	31
IWN VHF Bloomington			474	–	465	31
IWN VHF Kokomo			710	–	155	31
IWN VHF Northeast			1163	–	620	31
Hoosier VHF nets(11 nets)			1173	46	1058	72

D9RN in 62 sessions total QTC 165 IN represented 95% by K9GBR, N9KNJ, W9UEM, WB9QPA and KB9NPU. 9RN in 61 sessions total QTC 175 IN represented by KJ9J, KO9D, K9PUI, N9HZ, WB9UYU and W9FC. Tfc: W9FC 243, K9PUI 115, W9ZY 102, WB9QPA 87, W9FU 87, AB9AA 52, W9JUJ 51, N9KNJ 49, W9UEM 39, KO9D 36, KA9EIV 33, KB9NPU 32, KA9QWC 31, K9GBR 28, K9DUY 20, WD9HII 19, W8LEN 12, W9BRW 12, AB9A 11, K9RPZ 10, W9EHY 10, K9ZBM 9, N9HZ 5, WB9OFG 5, K9CUN 3, WB9NCE 1, K9OUP 1.

WISCONSIN: SM, Don Michalski, W9IXG—SEC: WB9RQR. STM: K9LGU. ACC: K9FHI. SGL: AD9X. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: K9UTQ, W9RCW, W9CBE. BM: WB9NRK. It is with deep regret that I inform you that Ralph Shannon, W9MGP, is a SK. Ralph was a member of FLARC and Madison DX Club. Gene Gould, KB9QIW, member of RRRC, died in a boating accident on his honeymoon. RMRA/RMATS received donation of a complete C/KU satellite receive system from Wausau Insurance Co. It will now provide an ATV repeater "on site" system. How about your club touring the Point Beach Nuclear Power Plant near Manitowoc? Hams support the simulated NPP emergencies so this is a good opportunity to see what makes them run. 2.5 hour club tours are available. Advanced reservations required. Call 800-880-8463 for details and reservations. Volunteers are needed to help run the BSSS; this includes incoming subscriptions, and bulk mailing. A paid BSSS advertisement job is available. Please support your state ham newspaper! Contact Jim, K9ZZ, at k9zz@arrl.net. 608-356-4031. 9RN report for October shows 98% Wisconsin participation! Congratulations to Jane, KB9USE, for upgrading to Extra! Nominations are needed for 3 ARRL Instructor of the Year Awards, Excellence in Recruiting Award, Hiram Percy Maxim Award, and 3 Technical Awards. Any Ham, club, VE, or student may recommend to me deserving individuals. I need your input NOW!! Go to www.arrl.org/ead/instructor/instructor/grants.html for more information. Congratulations to Bill Stolte, N9VBJ, for receiving Certified Emergency Manager certificate at Governors Conference. 73, Don, W9IXG. Tfc: K9JPS 1088, W9IHW 855, WZ7V 665, W9YPY 638, K9GU 424, N9TVT 382, N9VE 216, W9CBE 127, N9BDL 118, K9FHI 115, N9LGU 79, AG9G 62, W9YCV 54, W9UW 51, KE9VU 50, WD9GNK 48, KG9B 43, N9KHD 43, W9BHL 42, AA9BB 40, KB9ROB 37, K9HDF 30, WD9FLJ 27,KA9FVX 23, WB9ICH 22, W9PVD 13, W9ODV 12, N9JIY 12, N9UAR 8, WA9ZTY 2.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, KM0D—As an ARRL member, you know that it is your voice that determines who will be serving as your Section Manager. I have been informed that I will be serving another term. My tnx to those who supported me in this role by submission of nomination. It's an honor to serve as we have turned the century calendar. It seems like yesterday we were all making preps for the Y2K (ooh, there's that word again!). Personally, I was getting a little Y2K'd out and was glad to see it over. Many thanks to all radio operators statewide who played a role on Y2K-eve while we waited for the sky to fall. I wonder if anyone is still living in one of those underground concrete bunkers? I would like to take this opportunity to thank all the members of the field organization who continue to support our efforts thru their respective appointments. Many thanks to all VEs who had their hands full earlier this year with the many tests given because of the license structure changes. Each month I write this small news column for all members, but just a reminder to those with web capability...be sure to subscribe to my ARRL MN Section eSignals electronic newsletter. Go to ARRL web site and check the box to receive Division/Section mailings. Even if you receive the ARRL letter, you must check-the-box to receive my mailings. It's on the member-data-page of the site. I've sent out several distributions already and I appreciate those who have voiced their desire to keep receiving it. For now, 73 and may you be blessed in the New Year de KM0D, http://www.pclink.com/rwendel.

Net	Freq	Time	QNI/QTC/Sess	NM
MSPN/E	3860	5:30 P	580/77/31	W0WVO
MSPN/N	3860	12 P	399/103/31	WA0TFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	227/71/31	K0WPK
MSN/2	3605	10 P	143/33/31	K0PIZ
PAW	3925	9A-5P	2066/89/74	KA0IZA

Tfc: WO0A, KB0AII, WA0TFC, K0PIZ, W0LAW, KB0OHI, K0WPK, W0HPD, KB0AIJ, W3FAF, W0WVO, K0PSH, K0IKO, KA0IZA, KN9U, KC0HAW, N0JP, WD0GUF.

NORTH DAKOTA: SM, Bill Kurtti, WC0M—The Grand Forks Hamfest was a success at their new location. Congratulations to KC0WX on being nominated to receive the Andy Freeman Headbolt award in recognition for his work on the FORX ARC Feedline. Very interesting forms were given on PSK by W0PHD & a forum on the DXpedition to Bhutan followed by a forum on High Altitude research Balloon by KC0CRU being conducted by FORX Hams. Also FORX members provided communications for the Alzheimer's Walk. I'm sorry to report that N0SDE is a Silent key. Jim was very active in many activities of the Fargo club. An antenna ordinance was proposed in Fargo but area Hams explained PRB-1 to the City attorney & got a favorable hearing. Tfc: N0RDJ 1. Net reports WX net 27/680/5; Data 31/741/12; Goose River 5/59/1 KE0XT HF net msg.

SOUTH DAKOTA: SM, R. L. Cory, W0YMB—SEC: WN0Y. STM: W6IVV. PIO: K0ROG. ACC: WB0ULX. At Watertown, nine LARK members participated in the second annual Wal

EXCLUSIVE OFFER!

$599.99
Reg. $699.99
940-0827

SAVE $100
While supplies last!

DX-70TD HF/6-Meter Full-Featured Transceiver

Perfect for new or upgrading Hams who pass the new, lower 5WPM CW General and Extra exams!

Model DX-70TD

100-watt HF/6-meter transceiver with a detachable face. This model gives you access to all HF bands plus hot 6M DX openings and repeaters. Two VFOs, 100 memories. 38-tone CTCSS. Delivers 100 watts SSB/CW and 40 watts AM output on HF plus 100 watts FM on 10M and 10 watts FM/SSB/CW (4W AM) on 6M. (Mfr. Warranty: one-year. Size: 2.25×7×9". Weight: 5.95 lbs). 940-0827

Requires FCC Amateur Radio License of appropriate class depending on band/mode. Shipping extra.

ALINCO

SAVE $80
While supplies last!

METEX

Great gift! Auto/Manual Ranging Metex DMM with a PC Interface!

Incredible Value. DMM with a PC interface—it's our holiday offer to you! Metex Model ME-11. Features normally found on instruments costing over $100:

- Built-in PC interface allows Windows 95/DOS to log, graph and store meter measurements.
- DMM measures AC voltage up to 1000V, DC voltage to 750V, AC/DC current up to 20A and resistance up to 4MΩ. Includes advanced features.
- (Includes: test leads, spare 2A/250V fuse, 3.5" disk with software, operating manual. Mfr. Warranty: one-year limited. Size: 7.25×1.33×1.33" (HWD). Weight: 11.25 oz. ±2 oz. (including battery).) Uses 9V battery (sold separately). Shipping extra.

ONLY $19.95
910-4092
Reg. $99.95

950-0225 **DB9 M to F Serial Interface Cable**.....$7.99

HUGE SAVINGS on Alinco's best!

Alinco took one of their best handheld amateur radios and made it better. The alphanumeric display makes memory management easy. Travel the world with CTCSS encode+decode, DCS and European tone bursts, all included at no extra cost. Best of all, the DJ-195TD Alinco tradition of quality construction. (Mfr. Warranty: one-year. Includes: alkaline battery case. Size: 2.25x6x1.0625" (HWD). Weight: 300g.)

Model DJ-195TD

ALINCO

NOW ONLY $99.99
940-1281
Reg. $149.99

While supplies last!

Order Today! Call Toll-Free 1-800-442-7221

You Must Supply Special Code 53201 To Receive These Super Deals.

RadioShack.com℠

Mart Safety Day along with the Watertown Fire Dept, County Search and Dive Rescue, Salvation Army and County Emergency Management. At last report, K0ZBJ is recovering and going back to Watertown for rehab. The 10-meter band is recovering and has opened up giving new hams the opportunity to work some DX. Walworth Co Emergency Net has started up with the close of summer activities. It meets on Sunday at 12:45 PM, Central Time on 3700. Net control will answer at the speed you check in with. Also, Novice net is on 3700 on Sunday night 7 PM CST. All checkins are welcome. Please send me items for this column. This is your column. Happy New Year to everyone. Oct NEO net QNI 618, QTC 79. SD Novice Net QNI 35, QTC 0. Sunday Emergency Net QNI 58, QTC 0. NE SD 2 M Net QNI 48, QTC 3.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org – After long consideration, I have decided not to run for re-election as Section Manager. This decision is due to many factors including a conversation with Bob Ideker, WB5VUH. His comments assured me that the projects that I feel are most important will not be neglected if he is elected. The most important reason for this decision was decided in the Nov 7 election here in White County. It now appears that I will be in a position to correct many years of mismanagement in a county government agency as a department head for one of the newly-elected officials. I expect to be working many hours for a while just to get things back to a condition that is acceptable for normal operations. I feel that this obligation will not allow me to put the time necessary into my Section Manager job and therefore plan to step down at the end of my term. I want to thank everyone who has supported me for the past 4 years and especially my section staff who have made it a successful term. They deserve the credit for our success over this period. All I did was put the right people in the right places to do the work. Tfc and Nets (Oct): K5BOC 91, K7ZQR 66, AB5AU 54, AB5ZU 10, W5HDN 8, W5RXU 7, KK5QS 4, AMN 43, APN 20, ARN 80, OZK 14.

LOUISIANA: SM, Mickey Cox, K5MC— Be sure to check out the Web site at www.tchams.org/users/contest/laqp for results of the LA QSO Party. Congratulations to K5IQZ for his appointment as a Member at Large of the NTS Central Area Staff. Anyone interested in sharing ideas regarding the future of Amateur Radio is invited to join ARRL-FIELD-ORG, a new email reflector. Details on how to subscribe can be found at www.qth.net/. All League appointees, in particular, are encouraged to join the new reflector. On the recommendation of the BRARC, I have nominated Honor Roll Member K5EOA to be a DXCC Card Checker. Under the new policy adopted by the ARRL Board of Directors, each SM has one nomination on behalf of his section and large DX clubs each have one nomination. The only large DX club within the section that probably qualifies now is the DDXA in New Orleans. Thus, in the near future at least, we will probably have only two card checkers to serve our DXCC members in LA. If you have any comments about the changes in the DXCC Card Checker program, be sure to contact K5UR, our Delta Division Director. Hats off to the Lake Charles SWLARC for sponsoring SWAMPFEST 2000. Everyone enjoyed the hamfest and I was especially happy to meet a number of new faces. Tfc: WB5ZED 810 (BPL), K5MC 315 (BPL), W5CDX 190, W4DLZ 100, K5IQZ 91, KG5GE 41, K5DPG 22, KM5YL 6. PSHR: K5MC 218, WB5ZED 197, K5IQZ 128, W5CDX 127, K5DPG 121, KG5GE 105, W4DLZ 95, KM5YL 95, AC5JU 49. Net Reports: sessions/QNI/QTC. LTN: 31/347/74. LCW: 29/198/82.

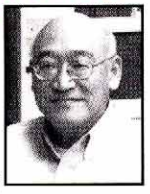
MISSISSIPPI: SM, Malcolm Keown, W5XX— Regret to report the passing of KD5P, past STM, and W5PVQ, a radio pioneer in Southwest Mississippi. Nearly 100 hams, XYLs, and harmonics converged on Paul B. Johnson State Park for the annual ARRL Day in the Park. A great time was had by all! Thanks to the MDXA for sponsoring the picnic and in particular W5OXA, Chairman, N5FG, K5JZ, KC5LZY, and N5WI. The Jackson ARC set up a Field Day Operation for the Boy Scout Jamboree on the Air during the Andrew Jackson Council Camporee near Clinton. The Tupelo ARC has generated a lot of interest by conducting foxhunts. Contact KE4LWT for details. Congratulations to MDXA/KARC/WJCARC (K5MDX)(#3) and the Vicksburg ARC (W5XX)(#7) for making the Top Ten in Category 3A in Field Day 2000 (out of 344 entries nationwide!). Good Show! DEC N5ZNT reports that the Southwest Miss ARES provided communications for the annual Multiple Sclerosis Bicycle AMS Tour for Cure. And don't forget on New Year's Eve that N5JCG will be hosting the MSPN Y2K+1 New Year's Eve Party. Contact him for details. Season' Greetings! Nets: Sess/QNI/QTC: MSPN 31/3117/54, MTN 30/96/46, MSN 31/1096/13, PBRA 31/798/20, Jackson Co ARES/RACES 31/460/29, MSSN 22/107/3, WCMS 13/118/3, Stone Co ARES 5/48/0, Lowndes Co ARES 5/61/0, MCARA 5/57/0, JARCEN 5/85/2, LARCEN 5/37/0, MBHN 4/28/0, NW Miss Skywarn 4/31/2. PSHR: KB5W 146, K5VV 129, W5XX 106, KJ5YY 73. Tfc: KB5W 426, K5VV 72, W5XX 8.

TENNESSEE: SM, O.D. Keaton, WA4GLS— UARC elects KE4RQF-Pres, KB4UG-VP & KB4LHU-Sec/Treas as its new officers. BSFARC hosted Cub Scouts, Boy Scouts and adults alike to JOTA Oct 21. A big thanks to all that participated. Thanks to NARC personnel who participated in the Middle TN Multiple Sclerosis 150 mile bike-a-thon: K4WME, KA4AU N4BHO, N4VHM, N4LHW, WB4HCL, K4IHI, KE4ETY, KE4TQO, KC4TMV, K4ANH, KB4IDC, KF4VCO, N4SYJ, KG4BHH, KF4MCD, K5LKT, KF4OAH, KD4TYZ & Betty Baker, Terri Burgess, Bryan Parkerson, Judith Pearson. JCARA had a wonderful fall picnic with 29 in attendance. KARC/BARC had 37 members, family and friends in attendance at the joint clubs picnic on Bays Mt. The members of CARC helped to make the MS 150 Bike Ride a success. There were approximately 70 riders. There were no major problems and the pledges were good. RCARS members are very active in SKYWARN training. This program is being coordinated along with the ARES program. More information may be obtained by meeting the Rhea Co ARES/RACES net Sat at 9 PM on 147.39+ and Meigs Co ARES/RACES net on Tues at 8:30 PM on 145.15 -; PL 141.3. Thanks to the ORARC members who provided communications for the Alzheimers Memory Walk on Sept 24. They were KC4RHW, KE4YBY, W4GEK, KF4VZD, KR4EP, KE4TG, KD4PQP & KD4RIC. DRN-5 rpt 62

MFJ *Speech Intelligibility* Enhancer™
gave me back my Ham Radio hobby

MFJ-616 **$169.95**

"As I got older, my high frequency hearing loss was destroying my ham radio for me . . ."



-- Martin F. Jue, K5FLU
President and Founder
MFJ Enterprises, Inc.

I know I'm not the only ham who can't understand all the speech in a QSO caused by high frequency hearing loss. I developed a solution that I want to share with my fellow hams.

I almost gave up my ham radio hobby

I have been a passionate ham radio operator for over 40 years ever since I was a teenager. I loved every minute of it. Still do, but I almost had to give it up.

As I grew older (I'm 56 now) I found myself asking "*What did you say?*" so often it got downright embarrassing. I can hear pretty good most of the time. I just can't always understand what people are saying and my left ear is weaker than my right ear.

It got to where I was having trouble carrying on QSOs. I could hear, but I just couldn't quite make out all the words.

My hearing problem almost put a stop to my lifelong hobby.

There was no way I was going to give up ham radio . . .

Research showed me what to do

I searched the literature and spoke to hearing and speech experts.

According to their research on the intelligibility of speech in hearing English words:

1. The frequencies important for speech intelligibility are the consonant sounds from 500 to 4000 Hz. They contribute 83% of word intelligibility.

Frequencies from 500 to 1000 Hz contributes 35% of word intelligibility and 35% of sound energy.

Frequencies from 1000 to 4000 Hz contributes *48% of intelligibility* but has *only 4% of sound energy!*

2. In contrast, frequencies from 125 to 500 Hz contributes 55% of sound energy but only 4% to word intelligibility.

***In** other words, nearly half the speech intelligibility is contained in 1000 to 4000 Hz frequency range with only 4% of the speech sound energy.*

On the other hand, the low frequencies 125 to 500 Hz have most of the speech energy but contribute very little to intelligibility.

How I improved my ability to hear and understand QSOs

The research showed me what to do.

First, drastically increase the speech energy above 500 Hz where 83% of intelligibility is concentrated.

Second, drastically reduce the speech energy below 500 Hz that contributes only 4% of intelligibility.

Amateur radio communications limit audio to about 300 to 2700 Hz.

I split the audio band into four overlapping octave ranges centered at 300, 600, 1200, 2400 Hz.

I could boost or cut each range by nearly 20 db to give me full control. This let me maximize speech intelligibility for most kinds of frequency loss.

My left ear is weaker than my right ear so I split the output audio into left and right channels with separate 2½ watt amplifiers. A balance control lets me equalize the perceived loudness to each ear. *Now both ears help in improving speech intelligibility!*

I couldn't believe my ears!

I built one and hooked it to my rig.

I boosted the high frequencies, cut the low frequencies, set the volume and adjusted the balanced control so I could hear each side equally loud.

I couldn't believe my ears! Speech that I could hear but barely understand before was now highly understandable. I got my ham radio back!

With this concept, you'll *understand* QSOs better and enjoy ragchewing and contesting more, even if you don't have high frequency hearing loss.

It helped me so much I wanted to share this with my fellow hams

I developed this into an accessory that any ham can use.

I made it immune to RFI, added a front panel phone jack, on/off speaker switch, two selectable transceiver inputs, a bypass switch for in/out comparison and built it into 10Wx2½Hx6D inch aluminum enclosure. Needs 12 VDC.

Other Uses

Replace your rig's audio section for superb audio. Eliminate hum, buzzes, poor frequency response, low audio power.

Works with SSB, FM, AM, CW -- any voice mode. Use any rig -- ham, marine, aircraft, CB. Use for PA systems, internet phone, radio talk shows.

MFJ-616 Accessories

MFJ-392, $19.95. Matching high performance communication headphones.

MFJ-281, $12.95. Mylar cone speaker emphasizes 600-4000 Hz for crystal clear speech fidelity. Requires two.

MFJ-1316, $19.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, $58.80. *All-in-one MFJ-616 Accessory Pack.* Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

Try it for 30 Days

Order from MFJ and try it -- no obligation. If not delighted, return it within 30 days for refund less shipping.

No Matter What™ Warranty

You get MFJ's famous one year *No Matter What™* limited warranty. We will repair or replace your MFJ-616 (at our option) no matter what for a full year.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

• 1 Year *No Matter What™* warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

MFJ . . . the world leader in ham radio accessories

sess, 512 QTC, TN rep 52% by KE4GYR and W4OGG. Net Sess/QTC/QNI: TEMPN 22/49/785; TEPN 26/29/2791; TMPN 31/17/2373; TCWN 23/26/152. TSCWN 26/20/148. Tfc: WA4HKU 29, WB4DYJ 19, KE4GYR 16, W4SYE 14, WD4JJ 7, WA4GLS 3, WA4GZZ 1.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM: Tom Lykins, K4LID. SEC: Ron Dodson, KA4MAP. SGL: Bill Burger, WB4KY. ACC: Todd Schrader, KF4WFZ. TC: Scotty Thompson, KI4AT. PIC: Steve McCallum, W2ZBY. STM: John Farler, K4AVX. BM: Ernie Pridemore, KC4IVG. November 11 started the "The Great Holiday Traffic Jam." This should prove to be a great contest. Hats off to the Hams in Eastern Ky, especially WA4SWF, Fred Jones, and his ARES crew during the slurry spill that occurred in October. The date for the Elizabethtown Hamfest has been changed to March 31, 2001. Let's take this opportunity to wish everyone and their families a very Merry Christmas and a Happy New Year. New Year's eve will be kind of boring with out Y2K going on. January 1, 2000, the Kentucky Section will lose a Ham that I call an icon to Amateur Radio. He has led the NTS Hams for several years and overseen the KY traffic nets for some time. John Farler, K4AVZ, STM, is retiring and we have a new STM coming on line. Effective 01-01-01, Mr. Mitchell, KG4EAB, will become the new STM for the Kentucky Section. All January traffic reports will go to Mitch. Address and other information will be in the next edition of the SN. Net QNI/QTC/Sess/NM: KRN/701/22/22/N4AFP. KTN1/1107/30/31/ K4LID. KTN2/1120/30/31/KB4VKS. KSN/203/39/30/KO4OL. CARN/366/30/30/AD4EI. TSTMN/431/27/31/KG4EAB. 4ARES/417/31/31/WA4RRR. Tfc: K4AVX 37, WD4JAW 25. KO4OL 33. K4YKI 4. PSHR: AE4NW, 99, KD4PWL 59.

MICHIGAN SM: Dick Mondro, W8FQT (w8fqt@arrl.org)—ASM: Roger Edwards, WB8WJV (wb8wjv@arrl.net). ASM: John Freeman, N8ZE (n8ze@arrl.net). SEC: Deborah Kirkbride, KA8YKK (ka8ykk@arrl.net). STM: James Wades, WB8SIW (wb8siw@arrl.net). ACC: Sandra Mondro, KG8HM (kg8hm@arrl.net). OOC: Donald Sefcik, N8NJE (n8nje@arrl.net). PIC/SNE: David Colangelo, KB8RJI (dcolangelo@ameritech.net). SGL: Ed Hude, WA8QJE (edhude@juno.com). TC: Dave Smith (DSmith@smithassoc.com). Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net); BM: Thomas Durfee, Jr.,WI8W (wi8w@arrl.net). Traffic reports for October 2000: KB8ZYY 243; K8GA 210;AA8PI 194; K8LJG 126; W8RTN 123; N8FPN 95; KA9EIZ 94; K8AE 80; K8KV 74; WX8Y 62; AA8SN 54; W8RNQ 41; K3UWO 29; K8UPE 28; WI8K 23; W8YIQ 23; K8ZJU 18; WA8DHB 18; KC8GMT 14; W8RF 14; N8TDE 13; K8KIR 11; K8AI 8; K8JN 8; K8JN 8; KI8GR 5; N8UN 4; N8EXS 1. Happy New Year 2001, the beginning of the New Millennium. I would like to welcome back Ed Hude, WA8QJE, as our State Government Liaison and thank John LaRock, K8XD, for filling in for Ed during his absence due to work commitments. Congratulations to the Bay Area Amateur Radio Club of Bay City for earning second place nationally in the "Frequency" Movie PR Contest, sponsored by ARRL, and winning a log periodic beam. At a recent District 5 Volunteer Recognition Ceremony held in Kalamazoo, Michigan State Police Emergency Management Division Captain Ed Buikema along with Kalamazoo County Sheriff Thomas Edmonds presented awards to the following: Art Snapper, NK8X, Doug Burke, WB8CFV, Paul Reissmann, WD8MWT, Andrej Sensnovis, KB8QGR, Jim Green, KB8VZE, Scott Garvison, KA8JNO, and Randy Kruger, KI8BM. Congratulations for being recognized by our served agencies as Michigan Section Volunteers. Now that the Winter doldrums are with us again, getting out to local club meetings and participation in public service activities would be a great way to pass the hours and days till the Spring sunshines warm again. 73, Dick. Please support the following Section Nets:

Net	*QNI*	*QTC*	*Sess*	*NM*	*Freq*	*Time*	*Day*
QMN	no report			WB8SIW	3.663	6:30 &10 PM	Daily
MACS	203	42	29	W8RNQ	3.953	11 AM (1 PM Sun)	Daily
MITN	448	228	31	N8FPN	3.952	7 PM	Daily
UPN	1149	46	36	AA8SN	3.921	5 PM (Noon Sun)	Daily
GLETN	566	99	31	VE3SCY	3.932	9 PM	Daily
SEMTN	511	49	31	WI8K	146.640	10:15 PM	Daily
WSSBN	1360	804	31	WB8ICN	3.935	7 PM	Daily
D8 ARES	16	0	3	VE3EUI	3.932	7:30 PM	Friday
VHF Nets	835	36	38	KB8ZYY	Various		
MI-ARPSC	78	6	6	W8FQT	3.932	5 PM	Sun

OHIO: SM: Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12—Three Field Day groups puffed out their chests when December *QST* announced results from June but none so far as Delaware ARA (K8ES) which finished third in North America in Four Alpha and within shouting distance of first place. They tell me watch out next year. But also finishing third from Ohio in the respective categories were Mad River RC of Dayton (K8MAD) in the popular Two Alpha and West Park Radiops of Cleveland (W8VM) in Two Alpha-Battery. And Case ARC of Cleveland Hts. (W8EDU) finished 11 in the difficult One Alpha Battery....At the beginning of a new year, it is wise for all Ohio clubs to remember to send your club annual report to ARRL HQ. Please keep us current on your activities and your leadership. It's easy to do online - just go to the ARRL database and search for your club's data. At the bottom of the page is a link for you to update the data. Other questions? Contact Ohio ACC, Brenda Krukowski, kb8iup@arrl.net...Plan ahead. Mark your calendars for the Ohio Section Conference, Saturday, September 15, 2001. OHIO SECTION CONGRATS (A) To Mahoning Valley ARC (Youngstown) for achieving 75 years of affiliation with the ARRL. Great Lakes Division Director George Race, WB8BGY, traveled from Michigan to present the award certificate, (B)) To Lancaster and Fairfield County ARC officers for 2001, Charlie Snoke, N8KZN, pres; Larry Wright, KB8AHK, veep; Ed Campbell, Sr., WD8PGO; Kevin Numbers, KC8MTV, sec; Candy Wright, KC8NQG; activities mgr, (C) To Paula DiGennaro, KA8HQJ, for being named Greater Dayton Area Realtor of the year. Jan. Hamfest at Nelsonville for Sunday Creek ARF (14.), ...de K8QOE. Now for October traffic reports - Some September reports are included in this count.

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*NM*
BN (E)	123	400	232	31	1845	3.577	WD8KFN
BN (L)	150	60	267	30	2200	3.577	NY8V
OSN	173	61	516	31	1810	3.708	WB8KQJ
OSSBN	1955	547	2531	931	030, 1615, 1845	3.9725	N8IO
OH Section ARES					1700Sn	3.875	WD8IHP
BN (L) Sep	1868	5	293	30			NY8V
OSSBN Sep	1860	456	2404	90			N8IO

Tfc: N8IXF 232, N8IO 225, WD8KFN 149, KB8TIA 136, N8RRB 132, WA8EYQ 127, N8TNV 124, W8STX 122, KD8HB 121, KC8KYP 116, KA8VWE 115, N8BV 113, N8DD 91, WA8SSI 80, WB8HHZ 84. WA8HED 66, N8BO 63, N8WLE 61, N8YWX 57, KC8JKE 55, KD9K 51, KI8IM 49, KC8HJL 41, WB8SIQ 48, NS8C 48, W8PBX 41, K34C 43, W8RG 37, KK8J 35, WB8PG 29, WD8KBW 28, KC8PDY 27, NY8V 27, KB8WSG 25, KC4IYD 24, KX8B 23, N8CW 22, K8JMP 20, KI8O 20, N8GOB 19, KC8DMW 19, N8IBR 18, WD8QXT 18, N7CEU 18, KB9KSR 17, KB8SIA 15, K8PJ 15, KC8HTP 13, KC8HPR 14, KB8SBK 7, K8QIP 3. (Sep) WD8KFN 174, KD8HB 126, KA8CXG 117, KA8VWE 64, N8RRB 41, NY8V 24, KC8HTP 23, KX8B 21, K3RC 21, KI8O 19, KB8TIA 19, KC8DWM 17, K8JMP 17, N8WLE 15, N8AUC 14, W8RPS 13, KC8KYP 7, N8RAK 6, K8WC 1.

HUDSON DIVISION

EASTERN NEW YORK: SM, Rob Leiden, KR2L—STM: Pete Cecere, N2YJZ. SEC: Ken Akasofu, KL7JCQ. ACC: Shirley Dahlgren, N2SKP. SGL: Herb Sweet, K2GBH. PIC: John Farina, WA2QCY. BM: Ed Rubin, N2JBA. OOC: Hal Post, AK2E. TC: Rudy Dehn W2JVF. ASM: Tom Raffaelli, WB2NHC. ASM: Bob Chamberlain, N2KBC. ASM: Andrew Schmidt, N2FTR. ASM: Richard Sandell, WK6R. ASM: Phil Bradway, KB2HQ. Net Reports (October 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 54/14 CDN 296/149 ESS 348/152 HVN 591/184 NYPHONE 220/573 NYPON 354/383 NYS/E 321/364 NYS/M 153/111 NYS/L 245/502 NYSPTEN 359/98. The NYC Marathon was a blast! If you're interested in helping out next year, let me know. Is your emergency gear ready for Winter (including your vehicle)? Remember the ice and snow storms of past years! 73 de KR2L. PSHR: N2YJZ 202 KC2DAA 188 N2JBA 174 W2AKT 150 WB2ZCM 149 W2JHO 148. Tfc: N2YJZ 213, N2JBA 96, KC2DAA 83, W2JHO 54, WB2ZCM 41, WB2IIV 34, W2AKT 25, KL7JCQ 15, K2AVV 14, WB2UWU 6, WA2BSS 2, N2AWI 1, KC2BUW 1.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: N2MUN. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. Congratulations to Bill, WB2GTG, on receiving the Brass Pounders League Medallion! Congrats to new club officers: LIMARC: President - WA2CNJ, VP - K2DO, Secretary - K2JAN, Treas - K2RB. Ham Radio University 2001 (and the NLI Section Convention) is THIS month on Sunday, January 21, 2001, at Babylon Town Hall Annex in North Babylon. First session starts at 9 AM - doors open 8 AM. There will be many new forums and an expanded program. Don't miss what is becoming the best winter event in our section! Talk-in on 146.685 MHz. Check the NLI Webpage at www.arrlhudson.org/nli for more information. The NLI staff wishes you a Happy and Healthy New Year! NYC/LI VE exam list follows: Manhattan: BEARS, ABC Cafeteria, 125 West End Ave at 66th Street, Contact Jerry Cudmore W2JRC at 212-456-5224 for dates & times; East Village ARC, 2nd Friday at 7 PM, Laguardia HS, Amsterdam Ave and West 65th Street, Manhattan. Contact Robina Asti, KD2IZ, at 212-838-5995; Columbia University VE Team, 3rd Monday at 6:30 PM, Watson Lab, 6th Floor, 612 West 115th Street, Manhattan. Contact Alan Crosswell, N2YGK, at 212-854-3754; Queens: Hellenic ARC, 4th Tuesday at 6:30 PM, Pontion Society, 31-25 23rd Ave, Astoria, NY. Contact George Anastasiadis, KF2PG, at 516-937-0775. Nassau County: Grumman ARC (W5YI), 2nd Tuesday at 5 PM, Northrop-Grumman Plant 5, South Oyster Bay Road via Hazel Street, Bethpage, NY. Contact Bob Wexelbaum, W2ILP, at 631-499-2214; LIMARC, Exams every 2nd Saturday only on odd months (Jan, Mar, May, Jul, Sep, Nov) at 9 AM, NY Institute of Technology, 300 Building, Room 311, Northern Blvd, Greenvale, NY. Contact Al Bender W2QZ at 516-623-6449. Suffolk County: Great South Bay ARC, Normally, 4th Sunday at 12 noon, Babylon Town Hall, ARES/RACES Room, 200 East Sunrise Hwy, North Lindenhurst. Contact Tom Carrubba at 631-422-9594; Larkfield ARC, 2nd Saturday in Feb, May, Sep, Nov, Huntington Town Hall, Room 114. Contact Stan Mehlman, N2YKT, at 631-423-7132; Peconic ARC, exams held January, April, July, and October on next to last Friday at 6:30 PM at Southold School, Oaklawn Ave, Southold, NY. Contact Ralph Williams N3VT at 631-323-3646. Mid Island ARC, last Weds of each month at 7 PM at 36 Dew Flag Rd, Ridge NY 11961, Contact: Mike Christopher W2IW at 631-924-3535. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 524, N2AKZ 191, W2RJL 120, KB2KLH 102, WA2YOW 40, KA2YDW 10, KA2UEC 7, KC2FWD 6, N2TEE 5.

NORTHERN NEW JERSEY: SM, Jeff Friedman, K3JF— I wish that everyone had great holidays, and that they are happy and healthy for the New Year— the real millennium. Tfc: K2VX, KC2AHS 54, N2OPJ 54, W2MTO 50, N2RPI 41, KB2VRO 30, W2JG 29, N2GJ 26, K2PB 17, W2CC 16, K2DBK 11, KC2ANN 10, KB2VVB 8.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—Happy New Year! TSARCN is at it again! They have been awarded a WalMart "Making the Difference Award." Congratulations! And well done! The editor of the "Bandspread" says that it is easier to create the Newsletter with too much information than when there is too little. Boy, is that an understatement! With that said, please send me your newsletters... and help your local editor also. DMRAA did three events on Sep 30. The Ottumwa club worked Oktoberfest once again. There were 7 amateurs participating? DARC officers for '01 are K9UQI, N9TPQ, K9FHX, WM0D, plus N0BFJ and W0OMV are new to the board. EIDXA elected new officers. I'll let you know who they are when I find out. They are also ordering new shirts and jackets. That should make them a distinctive bunch! Story County had a program on chasing DX. They will soon have a Web page also. I have no URL. The Northern Iowa club had their Christmas dinner meeting at the Rose Bowl on Dec 15. I guess that was early

MFJ TUNERS

MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

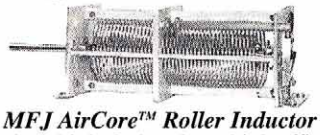
The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

MFJ-989C **$359.95**

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).



MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

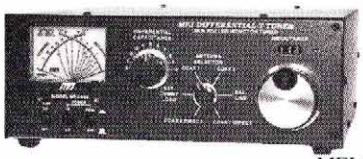
Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

MFJ *No Matter What*™ Warranty

MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

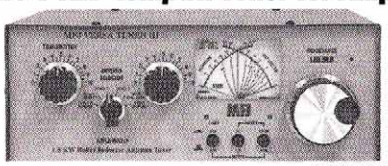
MFJ-986 Two knob *Differential-T*™



MFJ-986 **$329.95**

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

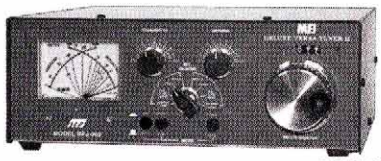
MFJ-962D *compact* Tuner for Amps



MFJ-962D **$269.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner



MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$129.95**

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$119.95**

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

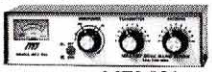
Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners



MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground

MFJ-931 **$89.95**

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

1 Year *No Matter What*™ warranty 30 day money back guarantee (less s/h) on orders from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

enough not to interfere with the football game. I hear that six meters has been really hot lately! Did you work any new ones? How did you do in SS? TSARCN is spending some the earnings from the summer for three new tower sections for the repeater and new feedline. They have been using some almost as old as mine. New officers for FMARC are WB0B, KB0ERK, and KA0DX. Time flies when you are having fun. Another year is gone. Each of us is another year older. Have you done something new? HNY! Newsletters were received from CVARC, TSARCN, DMRAA, DARC, EIDXA, SCARC, CARC, SEITS, NIARC, CVARC, FMARC, OARC. Traffic: W0SS 171, KA0ADF 97, N0JL 22, (Sep) KA0ADF 91.

KANSAS: SM, Orlan Cook, W0OYH—SET is alive and well in Kansas thanks to the following: DEC KA0RID. ECs N0BTH K0UO N0OBM KB0WEQ N0APJ WD0DDG KC0AUH K0FJ K0DXY. The Ks Sideband Net racked up 278 points es 95 for QKS CW tfc net. KSBN NCSs were W0TQ W0NBT KB0DTI and N0KFS. For more see the "KAR" October newsletter es don't forget http:/www.colossus.org/kar/ for other Ks info. Kevin KC0YGL of Salina has accepted the DEC job for Dist 2 and Sid N0OBM has taken Kevin EC job. Bud, N0APJ, of Lawrence has taken the EC position there. We have a new TS, Gary, N0OU, of Hardtner. If you have a net you would like to get listed in the ARRL Net Directory or one updated, go to http://www.arrl.org/field/nets/ Sep Kansas Nets: sessions/QNI/QTC, KSBN 30/1023/79 KPN 22/298/31 KMWN 30/605/453 KWN 30/796/491 CSTN26/1995/91 QKS 60/278/68 QKS-SS 6/11/0 SEC 45/520/12. QNS KC0ABN KB0AMY KC0AUH N0BTH K0BXF KC0CIG WD0DDG WD0DVM (SEC) AA0HJ AA0IQ K0JJV N0LJR W0PBV WA0SSR N0UXG KB0WEQ KB0YQV TEN 289 msgs 60 sessions Kans 75% w/KB0DTI AC0E AA0OF KX0I K0PY W0WWR NB0Z WB0ZNY W0SS mgr. BBS AA0HJ received 23 W1AW Bulletins, Sent 6 Personal NTS tfc 0. Ks Stns tfc: W0WWR 110, WB0ZNY 83, NB0Z 44, W0OYH 36, KB0DTI 35, K0RY 25, N0RZ 15, N0ZIZ 2 OBS, WA0DTH 12. Room 4 UR report here.

MISSOURI: SM, Dale Bagley, K0KY— ASM: John Seals, WR0R. ASM: Bill Coby, KB0MWG. ACC: Keith Haye, WE0G. BM: Brian Smith, KI0MB. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA0A. SGL: E.B. DeCamp, KD0UD. STM: Charles Boyd, KE0K. SEC: Patrick Boyle, K0JPB. TC: Wayland McKenzie, K4CHS. Cliff Ahrens, K0CA DXCC Card Checker. For more news, checkout ARRL MO Web page http://www.qsl.net/arrl-mo. MO Traffic Nets, Daily: SSB 3.963 MHz 5:45 PM. CW 7:00 PM and 9:45 PM 3.585 MHz. The first Hamfest in 2001 will be in St Joseph, MO, on January 20, 2001, with the Northwest MO Winter Hamfest. Sponsored by the MO Valley ARC and the Ray-Clay ARC this is always a fun event. Next up is Winterfest 2001 in St Charles. The Hamfest, sponsored by the St. Louis Repeater Inc, is one of the largest in the St Louis area. A thanks to all of the radio clubs that have been sending me their newsletters. I am glad to get them as hard copy or on the Internet. Some of the clubs include PHD ARA, Bootheel ARC, Kimberling ARC, Heart of America Radio Club, Macon County ARC, Hannibal ARC, Warrensburg ARC, Audrain ARC, NEMO ARC, Lebanon ARC, Mid-Missouri ARC, Boeing Employees ARC, St Charles ARC, Suburban ARC, and Southwest MO ARC. Jeff Young, KB3HF, has been appointed to the position of Emergency Coordinator for St Charles County. John Bowzer, N0YXG, is now the Emergency Coordinator for Buchanan County. A special thanks to John Seals, WR0R, ASM and Patrick Boyle, K0JPB, for their help with the ARRL exhibit and ARES program at the Southside Hamfest in Grandview, MO. Net Sess/QNI/QTC: QCWA 35/4/40/0; WARRCI 5/105/0; MTN 31/421/68 K0IPM; Rollabillboard 30/394/7; N0ATH Rpt 102/0; Jackson Co ARES 4/49/0; 10th region 65% 62/279 W0SS, K0VNB, W0OUD, K9RTV, W2RRX. Tfc: KE0K 77, PSHR: KE0K 105.

NEBRASKA: SM, Bill McCollum - KE0XQ—ASMs: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. Congratulations go to the AK-SAR-BEN ARC for placing first in the Frequency Amateur Radio promotion. K0NSA & W0NSA were the organizers of a job well done. The first prize was an ICOM 746, Heil microphone, 500 ft of RG8X, antenna and antenna switch. Midwest Division Director W0EJ made the presentation at the November 10th meeting. On October 7, a joint SET was held by the MARES and Sarpy County ARES organizations. It involved approximately 50 amateurs from the 2 county areas. W0ERT reports that his ARES organization also conducted a SET that same day. Thanks to all who participated in the event. N0TRK has been appointed an Official Emergency Station. The Ashland ARC assisted the police department on Halloween, keeping the streets safe for trick or treaters. Net Reports: MARES: QNI 304, QTC 5 & 8 sessions. MID NE ARES: QNI 387, QTC @ & 31 sessions. NE 40M Net: QNI 414, QTC 13 & 28 sess. NMPN QNI 1674, QTC 11 & 31 sess. West NE Net: QNI 1489, QTC 160 & 26 sess. ENE ARES: QNI 513, QTC 2 & 30 sess (Oct). W0IRZ Memorial Net: QNI 68, QTC 3 & 5 sess. NE Storm Net: QNI 914, QTC 16 & 31 sess. Tfc: KE0XQ 22, W0RWA 10, KC0DA 4, W0WHY 2, KB0MTT 2, W0EXK 2, KA0O 2, KA0DOC 2, K0RRL 2, WY0F 2, KA0DBK 2. PSHR: KB0YTO 36, KB0YTM 22, KC0HOX 51, KA0DBK 81.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: W1GC. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. I wish you all a very happy and healthy holiday season and hope that the New Year brings you all the very best that life has to offer. I am writing this just before Thanksgiving thinking about how grateful I am to all of you volunteers out there who continue to do so much for the hobby. My experience over the last nine years has been and continues to be very pleasant working in a section that I think enjoys a good team spirit. Oh sometimes we have a hard time recruiting volunteers—we're all busy but the cooperation among you is noticed and absolutely appreciated. DEC Roger, K1PAI, and SEC Darrow, WA1D, have appointed Jim, KD1LD, as assistant DEC for SKYWARN in CT, a position formerly held by Lenny, N1PTG. Thanks to Len for a super job—you were always there to get nets activated! Jim is well known for his work with weather. Just check out his Web site: http://www.99main.com/~kd1ld/wxpage.html. Please give him your full support. The Valley ARA has moved its meeting place to the EOC in Shelton. Members are considering putting together a club station at their new meeting place! For further info contact Jon N1BDF President. CT has a new club organized by Dan K3UFG—The CT Amateur Radio League of Youth.

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

***New** MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!*

***The** world's most popular SWR analyzer just got incredibly better and gives you more value than ever!*

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

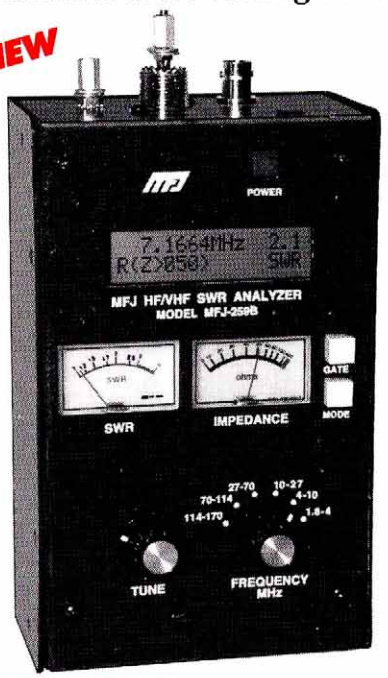
Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

NEW



Call your favorite dealer for your best price!

MFJ-259B **$259.95**

Call or write for *Free* Manual

MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1315, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

How good is the MFJ-259B?

MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ *SWR Analyzers*™

MFJ-249B, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $139.95. Like MFJ-249B but reads SWR only on meter and has no LCD or frequency counter.

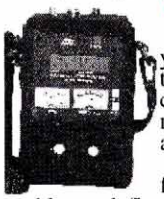
MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

Genuine MFJ Carrying Case



MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. ***Save $5!***

New! ***Tunable Measurement Filter***™

MFJ-731, $89.95. *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8 to 30 MHz in presence of strong RF fields. Has virtually no effect on measurements. Works with all SWR Analyzers.

MFJ *No Matter What*™ warranty

MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

Free MFJ Catalog
Nearest Dealer . . . 800-647-1800
http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders from MFJ

MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

More hams use MFJ SWR Analyzers™ than any others in the world!

This club has just received its certificate of ARRL affiliation! Congratulations to you all! Congrats, too, to John, W1JMA, formerly N2DVX on becoming VP of the CT Spectrum Management Assn. Contact info: w1jma@aol.com. Net sess/QNI/QTC/NM: ECTN 31/255/46/WA4QXT; WESCON 32/297/97/KA1GWE; NVTN 32/125/63/KB1CTC; CPN 32/284/113/N1DIO; CN 29/120/60/N1AEH; CT NTSD 56/976/947/W1WCG. Tfc: NM1K 1907, K1TLK 1050, KA1VEC 335, KA1GWE 140, KA1VED 110, K1STM 66, WA4QXT 54, KB1ETO 7.

EASTERN MASSACHUSETTS: This month's column was co-authored by the two SM candidates Stan Laine, WA1ECF, and Phil Temples, K9HI. With sadness, we note the passing of Richard McGinn, WA1IMS, of Bridgewater. Amateurs turned out in numbers to provide communications for the recent Head of the Charles event in Cambridge. KY1B, Chelmsford, has been playing baseball on the championship Labrador Retrievers team. Billerica ARS sponsored an information booth at the recent Yankee Doodle Day celebration. A dozen hams from the Massasoit ARA operated HF and VHF at the annual Edaville Cranberry festival on Oct. 7. MARA was invited to participate by W1IFX, who is a conductor on the trains there. This year's New England Division ARRL Convention at Boxboro was bigger and better than ever, according to K1TWF. Falmouth ARA holding a class for the General license. Whitman ARC is planning its annual Plimoth Plantation Special Event operation on Thanksgiving weekend as WA1NPO. Boston ARC organized several dozen hams who turned out to assist at the recent Jimmy Fund Walk along the Boston Marathon route. The event raised $3.3 million to benefit the Dana Farber Cancer Institute for children. N1NHZ looking for more hams to become involved in the Boston Emergency Response Team. At this writing, many groups are planning their involvement in the Scout Jamboree On The Air. What about your club? Kudos to the Norwood ARA for a very sharp, attractive e-newsletter, at http://www.qsl.net/k1jmr/newsletr.html. Harvard Wireless Club (W1AF) is making history again: HWC is licensed as WA2XSY/3 for experimental operation on 5 MHz! Look for them and other experimental stations, operating from 5.125 to 5.450 MHz on voice, cw and digital modes. Congrats to W1GSL and the MIT Radio Society for concluding another successful flea market season. MITRS and other area clubs operate a flea on the MIT campus monthly every April until October. Framingham ARA will hold its bi-annual flea market on November 5 as of this writing. Incidentally, their recent License in a Week class was a huge success with 17 new licensees! Tfc: N1LKJ 374, KB1AJ 170, W2EAG 113, WA1FNM 111, K1BZD 84, WA1LPM 71, NZ1D 50, K1SEC 44, N1IST 39, K8SH 38, N1LAH 35, KD1LE 35, N1AJJ 28, N1TPU 28, N1TDF 12, KB1EB 12, WA1VRB 11.

MAINE: SM, Bill Woodhead, N1KAT— RF activity was running 20 over in the month of October. From Fort Kent to Kittery, it gives me great pleasure to tell you that the fine folks in the most northern part of the state, involved with the St. John Valley ARA, have become League affiliated. Congratulations to all of you! Fort Foster in Kittery was where hundreds of young scouts were given a dynamic display of Amateur Radio by the following: W1CEK, W1PIE, AA1SB, AA1MI, AA1CA, N1LBG, and KA1GJB. Terrific job! From Central Maine, at the Topsham Fairgrounds, N1MHC, N1RY and W1ME did a great job with the Boy Scouts in showing them the future in communications with satellite demonstrations. From Down East, K2LOT was working with the Girl Scouts to give the future YLs a hands-on with the wireless world. Camp Roosevelt, just outside of Bangor was the scene of a tremendous display of contribution of time and labor to show future Hams tomorrow's technology, tnx to: K1GUP, W1WL, W1CN, N1GNN, N1OJH, N1ATO, W1SUE, W1COP, W1CHC, N1WTC, N1TCM, N1UAM, N1OJD, N1UCP, N1ZPM, N1UHG, N1NGM, N1UHN. A fantastic job was done by the Portland WA in hosting the AMSAT 2000 Convention. Tfc: W1KX 150, W1JTH 45, W1UNQ 39, W1QU 37, N1JBD 30, KA1RFD 23, W1JX 22, W1BLT18, KA2ZKM 10.

NEW HAMPSHIRE: SM, Al Shuman, N1FIK (n1fik@arrl.org)— Web site (www.nhradio.org) I hope everyone is enjoying their holiday season. I continue to work on assembling the Field Organization Management team. Pleased to announce the ASM appointment of Bryan King, K1SNH, for Technology Iniatives. An in-depth job description appears on the Web site under "What's New". By the time this column appears, NH will have held its Simulated Emergency Test (SET) on 11/18. The prime focus this year is to identify skills and assets in NH. ARES has begun the re-building process with the appointments of Harvey Schow, W1ZIZ, and Jeffery, Demers, N1SNB, as ECs for Manchester & West Rockingham districts. I have also begun visiting clubs with CNHARC on 11/7 and IRS and Amoskeag on 11/9. I hope to visit more of you before the heavy snow. Sad to report of the passing of Rob Fair, WA1UKV. Rob was a valued member of the CVRC. Thank you to those who have contacted me offering to volunteer. We still need more people to help with the workload. If interested in volunteering please e-mail me or call at 603-487-3333 with your strengths and interests. Don't forget to check your generator and again happy holidays -73, Al. Net NM/sess/QNI/QTC: GSFM N1RCQ 31/2229/34; GSPN WB1GXM/29/136/82; VTNH WA1JVV/31/125/107. Tfc: W1PEX 880, WA1JVV 140, W1ALE 55, WB1GXM 30, N1NH 18, N1CPX 14, K1STV 11.

RHODE ISLAND: SM, Armand Lambert, K1FLD— ASM: W1YRC. OOC: W1AOM. STM: KA1JXH. TC: N1DKF. PIC: WB1P. SEC: N1JMA. Perched high atop Landmark Medical Center in N Smithfield, the emergency antenna installed by BVARC members proved to have far reaching results even though the test was conducted using low power to simulate emergency conditions. Thanks for the great project accomplished by AA1VU, KB1CW, KD1YM, W1YRC, WA1E, N1WWG, K1PZY, N1MIU, K1FLD, N1BU, N1DO, KB1RJF, WB1P, K1KML, N1MUB, W1AUT, and WA1UKR. // Fidelity Amateur Radio Club reports progress on their emergency communication trailer is on schedule and will be ready for Field Day 2001. Check out the photo of their Field Day site on page 107 *QST* Dec. issue. // The 223.76 Lincoln repeater is back on the air after a thorough maintenance thanks to Steve, WA1POX. // The ARRL Spectrum Defense Fund is again in need of our support as little Leo's are surfacing again as a threat to amateur radio frequencies. Contribution can be made at any time. Keep in mind that supporting the league supports our own best interest. // Wishing you all a Happy New Year and a year filled with fulfilling communications!

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1NZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Ten meters is open to all areas of the world on a daily basis. K5K asked for QRP stations, and I turned the rig to 5 watts and worked them. Peter, K1II, Eric, N1QKO, and Tom, N1MUV, presented RACES, SKYWARN and ARES to the Mt Tom meeting during their Oct meeting. Don, N1ISB, and George, KB2SAI, won NOBARC's foxhunt for June followed by Tim, KE3HT, in Aug and Todd, N1HXR, in Sept. Under the guidance of Steve, KA1PIJ, and Paul, N1ISB, the Fall Foliage Parade in N Adams had commo backup furnished by NOBARC group. It with regret that I have to announce the passing of W1IPZ, of Shirley, MA. Gerry was a life member of the MARA club. A good friend, excellent operator and Elmer to many, he will be missed. If you know a ham that has not been active, give him a call and encourage him to get back on the air. Tfc: W1ZPB 29, N1SSC 14, N1ISB 11, N1WAS 61, KD1SM 11, K1TMA 211, W1SJV 18, W1UD 237. (Sep) W1ZPB 87.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T — We are looking to increase the number of Official Observers throughout the Section. Contact KL5T or KL7IKX for info. Alaska HF Pactor Gateway Network is expanding. We need stations at major hubs throughout AK. AL7PI is heading the effort. Get ready to sharpen your traffic handling skills. Girl Scout campout this upcoming summer may generate hundreds of pieces of traffic! Are your nets prepared to handle the volume? We are still looking for a sponsor for our state PRB-1 effort. Will your state representative be willing to help? Contact your State Government Liaison, Rob Wilson, AL7KK for input. HF nets: Sniper's Net 3920 1800 AST, Bush Net 7093 2000 AST, Motley Group 3933 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Please report communication drills and exercises, emergency communication activations, and public service activities on FSD-157 to KL5T.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—I just heard of a new radio service created by the FCC called "MURS", the Multi Use Radio Service on the 1521 MHz band. This could challenge ham radio as repeaters are permitted along with phone patching, packet, data, and external antennas. Users can use up to 2 watts of ERP. I'm wondering, too, with more people sending e-mails if sending messages via Amateur Radio is becoming more of a novelty than a necessity. In memoriam: Leon Anderson, KF7GL, of Spokane became a Silent Key on October 29th. All 9 OO stations reported monitoring activity for September. 73, KA7CSP. Net Activity: WSN: QNI 873, tfc 237; Noontime Net: QNI 8905, tfc 362; WARTS: QNI 3405, tfc 113. Tfc: K7GXZ 272, W7GB 194, K7BFL 93, KA7EKL 66, KK7T 19. PSHR: W7GB 138, K7GXZ 121.

IDAHO: SM, M.P. Elliott, K7BOI—OOC: N7GHV. SEC: AA7V. STM: W7GHT. Section winners of high score for Field Day 2000 are N7CE and WC7F - N7CE with 4,220 points in the multi-op category and WC7F with 1,645 points in the individual category. N7CE had 5 operators in category 2A-battery. WC7F won in category 1B-battery (second year in a row)! Congrats to all Idaho participants! The Section awards plaques for the high scores in multi-op and individual categories each year. Make a goal to be involved Field Day 2001 and bring home the hardware! Idaho Bureau of Disaster Services reports an increase in SET participants in 2000. Thanks for the help! 73 - Mike, K7BOI. Tfc: W7GHT 348, WB7VYH 92, KB7GZU 55, N7MPS 2. PSHR: W7GHT 127, WB7VYH 113, N7MPS 25. Nets: FARM 31/2551/35/W7WJH; NWTN 31/918/67/KC7UND; IDACD 23/388/10/K7UBC; IMN-31/416/ 256/W6ZOH. http://id_arrl.homestead.com/mainpage.html.

MONTANA: SM, Darrell Thomas, N7KOR—It is an honor having two members of the MT Section as members of Team USA in the ADRF World Championships in Nanjing, China. Congratulations to Harley , KI7XF, and Karla, KC7BLA, Leach of Bozeman, MT, for being selected to the team. Members of YARES, the emergency communications group of the Yellowstone Radio Club participated on October 18 with the National Weather Service in Billings. The Weather Service issued a simulated severe weather warning involving a winter storm. YARES members responded to the various warning siren sites around the city to confirm operation of each. Other members reported to the Emergency Operating Center and conducted HF contact for DES with the State using the Montana Traffic Net. Traffic was sent to the MT State EOC. This group continues to be heavily involved with County Agencies in Emergency Communications. JOTA was well represented in the Section. The Great Falls Area ARC set up their tower trailer and full Amateur Station at a local shopping mall and invited scouts from the entire area to participate. 32 scouts responded making 29 contacts in 17 states and the Providence of Ontario. Net/QNI/QTC/NM MSN 121/2, MTN 1849/51 N7AIK, IMN 416/256 W6ZOH. PSHR: N7AIK 116.

OREGON: SM, Bill Sawders, K7ZM—On November 10th, I attended a Deschutes County workshop regarding cell tower and Amateur Radio tower proposals. Both were tied together in a single ordinance. I spoke of how ham radio today is helping law enforcement and other emergency teams, and gave reasons why towers should be higher than the proposed 30 foot maximum. I reminded the commissioners how hams helped during our most recent fires, floods, earthquakes and hurricanes, and how we worked together with the Red Cross and other officials. Finally, I introduced PRB-1 and Oregon Senate Bill 879 to them and there was a discussion. Finally, a vote. "Let's adopt the wording of Senate Bill 879 and insert it into our county ordinance, keeping Amateur Radio out of the proposed cell tower and wireless legislation". Even thought the Senate Bill states a 70-foot limitation, all present towers are grandfathered and a future meeting will be held to increase the Amateur Radio tower height to 130 feet in "designated areas." Scenic areas, such as along the Deschutes River and various waterways, and where c.c. & r's prohibit antenna structures, will prevail. I wish to thank Wayne Jack, KK7TT, and others who got involved with this motion. Had it not been for them, this ordinance could have passed through committee, and became law within our community. This scenario can happen in your area, too. Keep

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

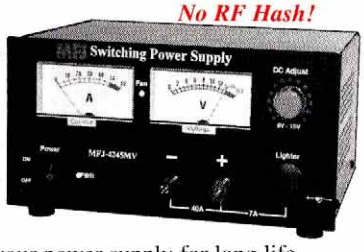
You won't burn up our power supplies!

No RF Hash!

MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV
45 Amp
$199.95
plus s&h

No RF Hash!



They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¼Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

NEW! 25 Amp *MightyLite*™

Super light, super compact switching power supply delivers 25 Amps maximum/ 22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¾D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
$54.95

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

NEW! MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

Free MFJ Catalog
Nearest Dealer . . . 800-647-1800
http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

All are protected by MFJ's famous No Matter What™ one year limited warranty.

your eyes and ears wide open. Check your local newspaper for county meetings and workshops, and be ready to join others in keeping our hobby free of city and county ordinances regulating Amateur Radio. Keep in touch. NTS traffic totals for October: W7IZ 113. K7NLM 107, N7YSS 101, W7VSE 69, KC7ZZB 67, KC7SRL 55, N7DRP 30, KC7SGM 8, KK1A 4.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—Are you prepared for an emergency? Let's assume the lights go out while you are reading this column. Where is the flashlight, your handheld? How do you operate that HF transceiver? Of course your furnace won't start and it's freezing outside. Don't expect your car to start, the radiator is frozen. By morning the only thing not frozen will be the food in your refrigerator. Of course you will know when the thaw arrives because your basement will be flooded. What? Your toolbox is under water? And you didn't remember to turn off the water to the outside water faucets last fall? Should we have a personal simulated emergency test every day? The only way to prepare for a real one is training and practice. Section Emergency Coordinator N7NVP comments as follows: The Simulated Emergency Test (SET) was the primary focus last October. Fortunately, there is no standard or mandated way to conduct SET. Every unit has its own specific training and operational needs. The units who did SET are better off for it. Those who didn't please consider conducting a training event that will enhance your overall performance and usefulness to the community. When you have meaningful training, membership participation increases and a normal comment afterward will be, "We need more of this." Thank you to everyone who took part in SET. Perhaps next year we can have District/Regional level SET and exercise Regional nets with the State. Real world activity included; Jefferson Co where ARES assisted an overdue hiker and Cowlitz Co conducted an ELT search. Do you check in to the 75 meter traffic nets. Are you on time? Late check ins are of little value to a net. Here are a few of the traffic handlers and their report for October. N7AJ 26, K7BDU 698, W7BO 179, W7LG 127, K7MQF 79, W7NWP 166, W7QM 73, K7SUQ 18, W7TVA 254, N7YSS 101, W7ZIW 174. Fortunately the Official Observers of Western Washington had little to report during the fall months. Check out: http://www.hamtowerlaw.com and RCW 35.21.315 which directs that cities be reasonable and accommodating to radio amateurs. Perhaps a new law in Washington may emerge before Spring. 73.

PACIFIC DIVISION

EAST BAY: SM: Andy Oppel, KF6RCO—ASMs: KC6TYB, KE6QJV. SEC: KE6NVU. DECs: KE6QJV/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. OOC: KD6FFN. STM: W6DOB. ACC: KC6TYB. EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. Congrats to new section appointees: STM: W6DOB, ACC: KC6TYB, Alameda County DEC: KE6QJV. Many thanks to AD6KV for many years of service as ALCO DEC. MDARC mourns the loss of long time member KJ6YE. ORCA mourns the loss of W6FDJ. VVRC reports that N6ZU is back home and doing well. CCCC members showed their resourcefulness (and hard work) in getting an old repeater online while their new one was being repaired. ROVARC made the job fun by holding a QSL signing party. Oct tfc: W6DOB 597. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7PM; NCN2-SLOW SESSION/3705/9PM; NCN-VHF/145.21/7:30PM; RN6/3655/7:45 PM & 9:30 PM; PAN/3651/7052/8:30PM. Your check-ins are always welcome.

NEVADA: SM, Jan Welsh, NK7N—ASM: Dick, W6OLD. TC: Jim, NW7O. SEC: Paul Cavnar, NN7B. Busy month and regretfully, a letter of resignation from NM Bobby Eason, AB7WZ. Bobby's been put out of commission by illness. We're wishing you well in a hurry Bobby! N7JEH - Joe, in Elko handling net temporarily. Thanks to W6OLD for attending Pacificon 2000 as my representative. Dick's report on antenna/tower problems after he talked to Dave Sumner wasn't encouraging. Each battle having to be done on a local level across the country. If any of you are dealing with this problem yourself, send me any details. I'll keep them on file here as well as forwarding a copy to the ARRL. One keynote item was a push to get amateur radio into the schools. Benefits include improvements in geography, language, math and science. Riley Hollingsworth, K4ZDH, FCC Special Counsel discussed the Amateur Auxiliary, of which he is a big fan. Several of our appointee's are planning on talking the Certification Program covering Emergency Communications. This is our most important activity. Column deadline is 12th of the month. 73, Jan. Tfc: W7VPK 70, N7CPP 16, K7NHP 5.

PACIFIC: SM, Ron Phillips, AH6HN—Dale Fajardo, KH7D reports the stats for the Emergency ARC Net (Diamond Head Rpt 146.88 and 444.5) for Oct are: QNI: 294, net time: 546 mins. Lee Wical, KH6BZF, reports the EARC 2001 Officers and Board of Directors elected are President-AH6QO; VP-AH6Q; Secretary - AH7MI; Treasurer - WH7K; Director - KH7UK; Director -KH7CHI; Director - AH7D; Director - KH7V; Director - WH7O; Director - KH6JKG; Director - AH6P. A hearty congratulations to the incoming Officers and Directors. A very big Mahalo to the outgoing Officers and Directors. Lee also reports that in October he had the opportunity to visit with Francis Blatt, KH6KH, who celebrated his 90th Birthday and related he has been doing Amateur Radio since he was 16-yrs old. WH6CRU reports the Maui ARC is looking for officers for the upcoming year. Contact Dave for further info. KH6B reports Howard Atebara, KH6GZ, became a Silent Key October 3, 2000. He was K6OIW (Hawaii) pre-WWII and an early member of Hilo ARC in the 1930s. Hawaii Chapter QCWA held their semi-annual meeting in Hilo 10/21/00. KH6CC received a 60-Year award and KH6B received the 50-Year award. W6ORS, reports John Prugh,WH6AVX became SK on 10/13/00. The Hawaii Afternoon Net (HAN) is still in full operation. The net now QSYs up or down the band depending on QRM from the Spanish speaking operators. Mahalo and 73.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—A very happy and safe new year and new millennium to all. May this year be a good one for each of you personally and in your amateur radio endeavors. A recent edition of the GEARS Newsletter (President's Message) contained some excellent comments about how Amateur Radio public service is essential to the future of our service. ARRL Executive VP Dave

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own voice!

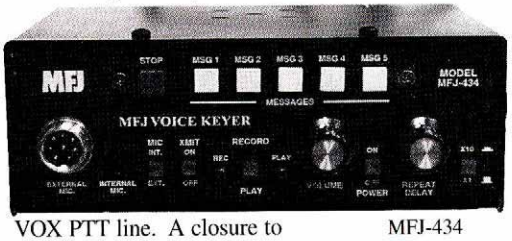
Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" and more! Contest by pressing a few buttons and save your voice.

You can record and play back five natural sounding messages in a total of 75 seconds. EEPROM technology keeps messages stored for up to 100 years -- no battery backup needed.

Repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes calling CQ so easy and it's also a great voice beacon.

A receive audio jack lets you record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by pressing the *Stop Button*, your PTT mic button or by your VOX PTT line. A closure to ground via remote control or computer can also halt messages.



MFJ-434 **$179.95** plus s&h

Has jack for remote or computer control (using CT, NA or other program and its interface). Lets you select, play and cancel messages.

The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

For marathon contesting, DXing, traffic nets, ragchewing . . . These lightweight, fully padded Boom Mic Headphones make operating superbly comfortable! Flexible gooseneck microphone boom and speech frequency tailored microphone cuts through noise and QRM!

This *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

Superb 3/4 inch thick padding on each ear and headband lets you wear your headset all day long! So super lightweight, you won't even know they're there! Headband adjusts for a perfect fit to keep out external noise.

The headphones' frequency response is enhnanced for communications to bring out speech fidelity that you never knew existed. Signals never sounded so crystal clear.

The flexible microphone boom lets you position the mic comfortably at an optimum distance to minimize silibant sounds.

MFJ's frequency tailored microphone element lets you bust through noise and QRM!

Extra-long 9⅔ feet of cable lets you move about your ham shack!

Has standard 1/4 inch jack for headphones and 3.5 mm jack for microphone. Build your own adaptor or use MFJ's pre-wired adaptors to match your transceiver. **Order** MFJ-5396 Y/K/I (YAESU, KENWOOD, ICOM respectively). $15.95 each.

Even casual operators will appreciate the advantages of MFJ's superbly crafted Boom-Mic headphones for *hands-free* operating at an incredibly low price.

MFJ-392, $19.95. Communication Headphones only. Great for ham radio, shortwave listening -- all modes, SSB/FM/AM/ Data/CW.

Each phone has individual volume and speech enhancement control. Superb leatherette padding.

Both MFJ-392 and MFJ-396 have MFJ *No Matter What*™ one year limited warranty.

MFJ Communications Speaker

MFJ-281 **$12.95** Ship Code A

SSB, FM, AM, and CW never sounded so crystal clear! Plug in this MFJ-281 *ClearTone*™ speaker and bring out communication speech fidelity that you never knew existed. Restores the smooth sinewave sound that CW naturally generates and makes copying easier. It was carefully designed to improve intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static and hum. A top grade 3" Mylar cone speaker is mounted in a well designed baffle. Its fine mesh metal grille allows sound to radiate without muffling. 8 Watts, 8 Ohms. Six foot cord. 3.5 mm mono plug. 3¾x3x2¼ inches.

MFJ 12/24 Hour *DXers Watch*

MFJ-181 **$39.95** plus $6 s&h

This *MFJ DXers Watch* lets you quickly check 12 hour local time and 24 hour time in time zones around the world. By noting day and night areas around its rotatable bezel, you can estimate which bands are open each hour to different parts of the world. You can even estimate best times of gray line propagation. It features a highly accurate *Japanese* quartz movement. Turn out the lights . . . *NiteGlo*™ hour, minute and second hands show up in the dark! Has date display. Well-known world cities encircle it's attractive world map face to indicate time zones. A durable stainless steel band adjusts to fit. Attractive giftbox has felt padding. A great gift!!!

MFJ 12/24 Hour LCD Clock

MFJ-108B **$19.95** plus $6 s&h

Dual Clock with separate 24 hour UTC and 12 hour local time displays. Large 5/8 inch LCD numerals, heavy brushed aluminum frame, sloped face, battery included. Synchronizable to WWV. 4½x1x2 in.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800
http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST. Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

Sumner, K1ZZ, made similar points in his keynote talk at PACIFICON. We are working to expand the number of appointments in certain field organization positions within the Section. The northern part of the Section (Chico area north) needs additional appointees in: public information, official observer, OES, technical, and traffic handling classifications. Donna, N6SVV, is a new (and northernmost) PIO in the Section. Thanks for applying! Russian Cosmonaut, U4MIR, recently visited in the north state and presented interesting talks at schools and service clubs regarding his three trips into space. It looks like we are at or very near the peak of the current sunspot cycle....take advantage of it! Until next month 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. TC: N1AL. The Fort Bragg group is now holding an evening meeting monthly in addition to their weekly coffee get togethers. Petaluma ARES EC Mike Knope, KD6LYU, held a SET. They passed traffic for the Petaluma Fire Department and demonstrated SSTV and packet. Santa Rosa ARES EC Rich Freitas, KF6SZA, also conducted a SET. Their simulation covered three hospitals and two shelters passing drill messages about every five minutes. The group included new and experienced operators. Sonoma County Radio Amateurs reports the loss of valued member Jim Pelmulder, N6PTM, SK. Jim fought a valiant battle with ALS. Jim was a past president of the club, a past Sonoma County RACES Radio Officer, a CDF- IP and was involved in the restoration of the radios aboard USS Pampanito. Jim will be missed. Humbolt ARC is holding a pie and ice cream fundraiser to raise money for the 2001 SF section convention in Ferndale, June 23-24. The San Francisco ARC had a membership and info table at the most enjoyable Pacificon in Concord. Lambda ARC/GG completed a licensing class graduating 5 students to our hobby. Marin ARC's Ed Karl, K0KL, and Doug Slusser, KF6KU, recently held an equipment check-up clinic where they tested members' equipment while demonstrating proper testing procedures and educating the membership. Winter is here! Keep your batteries charged and your volunteer communications skills sharp!

SAN JOAQUIN VALLEY, SM, Donald Costello, W7WN—I am pleased to announce that on October 21, 2000, at Pacificon, as your Section Manager of the ARRL, San Joaquin Valley Section, I signed a Memorandum of Understanding with San Francisco Field Office Enforcement Bureau of the Federal Communications Commission. Signing for the FCC was Thomas Van Stavern, District Director of the San Francisco Office. Present at the meeting was Riley Hollingsworth and Thomas Hora of the FCC, Jim Maxwell, W6CF, Pacific Division Director and Bob Vallio, W6RGG, Pacific Division Vice Director. The purpose of this Section level M.O.U. is to establish a direct relationship with the S.F. Office of the FCC and the S.J.V. Section Amateur Auxiliary in a joint effort to improve Commission Rules compliance in the Amateur Service. This is the first local M.O.U., in force, with the FCC in the Pacific Division. I am committed to bring about enforcement of Part 97 of the Commission's rules for the Amateur Radio Service as is Victor Magana, N1VM, Official Observer Coordinator for S.J.V. Section and his fine staff of Official Observers.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W — SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. The Santa Cruz County ARC had a club barbecue-potluck at the home of Jim, KF6YRD, and Norma. The 54 folks in attendance had a wonderful time. SCCARC meets at 7:30 PM on the third Friday at the Dominican Hospital, 1515 Soquel DR, Santa Cruz. The West Valley ARC is in the process of electing club officers. Their newsletter contains the candidates' statements this month. At the WVARC meeting, they heard from Eric, WA6HHQ, and Wayne, N6KR, from Elecraft of the latest company products. WVARC meets the 3rd Wednesday, 7 PM at the Campbell Community Center. See http://www.wvara.org for details...The Naval Postgraduate School ARC meets the 2nd Thursday of the month at 7 PM local in Spanagel Hall Room 400 at the school. They also have a monthly "Eyeball Breakfast" (!?!) 0800 on the first Saturday at the Marina Village Restaurant in Monterey...The Lockheed-Martin ARC has a club net every Wednesday night at 8 PM local on the linked club repeaters, WA6GFY (224.28-100 Hz, 443.775+ 100 Hz, 1283.7- and 145.62 Simplex). The net is simply to pass information of a formal or informal nature. For more info contact WB6PVU/Terry tnak@pacbell.net The SCARES (South San Mateo County ARES group) heard from Sgt.. Robin Pitts of the Belmont PD - and also EC for Belmont. Robins father, Ron K6TJU) brought the Millbrae communications van for a look-see. SCARES meets third Thursdays, 7:30PM at the San Carlos City Hall...The Millbrae ARC MARC's Pumpkin Patch Patrol was active on Halloween. 73 de Glenn, WB6W. Tfc: W6PRI 2.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC— http://www.ncarrl.org. The statewide SET during the first weekend of November was a great success. We had participants from all parts of the state, and learned a lot about our capabilities. Make sure you send the SET paperwork in as soon as possible. While points are not the primary reason for holding the SET, it gives us a basis for comparison with previous years. You may want to have a critique meeting soon to evaluate your group's strengths and weaknesses. Congratulations to Marvin Whatley, AA4YW, of Oriental on qualifying for a Public Service Honor Roll certificate. The PSHR certificate recognizes extensive participation in the National Traffic System, and is not limited to just messages handled; it includes net participation, net control functions, liaison functions, and so forth. Marvin has made the PSHR listing in *QST* each month for a year. Thanks, Marvin, for all of your activity. While I'm on the subject of NTS, we need some liaison stations to participate in the daytime 4th Region Net. Right now, we have a couple of people handling all seven days, and this is asking too much of these individuals. If we could get five more, no one station would have to assume a tremendous burden, and we would have enough folks to cover those days when someone needs to be absent. If you have one afternoon free each week, consider serving as a liaison. Radio clubs need to make sure they file annual reports with ARRL HQ so we will have the correct contact information for your club. With officer changes each year, and area code changes seemingly more often than that, we need all clubs to verify their information. The easiest

MFJ *tunable* Super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP Filters

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phasse filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

U.S. Patent D374,010
MFJ-784B
$249.95

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive *tunable Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with variable aggressiveness, new quieter 2½ Watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and automatic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95**. Gives you most features of the MFJ-784B.

60 dB Null *wipes out* noise and interference

MFJ-1026
$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

MFJ-1025, $159.95. Like MFJ-1026 less built-in active antenna, use external antenna.

Add DSP to any Multimode

MFJ-781
$129.95

Add "brick wall" DSP filtering to any TNC or multi-mode data controller. Copy signals buried in noise and QRM. Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, GTOR, Clover, RTTY, SSTV, WeFAX, FAX, CW -- nearly any digital mode. Automatic gain control, On/Off Bypass switch. Plugs between transceiver and multi-mode. Uses 10-16 VDC or 110 VAC with MFJ-1312B, $14.95. 4½x2½x5 inches.

DSP for your MFJ-1278/B

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

MFJ-780
$99.95

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

MFJ . . . the world leader in ham radio accessories!

way to file the report or examine your club's status is to do it on the Web (http://www.arrl.org/field/club). I visited meetings of the Randolph ARC (Asheboro) and Triode ARC (near Murphy) recently. Both clubs were very friendly and are planning many activities for their members. Looking for some suggestions for your ARES training program? The ARRL Amateur Radio Emergency Communication Course is coming soon; to be made available on the arrl.org web site sometime in early 2001. Use this to supplement your own program. If you have something that works well in your program, let others know about it. Oct Traffic: W4EAT 517 (BPL), AA4YW 153, KI4YV 140, K4IWW 134, AB4E 110, NC4ML 101, KE4JHJ 88, W4IRE 62, W3HL 33, KE4AHC 34, AD4XV 32, W4CC 27, WA4SRD 23, N0SU 16, KE4YMA 14, AE4HJ 13, KF4YHG 9, WA2EDN 8, N8UTY 8, NT4K 7.

SOUTH CAROLINA: SM, Patricia Hensley, N4ROS —A measurement of leadership can be ascertained by noting successful outcomes of an organization. Therefore, it would be appropriate to present SC ARRL accomplishments during the past year: Proclamation by Governor for emergency communications program; approval of Amateur Radio education/training curricula; increased partnership with Red Cross; state certification of 65 volunteers for public service communications support; active ARES/RACES HF/VHF nets; coordination with NWS for new community action program; ARRL representation at all SC hamfests; and continued recruitment for ARRL membership. I look forward to another outstanding year with continued service and support to SC ARRL. NEWS FLASH: SC has been chosen to be one of the first ARRL sections offering the new ARRL Amateur Radio Emergency Communications Course in a live classroom setting. Contact me immediately for details. Merry Christmas, Happy Holidays and a joyous New Year. Tfc: KA4LRM 58, W4DRF 45, KA4UIV 41, WA4UGD 39, AF4QZ 36, K4BG 17, KA4IGE 12.

VIRGINIA: SM, Lynn Gahagan, AF4CD—SEC, OOC: KR4UQ. STM: W4CAC. ASM/A: KE4MBX. ASM/B: W4TLM. ASM/C, TC: W4IN. ASM/D: KC4ASF. PIC: W2MG. Greetings to all! Buddy, W4YE, one of our Roanoke Div Assistant Directors has brought to my attention that Auto-Call, a monthly publication of the Foundation for Amateur Radio has published a list of scholarship winners in their November issue. Quite a number of young Va Hams won scholarships and their calls are KF4HJO, KC4SZT, KG4EIF, KD4COA, KF4PAS, KF4LGR, N4XDR, KF4MFK, KO4SJ and KE4ACK. It's great to see these young people in ham radio get financial help for college! I am pleased to report that Jim Sausa; KD4LAV, has accepted the position of EC for the County of Stafford. I am sure Jim will do a great job. Please give him your support. On October 28 at 1400 the Hanover County dispatcher requested Henrico County ARES to help them due to their trunked system being down. The County radio was out for a total of almost 3 hours. It went down twice. Within 20 minutes, one ARES unit was on the scene at the 911 Center in Hanover County. Within one hour, all stations that were requested to be staffed with ARES personnel were. Hams from Prince George and Chesterfield also joined in to help. The team did a great job on response and professionalism. The Incident was terminated at 1630. Ken Pierpont, KF4OW, reports that the Amateur Radio satellite station, KE4XZW, located at the Virginia Air & Space Center in Hampton has been selected to have one of the very first scheduled communications with the International Space Station Astronauts in the next millennium. Hampton's Armstrong Elementary School students and former students will be the "participating" school group. Mrs. Denise Carson is the "Leader" in charge of the participating students. Wally Carter, K4OGT, Chief Control Operator for the satellite station will handle the radio systems for the communications. A large number of students from Hampton Schools are expected to attend this special event. Station, KE4ZXW, completed 5 full years of fully automatic, 9600 baud digital operations on September 21 at 7:00 PM. There is no other known fully automatic station in the world, even commercial or government that has demonstrated such a performance feat. Very 73 de AF4CD. Tfc: W3BBQ 224, KQ4ET 215, WA4DOX 118, K4YVX 102, K0IBS 101, AA4AT 90, KV4AP 76, W4CAC 75, K4MTX 65, KR4MU 57, KV4AN 52, N4ABM 46, WB4ZNB 44, W4UQ 32, WB4UHC 31, AF4CD 23, KU4TM 17, W4SEE 14, W4YE 13, KU4MF 12, W4JLS 9, K4JM 8, KB4CAU 5, N4FNT 2, W4MWC 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart, WD8V— Hello and Happy New Year or if you would Happy New Millennium for those of you who feel that the world started in year 1. Although I am writing this in early November, it is intended for the January issue of *QST* which you will receive in mid-December, a couple of comments in regard to the Internet and the FCC and ARRL uses of it. Both Websites have been upgraded and changed and I urge all amateurs to make use of these facilities. The FCC has changed from the ULS to CORES and the 80% of you who failed to subscribe the ULS system will automatically be converted. In response to my query last month, I received a card from W8WVM indicating he was in December 1992 the First WV Amateur to receive his 144 MHz WAC and August 2000 the First WV Amateur to receive 144 MHz WAS. Congratulation Arnold. Let's have some more news about WV Amateurs and Amateur Radio. 73 Tfc: KA8WNO 258, WD8DHC 121, W8YS 107, WD8V 77, KC8CON 45 ,WW8D 37, N9MNA 11, N8BP 9, W8WWF 7. PSHR: WD8V 256, W8YS 163, WD8DHC-128, KC8CON 124, KA8WNO 118, WW8D 100, N8MNA 71. WVFN 1128/113/30. KC8CON; WVMDN 795/19/31 WW8D; WVN E 150/85/31, W8WWF; WVN L 138/43/31 W8WWF.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Tim Armagost, WB0TUB— ASM: Jeff Ryan, N0WPA. SEC: Mike Morgan, N5LPZ. STM: Mike Stansberry, K0TER. ACC: Ron Deutsch, NK0P. PIC: Erik Dyce, W0ERX. OOC: Karen Schultz, KA0CDN & Glenn Schultz, W0IJR. SGL: Mark Baker, KG0PA. TC: Bob Armstrong, AE0B. BM: Jerry Cassidy, N0MYY. Happy New Year, and New Millennium to all. 2000 was a pretty busy year with Y2K, fires, floods, and phone outages. Emergency service groups were pressed into service throughout the year helping our served agencies meet their public need. This is Amateur Radio at its finest, and thanks to all who gave of their time and talent to help their neighbors. A special thanks and congratulations to Wes Wilson, K0HBZ, of Woodland Park. Wes was selected as the 2000 Colorado Section Amateur Radio Operator of the Year. Due in part to his participation in numerous emergencies and disasters, Wes was also president of the Mountain Amateur Radio Club, and the editor of the club newsletter. I don't know how he kept up! With others assuming some of those duties in 2001, perhaps Wes will learn how to breathe again. Veterans Day 2000 (11/11) dawned snowy with treacherous roads up and down the Front Range. I was planning on attending the RMRL swap, but either fear or common sense prevailed and I stayed at home. Our SM, Tim, WB0TUB made the trip and reports that RM division director Walt, W0CP, and our new RM division vice-director, Rev, WS7W were both in attendance at a lively ARRL Field Forum. Turnout was pretty good taking the WX into account. EOSS turned ten on 11/18. Congrats to this group of dedicated and inspiring hams! Email me: n0wpa@arrl.net 73, de N0WPA. NTS traffic: AD0A 121, K0TER 81, KI0RP 70. CAWN: W0WPD 921, W0LVI 508, W0GGP 490, K4ARM 447, N0NMP 418, AB0PG 379, WB0VET 353, K0HBZ 337, W0NCD 313, WD0CKP 284, N0FCR 241, KI0ND 121.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner Net handled 120 msgs with 1326 checkins. New Mexico Breakfast Club handled 200 msgs with 1046 checkins. Yucca Net handled 44 msgs with 600 checkins. Caravan Club net handled 3 msgs with 55 checkins. SCAT Net handled 12 msgs with 520 checkins. Four Corners Net handled 24 msgs with 391 checkins. GARS Net handled 9 msgs with 31 checkins. Rusty's Net handled 82 msgs with 778 checkins. Valencia County Net handled 13 msgs with 42 checkins. Deming ARC Net handled 14 msgs with 88 checkins. Sorry to report the passing of K5MDW, a little known fatality of the first atomic test at Trinity Test Site. It was reported that Lee was exposed to radiation from the cloud that moved east after the first atomic test. Most of the NM hams were not aware that Lee was fighting his final battle with Leukemia that was reported to be the result of radiation from the atomic fallout. The International Hamfiesta in El Paso was a success. Nice to have N5OK, the ARRL West Gulf Division Director, and Charlie Royall, WB5T, the West TX SM. Congrats to K5TRW and his crew for a fine Hamfiesta. Best 73, W5PDY.

UTAH: SM, Mel Parkes, AC7CP—Well, 2000 has come and gone. 2001 is here. Remember how concerned we were last year about that Y2K thing, a big unevent! Well, are you still prepared? Ready for that unexpected event that may call on your emergency grab and go kit? Take inventory now and see what you could do to enhance your ability to respond to any unexpected emergency event. As we enter 2001, what goals or plans are you making to help further our Amateur Radio hobby? Elmer a new ham, help teach someone who wants to become a ham. Hey, try a contest or go for one of those awards you have heard about the other hams getting. You may want to find a local VEC group and help out as a volunteer. I guess the point here is have some fun while you are hamming this year. Don't forget about the VHF Society Swap meet in February, and mark your calendar for the Utah Hamfest July 13-15 at Rubys Inn (Bryce Canyon). 73 de AC7CP.

WYOMING: SM Bob Williams, N7LKH—Keep in mind the 2001 Wyoming State Hamfest over Memorial Day weekend. While it will be sponsored by the Tri-Counties ARC, it will be held in Casper at the Radisson Hotel like last year. The agenda is being prepared and will include a forum on Finding Hidden Transmitters (2-meters) aka Fox Hunting followed by a real hunt outside. There will be a table for Home Brew projects with a prize for the best. As usual, there will be the ARRL forum, ARES/RACES forum and VE testing as well as swap tables. There will be several vendors tbd. The club ladies are putting on craft classes and exhibits in the lobby just outside the doors to the hardware area. Inputs are solicited from all for any refinements in the agenda, particularly with regard to the Fox Hunting. All comments should directed to Jerry Pyle, WB7S, 568-2368, jpyle@tctwest.net, or via the Cowboy Net. There is also a Web page being prepared: http://www.qsl.net/wb7s/2001HamFest.html. Tfc: NN7H 273. PSHR: NN7H 198.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland, KR4TZ—Happy New Year! It's time for our New Year's resolution, and my resolution is to make the Alabama Section even better than is has been before. To help with that goal, I created a new Web site at http://www.kr4tz.org/al-arrl. This new Web site is data driven and designed to keep everybody in the Section updated on what is going on in Alabama. Some of the new features of the Web site include Alabama hams being able to submit news about their local clubs and events and have it posted on the "home page" for easy access. Interactive maps giving information about Amateur Radio Nets, ARES, the Alabama Inter-City Network, and Amateur Radio clubs within Alabama. The ability to submit your PSHR, SAR, EC and Net Reports online. Contact information for the Section Staff, and a calendar of events for which you can submit updates. Even though it took longer than I expected, I hope you agree that this Web site will make the Section more accessible than ever before. Because of circumstances beyond his control, Shane Jackson, K4JSJ is no longer, able to continue as STM. I'm thankful for a fine job that he performed for the Section and hope that he'll return to Amateur Radio as soon as he is able. Christopher Sells (AC4CS) has volunteered to take Shane's place. I would like to thank Chris for accepting the challenges that come with being the STM. One last thing, Butler County and Pike County RACES will have their Hamfest at the Butler County Fairgrounds on January 27, 2001. For more information contact Jerry McCullough (KE4ERO) at 334-382-7644 or KE4ERO@alaweb.com. I hope to see you there. God bless & 73, Bill Cleveland KR4TZ.

GEORGIA: SM, Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. Asst SM/IT: Mike Boatright, KO4WX. SEC: Lowry Rouse, KM4Z. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Susan Swiderski, AF4FO. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. Happy New Year. Has it been a year since we all were speculating about the pending end of the world with the year 2000, now we are not at all concerned about the impending real new millennium. I am pleased to announce that Mike Boatright, KO4WX, has

MFJ ACCESSORIES

MFJ W9INN Balun Box

MFJ-912
$49.95

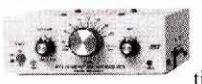
Lets you use coax from your antenna tuner to the MFJ-912 mounted outside your ham shack. The MFJ-912 converts the unbalanced coax to a balanced transmission line (ladder line). Provides szame function as an internal balun except it is located away from tuner. Giant 2 core balun wound with *Teflon*® wire connected to high voltage ceramic feedthru insulators. Handles full legal power with ease. 3¼x2¼x7 inches.

MFJ Artificial RF Ground

MFJ-931
$89.95

Creates artificial RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF ground- ing. Greatly improves your signal if you're using a random wire or long wire antenna with an ineffective ground. Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver

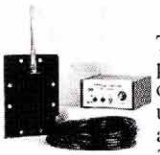


MFJ-9020
$189.95

Throw this tiny MFJ 20 Meter CW transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go. You get a high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 Watts output, semi/full break-in, much more. *Free* manual. See *free* MFJ catalog for 40, 30, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super Active Antenna

MFJ-1024
$139.95



"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna... quiet ...excellent dynamic range...good gain ...low noise...broad frequency coverage...excellent choice". Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz - 30 MHz. Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. 54 inch whip, 50 ft. coax. 3x2x4 in. 12 VDC or 110 VAC w/MFJ-1312, $14.95.

Cross-Needle SWR Meter

MFJ-815B
$79.95

Peak/Average Cross-Needle SWR/Wattmeter shows SWR, forward/reflected power in 2000/500 and 200/50 Watt ranges. 1.8-60 MHz. Mechanical zero. SO-239 Connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $14.95.

MFJ Coax Antenna Switches

MFJ-1701 **$49.95**

MFJ-1702C **$29.95**

MFJ-1704 **$69.95**

Select any of several antennas from your operating desk with these MFJ coax switches. They feature mounting holes and automatic grounding of unused terminals. One year *No Matter What*™ limited warranty.

MFJ-1701, $49.95. 6 position antenna switch. SO-239 connectors. 50-75 Ohm loads, 2 kW PEP, 1 kW CW. 10x3x11/2 inches. DC-60 MHz.

MFJ-1702C, $29.95. 2 positions plus new Center Ground. 2.5 kW PEP, 1 kW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 Ohms. 3x2x3 in. Now has lightning protection. **MFJ-1702CN, $34.95.** N-Connectors.

MFJ-1704, $69.95. 4 position cavity switch with lightning surge protection. Center ground. 2.5 kW PEP, 1 kW CW. 50 dB isolation at 500 MHz. 50 Ohms. 6¼x4¼x1¼ inches. **MFJ-1704N, $79.95.** N-connectors.

MFJ Compact Speaker Mics

Compacts MFJ-296I or MFJ-286 **$19.95**

MFJ's compact speaker mics have first-rate electret mic element and full size speaker to give superb audio on transmit and receive. Earphone jack, PTT, lightweight retractable cord. Gray. 1¼x2x3 inches. **MFJ-296I** fits Icom, Yaesu, Radio Shack and Standard. **MFJ-286** fits Kenwood.

MFJ Mini Speaker Mics

Minis MFJ-295I or MFJ-295Y **$15.95**

MFJ's mini mics give excellent audio from electret mic element and speaker. Has swiveling lapel/pocket clip, PTT button, earphone jack, lightweight retractable cord. Tiny 2x1¼x¼ inches. Order **MFJ-295I** for Icom, Yaesu, Alinco, Radio Shack and Standard; **MFJ-287** for Kenwood; **MFJ-295Y** for Yaesu R-series; **MFJ-285WC** for Alinco credit card radios.

Dry Dummy Loads for HF/VHF/UHF

MFJ-260C **$34.95**

MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

MFJ-260C, $34.95. VHF/HF Air cooled, non-inductive 50 Ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 650 MHz. 2½x2½x7 inches. *MFJ-260CN, $39.95, N connectors.*

MFJ-264 **$69.95**

MFJ-264, $69.95. Versatile UHF/VHF/HF 1.5 kW load. Low SWR to 650 MHz, usable to 750 MHz. 100 Watts/10 Minutes, 1500 Watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches. *MFJ-264N, $74.95, N connector. MFJ-5803, $4.95, 3 foot patch coax cable with PL-259.*

MFJ Low pass Filter

MFJ-704 **$49.95**

Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. 9 poles, MFJ's exclusive *Teflon® Dielectric Technology*™ capacitors, hi-Q inductors, ground plane shielding, RF tight cabinet gives excellent TVI/RFI protection. Full legal power 1.8-30 MHz. Has handy mounting tabs.

MFJ-702, $24.95. 200 Watts Low Pass TVI filter.1.5-30 MHz.

Full Color FAX

MFJ-1214PC **$149.95**

Use your computer and transceiver to receive, display and transmit brilliant full color news photos and incredible WeFAX weather maps with all 16 gray levels. Also receive/transmit RTTY, ASCII, and CW. Animate weather maps, display 10 global pictures simultaneously. Zoom any part of picture or map. Manager lists over 900 FAX stations. Automatic picture capture and save.

MFJ Iambic Paddles

MFJ-564 **$49.95**

MFJ Deluxe Iambic Paddles feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all electronic CW keyers. Chrome/Black.

MFJ/Bencher Keyer

MFJ-422D **$144.95**

The best of all CW worlds -- a compact MFJ Keyer that fits right on the Bencher Iambic Paddle! Iambic keying, speed (8-50 wpm), weight, tone, volume controls. Automatic keyer or semi-automatic ("bug")/tune mode. RF proof. 4¼x2⅝x5½ inches.

MFJ-422DX, $79.95. Keyer only for mounting on your Bencher or MFJ Iambic paddle.

High Pass TVI Filter

MFJ-711 **$24.95**

Don't let harsh TVI ruin your DXing and your wife's favorite soap opera! Keep peace with your family and your neighbors. MFJ's exclusive *ShieldBreaker*™ high pass filter effectively suppresses annoying TVI! Wipe out TVI caused by broadcast, commercial, two-way, amateur and CB radios operating below 30 MHz. Use between cable, antenna and TV/VCR. For 75 Ohm cable or 300 Ohm twin lead.

12/24 Hour LCD Clocks

MFJ-108B **$19.95**

MFJ-112B **$24.95**

MFJ-108B dual clock has separate UTC and local time displays. Huge 5/8 inch LCD digits are easy-to-see. Brushed aluminum frame.

MFJ-112 shows hour/minute/second, day, month, date, year at any QTH on world map. 12 or 24 hour display. Daylight savings time feature.

VHF SWR/Wattmeter

MFJ-812B **$34.95**

Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4½x2¼x3 in.

Code Practice Oscillator

MFJ-557 **$29.95**

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-Volt battery or 110 VAC with MFJ-1305, $14.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy. 8½x2¼x3¾ inches.

MFJ Multiple DC Outlet

MFJ-1118 **$74.95**

Use your rig's 12 VDC power supply to power two HF/VHF rigs and six more accessories with this MFJ high current multiple DC outlet. 2 pairs of 30 amp 5-way binding posts separately fused for rigs. 6 switched, fused pairs for accessories. DC voltmeter, "on" LED, RF bypassed, 6 ft. of 8 gauge power cable. 12½x2¾x2½ inches.

MFJ-1116, $49.95. 8 DC outlets, voltmeter, on/off switch, RF bypass, fuse.

MFJ-1112, $34.95. 6 DC outlets.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

MFJ . . . the world leader in ham radio accessories!

accepted the job as Asst SM for Information Technology. Mike will create and maintain a Ga Section Website. He also would be happy to consult with affiliated clubs and nets on Web site matters. Mike is a professional IT Web site architect with 18 years with IBM before becoming a VP at ix in Atlanta. You may reach him at ko4wx@mindspring.com. Several SKs to report. Gerald Evans, W4YXM, Macon. Buck Jones, W4GRX, Conyers. Dorse (Lucky) Byrd, WA4EZN, Decatur. Our condolences to their families. There are two significant events in January. On Jan 20, the annual ARES meeting will be held at the Ga Public Service Training Ctr in Forsyth. This will be the first ARES meeting under our new SEC, Lowry Rouse, KM4Z. Fascinating topics concerning emergency communications will be discussed plus the awarding of the coveted ARES ham of the year. If you are an EC, DEC, AEC or interested in this topic make plans to attend. Jan 28 is the annual Tech Fest sponsored by the Gwinnett ARS at the Central Baptist Church in Lawrenceville. This is a day-long gathering of exhibits on numerous technical and operating topics. See Amateur Radio from other points of view. Look at their Web page www.gars.org for more info. The first hamfest of the year is Feb 24 in Dalton. N4BD is the longtime chairman. 73, Sandy. Tfc: W4WXA 118, AF4NS 74, AF4PX 52, KA4HHE 48, K4WKT 39, K4BEH 38, WU4C 26, K4ZC 5.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—The members of the Northern Florida Section met in Tallhassee November 4, with 55 attending from the 43 counties of the Section. The State Officials Mr Craig Fugate welcomed the group, and provided excellent space in the SEOC building. John Fleming, WD4FFX, hosted the meeting and also presented the States' position in using the amateurs for providing communication into and out of the SEOC. Several speakers joined in with the theme "Do not ask what ARRL and the Section can do for you, but rather what can you do for the ARRL and the Section as an amateur". The persons presenting various topics were: John Fleming, WD4FFX, John Hills, KC4N, Kent Hutchinson, KC4TOC, Billy Williams, N4UF, Steve Barber, WA4B, Steve Richbourg, KO4TT, and representative from the State Grant Programs. NOFARS member, David Myers, WA4USA, was chosen Law Enforcement Office for the Year. His program has gained nationwide acclaim as one of the experts on fraudulent identification Internet issue. Congrats, David. Those of you having amateur tags should be aware if yours is lost or stolen, you can have it replaced with your call sign. I wish the space permitted the inclusion of an article in the latest "Orange Park Spark" about unity in strength. It's about why geese fly in a V formation. It creates an uplift for the bird behind and in flying in formation the whole flock adds greater flying range. If one drops out, it takes more energy to get back in the flock. This same principle applies to Amateur Radio. We need to stick together and pull as one team. The stronger we are also permits us to have greater impression on the Congress for the use of these frequencies. The Orlando HamCation will; be in February, so make plans to attend. I understand it is planned to be bigger and better than last year. 73, Rudy. Tfc: WX4H 1112, AG4DL 331, KE4DNO 233, AF4PU 153, KE4PRB 120, K1JPG 116, NR2F 114, K4DMH 78, AF4GF 46, N9MN 46, KG4EZQ 46, KB2EV 45, WB2FGL 39, K4JTD 30, KC4FL 26, AB4PG 25, W8IM 25, W4KIX 23, WA1VIP 22, KM4WC 20, KJ4HS 20, N4JAQ 18, KE4WBI 17, KB4DCR 16, KB4DXN 14, WX4J 9, WB9GIU 8, WA4EYU 8, WB2IMO 8, KF4WIJ 7, WD4ILF 3.

PUERTO RICO: SM, Víctor Madera, KP4PQ— La actividad en la radio tomó un receso debido a las elecciones generales. Sin embargo, tuvimos una buena participación en el concurso CQWWDX-SSB. Se nos informó que la KP4AM operando desde WP3A logró 1,235,400 puntos. Felicitamos a Jaime y a David quien viajó desde Florida para participar en el concurso. La FRA eligió su nueva Junta. La matrícula escogió por aclamación a su pasado presidente César Martínez-KP4EMC para presidir un año más. Otros directores electos fueron, KP4RAA, NP4WI, NP4RO, NP3MB y WP4MSL, les felicitamos. El PRARL comienza clases preparatorias en la UPR el 17 de enero. Se celebrarán sin costo, todos los miércoles a las 8PM. Sigue la auditoria de la FCC a las sesiones de exámenes. Está bajo investigación la acreditación de nuevos VEs por VECs en los Estados Unidos. Pueden disfrutar de una página del Section Manager en el Internet cortesía de La Liga Puertorriqueña de Radioaficionados. Lo que pasa en la Sección aparece en http://prarl.org/secmgr.html. El curso de orientación para OOs está pautado para enero. Todos los interesados deben comunicarse con el SM por correo o email a kp4pq@arrl.org

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI —For expanded Section News, see www.sflarrl.org or request e-mail. Thanks to Collier ARA, Dade ARC, Ft Myers ARC, Indian River ARC, South Brevard ARC, Vero Beach ARC, Wellington ARC, and section ECs for the newsletters and activity information. Broward ARES is to be commended for the fine job done with the Cancer Walkathon in Ft. Lauderdale. While most of us have SKYWARN nets, Indian River also has Launch Watch nets and are adding more hams for Merritt Island and the mainland. Steve Nowak, KE8YN, director if Imaging at Wuesthoff Hospital and South Brevard Area EC, called for communications assistance when the entire communications switches for internal, external, paging, phones and computer went down at the hospital due to lightning. Elections were held at the Okeechobee ARC. New officers starting Jan 1, 2001 are: AD4RZ pres, KE4EUW vice pres, KF4FLF sec, KF4DEX sec, KK4TA dir, KE4IQQ dir, and KD4KDO dir. Osceola reports that their main emergency repeater is back on the air on 145.350 with PL of 103.5 after being off the air due to a lightning strike. The coverage has even improved! The September/October issue of the AMSAT Journal has an article about Field Day satellite stations. K4RS, the joint Vero Beach ARC and Ft Pierce ARC station, placed 5 overall and2 as 2A. There was also a very nice article about the field Day effort, written by Roger Snyder, K4RS, who will be giving a presentation on Phase 3D at the next Vero Beach ARC meeting. KS4EC, presented an overview of how repeaters work, characteristics of the Wellington repeater system, and a site tour to the club. The Wellington Emergency Net will be used to help coordinate food pickups in servicing a «Food For Families Campaign» with the FAU Club and Jupiter-Tequesta Rptr. Group. Kudos to the clubs and AF4OR, the project coordinator for all Palm Beach Co. Our condolences to the family of Silent Key, Buck Willett, WB8REJ, always a friendly face at the Lee County hamfests and master of orga-

hamcity.com

ONLINE LEADER IN RADIO COMMUNICATIONS: BUY, SELL, TRADE, LEARN...

Online Shopping Cart
Amateur Equipment, Two-Way Radio, Family Radio Service, Shortwave, Scanners, GPS and Marine Equipment

Community Center
Used Equipment Postings, Message Boards, Product Reviews and Ham Club Listings

Learning Center
Ham Practice Exams

Resource Center
Manufacture Directory, Call Sign Search, Hamband Chart, Prefix Search and Much

More.....

ALINCO
AMATEUR RADIO'S VALUE LEADER™

DX-70TH Compact, 100W, HF $759.95
DR-140T 2 M Mobile .....CALL $$
DR-150T 2M Mobile .....CALL $$
DR-605T 2M/440MHz Mobile.....CALL $$
DJ-195T 5W 2M HT .....CALL $$

DR-610T 2M/440MHz Mobile ..... **CALL $$**

DJ-C1T/C4T
Credit Card size 2M or 440MHz HT
***SPECIAL!*.....$89.95**

JRC

JST-245 160-10M PLUS 6 Meter Transceiver
JST-145 HF Transceiver
NRD-545 DSP Receiver

BARGAIN BOX

AOR AR-147 CALL

ICOM

IC-BP173 9.6V 600 ma Battery.....$59.95
IC-B157A 7.2V 900ma Battery $59.95

ICOM

IC-756 PRO
Call For Details

IC-746 HF+6M+2M-SPECIAL..CALL $$
IC-706MKIIG HF+6M+2M Transceiver w/CTCSS encode/decode.....**CALL $$**
IC-2800H NEW 2M/440MHz ... **CALL $$**
IC-2100H NEW 2M Mobile 55 Watts, Remote Control Mic..**SPECIAL CALL $$**

C-207H Dualband Mob., 45W/35W Detach. Front Panel .....**CA**

IC-T81A 2M/440MHz/6M/ 1.2GHz.....**CALL $$**
IC-T2A NEW 2M/HT 6 Watts.....**CALL $$**
IC-W32A 2M/440MHz HT 3/5W**CALL $$**
IC-R2 NEWAM, FM, WFM Receiver, .5-1300MHz, 400 Memories..... **CALL $$**
IC-R10 .5MHz-1.3GHz HT Rec...**CALL $$**
IC-PCR 1000 5-1300MHz ..... **CALL $$**
IC-PCR 100 .1-1.3GHz ..... **CALL $$**
IC-R8500 .1MHz-2GHz Rec..... **CALL $$**

KENWOOD

TS-870S HF Transceiver All Amateur Bands.....**CALL $$**
TS-50S 1.8-30MHz HF Transceiver Super compact.....**CALL $$**

TS-570DG HF Transceiver 100W Auto Antenna Tuner, DSP.....**CALL $$**
TS-5[illegible]

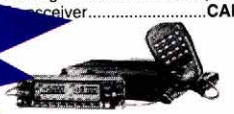
Jun's Holly Day Special
HT Radios $5.00 off
Mobile Radios $10.00 off
HF Radios $20.00 off

TH-D7A 2/440 HT .....**CALL $$**
TH-79AKSS Dualband HT .....**CALL $$**
TH-G71A NEW, Dualband HT .**CALL $$**
TH-22AT 2 Meter HT .....**CALL $$**

YAESU

MARK V FT-1000MP NEW HF 200W output .....**CALL $$**
FT-920 NEW HF+6 Meters .....**CALL $$**
FT-1000D Deluxe, Allband HF .**CALL $$**
FT-1000MP HF Base, Advanced Features .....**CALL $$**

FT-847 HF/2M/430MHz Transceiver
[illegible]W HF/6M 50W 2M/430.....**CALL**
[illegible]-100 Ultra Compact
[illegible]F/UHF Transceiver .....**CALL $$**
[illegible]40 High Preformance Compact
[illegible]sceiver.....**CALL $$**



[illegible]400R .....**CALL $$**
FT-90R 2M/440MHz Mobile .....**CALL $$**
FT-1500M 5000/2M.....**CALL $$**
FT-2600 2M, FM Mobile, 60W ..**CALL $$**
FT-3000M 2M, Mobile, 70W.....**CALL $$**

VX-5R NEW 2/440 HT.....**CALL $$**
VX-1R NEW Mini 2 M/440MHz HT **SALE** ..... **CALL $$**
FT-50RDH Ultra Compact Dualband HT ..... **CALL $$**

800-882-1343 / 800-564-6516
Out of State California

310-390-8003 • FAX 310-390-4393
http://www.juns.com • E-mail:radioinfo@juns.com
HRS M-F 10 - 6, SAT 10- 4 • 5563 SEPULVEDA BLVD. • CULVER CITY, CA 90230
2.5 miles from LAX-N. on I-405 • ESPANOL • KOREAN

Jun's Electronics

nizing the bus trips to other hamfests. He was the Club's ham of the year in 1999. The Amateur Radio Lighthouse Society, co-sponsors of the August National and International Lighthouse/Lightship Weekends is sponsoring a new annual Winter event called «Lighthouse Christmas Lights» from Dec 18, 2000, through Jan 2, 2001. An extensive awards program is planned for the event. Best wishes to the Indian River ARC and Cape Canaveral Lighthouse. Details are on the Web at http://arlhs.com or by e-mail to k3jxw@amsat.org. The ARRL Net Directory is now on line at http://www.arrl.org/field/nets or http://www.arrl.org/field/pubservice.html. To register or change registration of a FL net, contact STM Jan, KJ4N, or me. Oct Tfc by Jan, KJ4N: WA9VND 586, KA4FZI 343, KB4WBY 298, KC4ZHF 217, KD4HGU 184, KD4GR 148, KJ4N 131, K4FQU 126, KE4IFD 125, WB4PAM 121, K4VMC(club) 106, WA4EIC 83, AA4BN 64, KD4JMV 59, KT4XK 52, KE4UOF 46, WB4CSQ 38, KN4JN 35, KG4CHW 26, W8SZU 25, KE4WBI 17, K9ALX 14, W4WYR 11, W6VIF 11, K4OVC 8, W3JI 2. Best wishes to all for a safe and happy holiday season!

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix, ASM: Drew, NP2E, St. Thomas. ASM: Mal, NP2L, St. John, SEC: Duane, NP2CY, St Thomas. PIC: Lou KV4JC, St Croix, SW Jeanette, NP2C, St Croix. ACC: Debbie, NP2DJ, St Thomas, NM, Bob, VP2VI/W0DX Tortola. New appointment this month, since the Internet is becoming so popular, we are making the "Section Webmaster" or "Webmeistress" an appointed position. Visit the section Website for valuable info for visiting hams. St Thomas / St John group meets for lunch at "Hook, Line & Sinker" in Frenchtown on St. Thomas every Tuesday in the "back room." Big news this month was active VI participation in the CW Sweepstakes. Respectable performances by KP2D (team ritty) on St Thomas, WP2Z, and Bob, N4BP, who operated NP2B for 127 Qs in all 80 sections in 23 hours & 48 minutes! Good work Bob. Not like last year when we had only minimal participation due to Hurricane Lenny. 10M has been quite good, hear Manny, NP2KW, making lots of QSOs. SM has been "Elecrafting" with his new K-2 on 10M. Amazing what you can work with 10 watts! VI section Website http://www.viaccess.net and SM always looking for good gossip to put in the column. You can e-mail SM at np2b@atthehelm.com. 73 all, John NP2B

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR ae4mr@arrl.org, http://www.wcfarrl.org—ASM: NA4AR. ASM-Web: N4PK. ASM-Legal: K4LAW. SEC: KD4E. TC: KT4WX. BM: KE4WU. STM: AB4XK. SGL: KC4N. ACC: AC4MK. PIC: AB2V. Help us celebrate our first anniversary as WCF with the Next Contact Special Event 01/14, noon-6:00 PM. The section has been successful in securing repeater space at the 1,000' level of a centrally located tower which should cover most of the section. October:

Net/NM	*QNI*	*QTC*	*Bulls*	*QND*	*Sess*
AIN/WA4ATF	72	3	6	107	4
POLK ARES/KE4VBA	71	1	4	103	5
SPARC/KF4FCW	409	34	0	725	31
TURTLE/KT4TD	297	43	0	331	31
HCAN/KD4CQG	74	4	4	52	4
FMSN/KT4PM	321	49	0	456	31
TPTN/AD4IH	679	81	0	385	31
QFNS/KF4KSN	184	46	0	660	31
QFN/AB4XK	884	346	0	1,087	62

PSHR: KT4PM 169, AD4IH 157, K4SCL 144, AB4XK 140, K4RBR 139, WB2LEZ 112, KT4TD 105, KF4KSN 101, KE4VBA 86, W4AUN 78. SAR: AB4XK 219, K4SCL 167, AD4IH 122, KT4PM 116, KF4KSN 50, KT4TD 26, K4RBR 24, KE4VBA 14, W4AUN 9, WB2LEZ 5, W4HCS 1. 73, Dave, AE4MR

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—Arizona has had some strange weather that resulted in several floods. Yes, excess water that did not cooperate and stay in the dry riverbeds. Remember the floods of Wendon during October? Amateur Radio was there helping the American Red Cross. The Yuma County Auxiliary Communications Service, London Bridge ARA, Arizona Repeater Association, the Western Arizona Radio Club, and the Red Cross Central Arizona Chapter were all present providing relief communications as needed. There were over 35 operators who helped support this flood relief program. I don't have the room to list them all, but our Arizona Web site has pictures and more information. Thank all of you for helping our state during a time of need. Tom Fagan, WB7NXH, has developed the Web site for the Arizona section. http://www.qsl.net/arrlaz /. The next hamfest will be on January 13 at the Glendale Community College. Scottsdale ARC has scheduled the Spring Hamfest for March 10 at Scottsdale Community College. Please keep your newsletters coming so I can keep up with the activities around the state. If your club or organization would like me to present a program, let me know and we can set up a date. Next year the ARRL SW Convention will be in Riverside at the Holiday Inn. My e-mail address is kd6xh@arrl.org, (see page 12 of this magazine under Arizona) and my home telephone number is 520-744-9095. If you call and I am not home, please leave a message and I will call you back. I am normally at home after 1930 hours each evening except for Thursday (Bowling). 73, Clifford Hauser, KD6XH. ATEN: 691 QNI, 28 QTC, 31 sess. Tfc: K7VVC 703, W7EP 52.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF — Thanks to the response to my call for ARES / GPS and APRS, equipment and ham operators in this section we had a very successful test run to show off our APRS capability. Eleven volunteers were activated employing two repeaters. Dennis Smith, KA6GSE, our assistant SEC, worked out the details of our test drill and limited demonstration. About 50 guests from a local Northridge Methodist Church men's club were selected to view the Demo. They were very impressed with the demonstration by four ARES members. This was held near the corner of Superior St and Reseda Blvd, in Northridge. Dave Bell, W6AQ, our PIC, suggested that we have a full demonstration at a "Fashion Center," type of atmosphere where the general public can view and appreciate our Public Service interest and capability. So we are planning to call for volunteers from our ARES, group to put on a real full-blown

YOUR SECRET IS SAFE WITH Us!

OMNI owners know the advantages of this superlative rig. First and foremost, they work the weakest signals under the most crowded band conditions, signals their friends can't even hear! Active operators, like contesters and DXers, tell us they can operate for hours on end with little or no listening fatigue. They've never owned a rig this clean. Just the right amount of DSP eliminates interfering carriers and provides up to 15 db of DSP adaptive noise reduction. Owners call every day to tell us, "It's the best rig I've ever used!"

But there is one problem. OMNI owners also ask us NOT to tell their friends. "Tell them it's the...coax...sunspots...operator skill...day-glo readout...antennas...ground rod...knobs per square inch. Distract them, confuse the issue, recommend 'brand X', but *PLEASE, PLEASE,* don't tell them my secret is the OMNI-VI *Plus*!"

To learn more, request literature, or to place an order, call Scott or Stan at **800-833-7373.**

Model 564, OMNI-VI *Plus*	$2,585.00*
Model 962, Matching Supply with Speaker	$275.00*
Model 705, Desk Mike	$89.95*
Accessory Crystal Filters	$98.00* each

- No-Risk 30-day Money-Back Guarantee**
- We take trades on used TEN-TEC gear
- We accept VISA, Mastercard, and Discover

*Plus Shipping and Handling (ground transportation anywhere in 48 states). OMNI - $20; OMNI & Supply - $31

**Customer pays shipping both ways

You can reach us at:

Office: (865) 453-7172 • FAX: (865) 428-4483
Repair Dept.: (865) 428-0364 (8a - 4p EST)
e-mail: sales@tentec.com
Visit our web site at http://www.tentec.com

TEN-TEC
1185 Dolly Parton Parkway
Sevierville, TN 37862
MADE IN USA

L.I. - N.Y.C. WINTERFEST 2001

Sunday, Feb. 25th

The tri-state region's premier indoor hamfest at Levittown Hall, 201 Levittown Parkway, Hicksville, NY
Sponsored by the Long Island Mobile ARC
Adm $6, doors open 9 AM, VE 10 AM.
Tables by advance registration.
24 hr infoline 516-520-9311

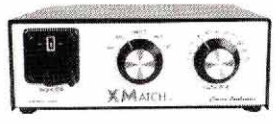
email: K2EPM@arrl.net
http://www.limarc.org

CALL (800) 727-WIRE (9473)

That's All You Need to Know About Wire, Cable and Accessories!
20 Years of Quality & Service!
Web Site: http://www.thewireman.com
Email: r.8ug@thewireman.com
TECHNICAL HELP: (864) 895-4195
THE WIREMAN™ INC.

XMATCH® Antenna Tuner

- SWR rated at power
- Outstanding efficiency
- Innovative patented circuit



INFO $3.00

http://c-space.net/xmatch/

Paul - N4XM
7001 Briscoe Lane • Louisville, KY 40228

ARRL Publications

If it's Ham Radio or Electronics, you'll find it in a **LEAGUE** Publication!
CD-ROMs, Videos, Books, and More!
To find an authorized ARRL dealer today, call toll-free 1-888-277-5289.

A BEST BUY

MINIATURE KEY/KEYER WITH 4 YEAR BATTERY LIFE

MODEL KP 4 - SIMPLY THE BEST!

- 12 functions including two 50 character memories, beacon mode & four non-volatile functions
- HET output to 1/8" mono jack, battery saver circuit and oversize lithium cell for extended life.
- Size 1 1/2" x 2"; Wt. 1.7 oz. Precision machined case
- Extra strong magnetic hold-down with spare magnet

PRICE: $84 ***With knee mount: $94*** *Add $3.75 S/H*

Send check or M.O. to Paddlette Co., P.O. Box 6036
Edmonds, WA 98026 Bob, KI7VY, Tel 425-743-1429
E-Mail: bham379627@aol.com

---

5 BAND QUAD

$289 2 Element Complete

Complete antenna from 20 meters to 70cm.
Many models to choose from.
UPS Shippable.

Lightning Bolt Antennas
RD#2, RT 19, Volant, PA 16156
724-530-7396 FAX 724-530-6796
www.lightningboltantennas.com

R&L Electronics

1315 Maple Ave HAMilton, Oh 45011
http://randl.com email sales@randl.com
Local/Tech 513-868-6399
Fax 513-868-6574
(800)221-7735

HEIL SOUND

FREE cable

With purchase of Heil Goldline mic

Other Popular Heil Mics
HM10 *HM10 w/4 or 5 element* **59.95**
HM10DUAL *HM10 w/4+5 elements* **99.95**
HS1 *Hand switch* **22.95**
FS1 *Foot switch* **25.00**
CC1 *cable for HM10/GM4/5* **24.95**

$118.95

Special price good through 1/15/2001 or until stock is depleted.

Heil Headsets
Proset *Headset w/4 or 5 element* **105.00**
Promicro *Headset w/4 or 5 element* **85.00**
HS1 *Hand switch* **22.95**
FS1 *Foot switch* **25.00**
AD1 *cable for HM10/GM4/5* **14.95**

GM-4 or GM-5

Free cable (CC1) with the purchase of a GM-4 or GM-5

Truly, the full-range microphone for all occasions - FM - AM - "Hi Fi" SSB

The "Goldline" Full-range Microphone, another innovative product from Bob Heil was created specifically for full-range smooth articulate SSB audio with a wide 60Hz-16kHz response. A +4dB peak @2kHz gives the new Goldline microphone excellent voice articulation along with it's "big bottom" low end that is all so important for producing a well balanced studio quality SSB signal.

YAESU

CLOSEOUT SPECIAL

$2299.95

Special price good through 1/15/2001 or until stock is depleted.

FT-1000MP

EDSP (Enhanced Digital Signal Processing). Dual In-Band Receive w/Separate S-Meters. Wide Receiver Dynamic Range w/separate optimized FET RF preamplifiers for high & low bands. 2.75 khz SSB Collins mechanical filter built-in. Selectable, independent, cascaded IF filtering. Shuttle jog enhanced tuning system. Built-in high speed antenna tuner

YAESU YAESU

FT1000MP MarkV 3249.00

MD100A8X *Desk Mic* 125.50
SP8 *External Speaker* 155.95
YF110CN *455 kHz 250 Hz filter* 139.95
YF110SN *455 kHz 2.0 kHz filter* 139.95
YF114CN *8.2 MHz 250 Hz filter* 139.95
YF115C *455 kHz 500 Hz filter* 155.95

FT817 ..... 759.95

FNB72 *Ni-Cd Battery Pack 9.6V 1000mAh* 54.95
MH36E8J *DTMF Mic* 54.95
YF122C *Collins CW Filter* 156.95
YF122S *Collins SSB Filter* 156.95

VR5000 ..... 879.95

DSP1 *Digital Signal Processing Unit* 35.95
DVS4 *Digital Voice Recorder* 108.95
FVS1A *Voice Synthesizer Unit* 38.95

FT920 ... Free FM1 ..... 1329.95

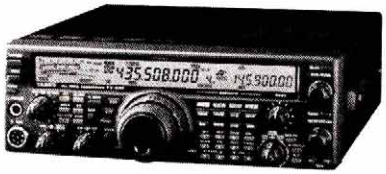
MD100A8X *Desk Mic* 125.50
SP8 *External Speaker* 155.95
YF116A *6 kHz AM filter* 109.95
YF116C *500 Hz CW filter* 109.95
FP1030A *25 amp power supply* 239.00
Aston SS30 *30 amp power supply* 110.95

FT8100R 409.95

ADMS2D *PC Programming Kit* 35.95
FTS22 *Dual Decode Unit (CTCSS)* 62.95
YSK8100 *Separation Kit* 62.95
Pyramid PS14K *Power Supply* 44.95

FT90R ..... CALL

ADMS2E *PC Programming Kit* 35.95
YSK90R *Separation Kit* 54.95
Pyramid PS14K *Power Supply* 44.95



FT847 ..... CALL

MD100A8X *Desk Mic* 125.50
FC20 *Automatic Antenna Tuner* 269.00
YF116A *6 kHz AM filter* 109.95
YF116C *500 Hz CW filter* 109.95
FP1030A *25 amp power supply* 239.00
Aston SS30 *30 amp power supply* 110.95

FT2600M ..... CALL

ADMS2E *PC Programming Kit* 35.95
MMB48 *Mobile Mounting Bracket* 15.50
Pyramid PS14K *Power Supply* 44.95

FT1500M ..... CALL

ADMS2F *PC Programming Kit* 35.95
Pyramid PS14K *Power Supply* 44.95

FT100D 1139.95

ATAS100 *Active Tuning Antenna System* 299.95
FC20 *Automatic Antenna Tuner* 269.00
YSK100 *Remote Kit* 71.95
MMB62 *Mobile Remote Head Bracket* 35.95
MMB67 *Quick Release Bracket* 25.95
Aston SS30 *30 amp power supply* 110.95

VX5R ..... CALL

ADMS1E *PC Programming Kit* 35.95
CD15 *Charging Stand* 26.95
CSC73 *Soft Case* 17.95
EDC5B *DC Cable w/Noise Filter* 23.95
FBA23 *AA Cell Battery Case* 22.95
FNB58LI *Lithium Ion Battery* 62.95
MH34B4B *Speaker Microphone* 27.95
SU1 *Barometric Pressure Sensor* 32.95

VX15064B ..... CALL

ADMS1F *PC Programming Kit* 35.95
CSC77 *Soft Case* 18.95
EDC5B *DC Cable w/Noise Filter* 23.95
FBA25 *AA Cell Battery Case* 38.95
FNB64 *Battery Pack* 39.95
MH34B4B *Speaker Microphone* 27.95

R&L Electronics

1315 Maple Ave HAMilton, Oh 45011
Local/Tech 513-868-6399
(800)221-7735
http://randl.com email sales@randl.com
Fax 513-868-6574

show for the public. Dave Bell and our PIOs will be planning our next move to bring in the TV and News coverage for our big Public BASH with APRS. We need this coverage, and more good publicity, if we are going to get the Governor to sign a new Antenna/tower bill for Amateur Radio. (PRB-1-CA) We don't need all of the counties and all of the cities, in the act, independently, trying to restrict our essential Antenna/ tower construction. Hank Magid, K6YMJ, our SEC, and his assistant Dennis, convinced me to attend our local ACS, group meeting at the Van Nuys airport last week. Fire Department Chief, Wilfred W. Bisson, (KF6XX@aol.com) is the City of LA, coordinator for RACES/ACS. The present personnel compliment is about 57, up and ready to help our Governor. Now maybe he can help us with our ONE need; a single PRB type of law for all Amateurs in California. Vy 73, de W6BF, Phineas.

ORANGE: SM. Joe W6UBQ, 909-687-8394—The Orange Section Web site at www.qsl.net/arrl-orange continues to evolve with new features being added periodically. Recent additions include hyper links to International Amateur Radio Organizations, i.e. RSGB in UK, WIA in Australia, etc. In addition, a Web page with photos ORG Section Ham radio clubs and past HAMCONS is included. A link to the Section Emergency N6RPG, Web site is available. TC Art, KQ6HF, has a very interesting presentation on RF Safety and Ham Radio. You need a speaker? Call Art, 909-734-1485, e-mail him at kq6hf@arrl.net. From the 220 SMA Pres. I continue to believe that the future of Amateur Radio if going to be full of exciting challenges. The coming technologies including fully digital and software programmable radios is going to require new and challenging solutions. From Clarafier, are you going to join ARRL or renew membership? Please do so through your club. Clubs receive $5 on new memberships and $2 on renewals. From LAND LINES, the Prez Ron WB6MSS sez, I'm pleased to see such a great response to the call for nominees for next year's officers. From Smoke Signals, Fullerton RACES was active in two drills on the 6th &7th of October. April, WA6OPS, reports 15 hospitals utilized HCSC communicators in the MCI hazmat drill. Communicators were at the Hospitals, disaster site, the EMS Central point, county EOC and at a drug company. 30 operators from HDSCS participated, 20 of them taking time off from work or school. A total of 179 man hours were contributed to the effort $29,990 worth of equipment and repeaters were used. STM Glenn N6GIW, reports NTS Traffic: KC6SKK 116, K6CTW 80, W6JPH 73, W6QZ 57. PSHR; W6QZ 148, W6JPH 93, KC6SKK 90. Digital traffic: W6QZ NTS BBS 174, .SCN/V Net Manager W6JPH Reports 21 sessions, QNI 159, QTC 31, SCN/V now meets on week nights at 2100 PST.

SAN DIEGO: SM, Tuck Miller NZ6T 619-475-7333— A new millennium? Are we there now? Some say last year, some say now. No matter which way you prefer, we can officially say we are at the beginning of a new era. As we start anew, let me take a few minutes to thank some folks who have given much of their valuable time for the benefit and furtherance of ham radio. I am going to start at the top, and work my way down, and hope I do not forget anyone. Under the ASM category we have Al, W6WYN, Harry, W6YOO, and Pat, KC6VVT. For section positions we have Warren, KT6A, STM. For BM, we have Steve, K6PD. PIC, has Steve, N6QEK. TC calls upon Gary, N6LRV, while the OOC has Bill, K6TWO. ACC has Evelyn, N6EVE. For the ARES positions we have leading the pack, our SEC, Dave, KC6YSO. For the DECs, we have Dennis, K7DCG, Rich, N6NKJ, Kent, K6FQ, Al, W6WYN, and Fred, W6FFF. We also want to thank Dennis, WB6CGJ, and Ralph, KF6TOK who had to give up the DEC positions for various reasons. We have so many other folks filling many positions such as EC, AEC, ORS, OES, PIO, OO. Everyone in the organization is very valuable, and important. The success of the section is because of the above persons. Thank you one and all! The San Diego Amateur Radio Council (SANDARC) has been on a 2-month hiatus, and returns to their meetings at the end of January. Talk of new officers is looming as long time chair George Roos, KO6BU, would like to step down. Del, N6JZE, vice chair tendered his resignation effective Nov 1. Del recently stepped down after many years as the TC, and OOC for the section. Tfc: KT6A 834, KD6YJB 190, KO6BU 2, WA6IIK 1 BPL: KT6A 834. PSHR: KT6A 138, KD6YJB 54, KO6BU 30.

SANTA BARBARA: SM, Robert Griffin, K6YR (k6yr@arrl.org or k6yr@arrl.net)—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). STM: Ed Shaw, KF6SHU (kf6shu@arrl.net). SGL: Paul Lonnquist, NS6V (paul@dock.net). ACC: Michael Atmore, KE6DKU (ke6dku@aol.com). OOC: Howard Coleman, W6HQA (w6hqa@arrl.net). PIC: Jeff Reinhardt, AA6JR (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ, (wglennrz@ix.netcom.com). ASMs: Ventura, Don Milbury, W6YN (w6yn@arrl.net). San Luis Obisipo, Bill Palmerston, K6BWJ & for Internet, Jack Bankson, AD6AD (ad6ad@arrl.net) & DECs: Santa Barb-Dave Lamb, WA6BRW (wa6brw@arrl.net); SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net) & Ven-Dave Gilmore, AA6VH (aa6vh@arrl.net). Bob Gromer, KB6RG, in Grover Beach has joined the Amateur Auxiliary ranks as an OO. Thanks Bob! OOC, W6HQA, now has eleven Official Observers operating in the Santa Barbara Section. OOs are now filing electronic monthly activity reports. The Amateur Auxilary plays an increasingly important role in "self-enforcement" of bands. FREE instant Section news updates? Join the SB Reflector! E-mail majordomo@qth.net the message subscribe arrlsb. SB Sec Web: www.qsl.net/arrlsb/. Join in our Section NTS traffic nets: SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90- (131.8) & 449.300-(131.8). That's 30! Rob, K6YR, SM.

WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM— Visit the section Web page at (http://www.lsic.net/net/ntexas.html) for the most current information. At this time, the entries for the North Texas Section Election should be in. I would like to welcome Jerry Combest, N5JL, to my staff. Jerry has been doing an excellent job of getting the section communications function working again, including an online newsletter. We had to pull the State Fair activities this year because of the high confusion factor on scheduling. I would like to thank John Fullingim, WN5PFI, and his group for the extensive efforts that they made trying to make this event happen. I hope that you all had a safe and merry holiday season and that Santa brought all the ham 'toys' that you 'needed.' Again I would like to thank

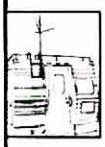
Spider™ Antenna

Since 1980 Made in U.S.A.

Go with the original *NO-HASSLE, NO-TAP, NO WHIP* Adjustment Multiple Band Antenna!

Four amateur bands (10, 15, 20, and 40 meters) at your command without having to change resonators or retune – just band switch your rig. Also available are the 75, 12, 17 and 30 meter bands. Needs no antenna tuner. May be configured for as many as seven bands at one time.

Wherever you roam, on Land or Sea . . . or even at Home

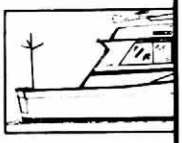


On Land

Suitable for use on any motor vehicle from a compact automobile to a motor home or trailer. Work four bands without stopping to change resonators.

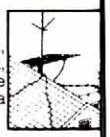
Or Sea

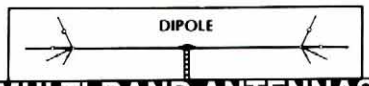
The Spider™ Maritimer is for use on or near the ocean. Highly polished stainless steel and nickel-chrome plated brass. Commercial marine frequencies (8, 12, 16 and 22 MHz) are also available.



At Home

If you live in an apartment, condominium or restricted area, the Spider™ may well be the answer to your antenna problems.





MULTI-BAND ANTENNAS
7131 OWENSMOUTH AVENUE, SUITE 363C
CANOGA PARK, CALIFORNIA 91303
TELEPHONE (818) 341-5460
WWW.SPIDERANTENNA.COM EMAIL: SPIDERRS@PACBELL.NET

A NEW CONCEPT IN FILTERS

Hi-Q Common-Mode™ Filter

CF5KV
5KW Continuous
PRICE **$124.95**
Made in Japan

CF250E
250W Continuous
PRICE **$89.95**
Made in Japan

Miraculous effect for any RFI...

Add a CF250E/CF5KV to your coax transmission line and it will effectively eliminate the common-mode noise which Lowpass filters never stop, reducing interference from your station.

●Attenuation(common-mode):-50~-60dB Below250MHz ●Choking impedance(Ohms):1.1~5.7K
●1.8 to 54MHz ●50 Ohms ●SO-239(Normally)or N Type ●Weight:0.5lb(CF250E)/1.3lb(CF5KV)

US DEALER AMATEUR ELECTRONIC SUPPLY
Toll Free: 1-800-558-0411 Web: www.aesham.com

RF Inquiry INC.
1-11 Gakuen-Cho, Gifu-City, 502 Japan
Tel 81-582-95-0582 Fax 81-582-95-0599
E-mail: info@rfinq.com www.rfinq.com

RADIO AMATEUR CALL BOOK

Fully updated Winter 2001 Edition includes new upgrades for HF!

Forget the copycats.

When somebody tells you, "I'm good in the book", this is the book. It always has been. It always will be. **The Radio Amateur Call Book** is THE source for over 1,600,000 licensed radio amateurs around the world. Available on CD-ROM, this comprehensive guide includes brand new amateur radio prefix maps and more than 50,000 e-mail listings! Colorful maps show more than 250 countries, islands and dependencies. With this CD-ROM, you can find listings quickly by name, call sign, and location, even if your information is incomplete. Own the most accurate and extensive Amateur Radio CD-ROM available.

Order now to receive a $5.00 discount!

Only $44.95 (with discount), plus $5.00 S&H. Mention Item # 87603

New Features for 2001

- View CD-ROM in English, Spanish, German or French, program selectable by user.
- Display ITU and IARU zone for each call
- US Data lists population by city, state capitals and other interesting facts.
- International Data shows population by country, lists world capitals and more.

Radio Amateur Call Book • 575 Prospect St. • Lakewood, N. J. 08701
To Order: *(Visa, MasterCard or American Express accepted)*
Call 1-888-905-2966 (Toll-free USA only), 1-732-905-2961, or fax: 1-732-363-0338.
order online! www.callbook.com

Carolyn, KC5OZT, for her excellent work in keeping the Section Traffic moving, mainly without any of my assistance (interference). Congratulations to W5APL, George Crumbley of Mabank, for being the 7290 net's Operator of the Month for October, and to WB5CTB, Bud Wallace of McKinney, for being 7290's Operator of the Month for November. Tfc (Oct) K5NHJ 505, KC5OZT 367, N5JZ 318, W5AYX 113, KC5VLW 104, WA5I 95, KB5TCH 55, N5GG 52, AC5Z 10, K5TEK 4, AC5UZ 2. BPL: K5NHJ 505, N5JZ 104 orig./deliveries. 73, Don, KB5YAM.

OKLAHOMA: SM, Charlie Calhoun, K5TTT— ASMs: N6CL, W6CL, W5ZTN, AB5JY. SEC: KA7GLA. ACC: KB5BOB. PIC: WA9AFM. OOC: WA9VMY. SGL: W5NZS. STM: K5KXL. You may not have heard much from me recently via e-mail. Through the assistance of Alan Waller, K3TJK, I have created an e-mail list through a list-server hosted by QTH.NET. This will enable me to easily communicate with all members of the section. If you have received my monthly e-mails in the past, you will automatically be subscribed to this list. You have the option of un-subscribing as well, but I hope that the information shared will be more valuable to you than the extra e-mail in your inbox. Anyone interested is invited to subscribe to the list. All you need to do is send an e-mail, in plain text format, to majordomo@qth.net and in the body of your message include "subscribe arrl-ok" (leave off the ""). Our new Section Emergency Coordinator, John Turner, KA7GLA, and our new Assistant Section Manager in charge of ARES training, Callen Gilbert, AB5JY, have created an Oklahoma ARES Web page. You can get there through the section web page or directly via http://www.ares-oklahoma.org. Look for information there on the state wide ARES net. 73 and Happy New Year! Tfc: WA5OUV 526, KK5GY 445, N5IKN 438, KF5A 198, K5KXL 168, WB5NKC 140, KE5JE 83, KI5LQ 74, WB5NKD 73, WA5IMO 50, W5REC 25, N5FM 2.

SOUTH TEXAS: SM, Ray Taylor, N5NAV—When you read this, you will be getting ready for the New Year 2001. It seems like yesterday we were getting ready for Y2K. Maybe by now you will know who the President will be. November 2nd proved hazardous as rains began to come into South Texas. The Weather Station called me at 9:30 AM to get ready for severe weather in the afternoon. HF SKYWARN was activated at noon due to the distances involved. At 6:28 2 meters was activated. Boerne, Texas hams provided a real public service by providing power for EMS, Fire, and the Sheriff's office. When the power grid for that area went down, AB5UE and KM5SY took one of the club generators out to their repeater site and got them back on the air. KC5OEG was the liaison to the WX station, on HF and later on 2 meters. Another incident, KD5HOP, came upon a bridge under water with a pickup about half submerged. We notified the Hayes County Sheriff's office. Later we found out the man had been rescued. We had 3 drowned during this when they tried to cross low water crossings. We had 2 more follow-up storms through the 5th. We had several rescues. There was around 85 to 100 hams involved. I want to thank all of those that gave of their time. While I'm writing this on the 12th, we are having tornadoes from San Antonio to Houston area. We will be starting training again on the Texas Traffic Net, 3873 between 7 and 7:30, Monday, Tuesday, Thursday, and Friday as time permits. This is for new hams and old that would like to learn traffic handling and emergency operations. San Antonio Radio Club had a very informative program on how the OO program works, presented by W5JAM, South Texas OOC. Very well presented Jack. The main purpose is to try to help hams become better operators. I want to thank Jack and the OO team for the fine job they perform. The bands and repeaters have really been cleaned up. Our clubs are doing a great job in bring in all the new hams. We have noticed a great increase in activity mainly on HF. I'm very pleased with the hams in South Texas with the service they have provided for the public over the past year. We can credit our clubs for most of the success. I do hope this trend will continue into 2001. Happy New Year to all, and may this be your most prosperous. Tfc: W5SEG 1212, KA5KLU 473, W5KLV 179, W5ZX 68, N5NAV 64, N5OUJ 64, W5GKH 46, KD5GM 33, K0YNW 26, W5TUK 18, W5OYY 12, W5CU 11, N5JUU 1.

WEST TEXAS: SM, Charlie Royall, WB5T, 915-944-0469, WB5T@arrl.org. ASMs: Cley, K5TRW. Ron, KB5HGM; Jerome, K5IS; Fred, W6VPI, Sandy, W5MVJ. SEC: Alex, N5LRH. OOC: John, KO5D. OBM: Frank, N5WT. With a lot of squinting through trifocals and a strong magnifying glass, yours truly went over the Field Day 2000 results. The section was well represented. West Texas leaders and placement per category are: Class 1A, WTX ARC, 33rd place overall, 1,153 and 2,570; Class 2A, Big Bend ARC, 19th place overall, with 2,486 and 7,730; and Class 4A, Key City/Dyess ARC, 32nd place overall, with 1,385 and 4,146. Big Bend ARC turned in the highest score for West Texas with the 2,486 contacts in a really tough category. Field Day is a lot of hard work requiring planning and dedication, and a little luck to turn in good scores. By the time you read this, Christmas and New Year will have come and gone and we will be starting another year. The next hamfest will be in Midland in March. I look forward to seeing a lot of you there. Until next time, 73 de Charlie, WB5T.

YAESU

FT-1000D Transceiver

tx: 160–10m **rx**: 100kHz-30MHz • 200w • 100 mem. • Dual receive • Antenna tuner • Dual bandpass filter • Temp. compensated crystal oscillator • 2.4kHz & 2kHz SSB filters, 500Hz CW crystal filter 6"h x 16"w x 15"d, 58 lbs.....**Special $3799.99**

FT-1000MP Advanced features • EDSP Collins mech. filter.....**Closeout $2299.99**

FT-1000MP MK V IDBT • VRF • Class A PA operation • 200W MOSFET final amp • Integrated shuttle jog ... **Spec $3299.99**

FT-847 All Mode Transceiver

Ideal for HF & satellite • 100w HF/6m • 50w 2m/430MHz • Crossband full duplex • Reg/reverse tracking • Satellite memory • DSP filters • Low noise VHF/UHF • Built-in preamp • 0.1Hz tuning step • Shuttle jog • CW sidetone pitch control • CTCSS/DCS encode/decode • Direct keypad entry • 1200/9600 bps .....**Special © $1449.99**

FT-920 HF Transceiver

HF+ 6m • 100w • AF-DSP • Auto antenna tuner • 127 memories • FET RF amp • Digital voice memory • Dual display • Keyer • **FREE FM-1 & TXCO-7 units for a LIMITED TIME**.....**Special $1329.99**

Affordable Beginner's Radio!

FT-840 HF Transceiver

transmit: 160 to 10m, **receive:** 100kHz to 30MHz • 100 memories • 100 watts • Twin VFOs • Optional FM • Repeater offset • CTCSS encode • 13.8V DC @ 20A • 10"w x 3⅜"h x 9½"d,18 lbs.....**Special $689.99**

Quadra System HF/6M Amplifier

Amateur coverage: 160–15 & 6m • 1000w • 220V AC 500w power out on 6m • Built-in high-speed ant. tnr • 2 RF inputs • 4 RF outputs • Auto band switching w/FT-1000D, FT-1000MP, FT-920 & FT-900 • Separate amp & PS units • 16¾" x 5¾" x 16¼" • (amp) 33 lbs; (pwr sply) 26 lbs **$3999.99**

FT-100 Mini HF Transceiver

160-6m mobile xcvr + 2m and 430-450MHz rx: 100kHz-30MHz, 30-970MHz (cell blocked) • 100/50/20w • DSP • SSB/CW/AM/FM/AFSK/Packet oper. • Built-in CTCSS/DCS • 300 memories • IF Shift • IF noise blanker • VOX • Dual VFOs • Electronic mem. keyer • Speech processor.....**Final Closeout *© $899.99**

FT-100D Same as FT-100 with 500Hz, 8-pole crystal filter • High stability reference oscillator • FTS-27 CTCSS decoder • New high quality speaker **$1199.99**

FT-90R Micro 2M/440 Transceiver

50/35w 2m/440 micro FM • Built-in CTCSS/DCS enc/dec • Select. TX power • 186 mem. • Direct keypad freq. entry • DTMF autodialer • ADMS PC program. • Auto repeater shift • RF-lavel squelch • Program. front panel/mic key func. • 1200/9600 bps compat. • 3.9"w x 1.2"h x 5.4"d .....**Special $369.99**

FT-8100R Dual Band Transceiver

2m 144–148MHz tx, 110–550 & 750-1300 MHz (cell blkd) rx • **70cm** 430–450MHz tx/rx • 208 mem. • 50-35/3/5w • CTCSS encode • 5½"w x 1½"h x 6¼"d ..... **Special $409.99**

FT-3000M 2m FM Transceiver

70w • 110 to 180MHz, 300 to 520, 800 to 999MHz receive (cell blocked) • 81 memories • 1200/9600b comp. • 5¾"w x 1¾" x 6¼"d, 2¼ lbs .....**Special $389.99**

© with Instant Coupon, coupons expire 12/31/00

***© Coupon good until stock is gone**

FT-2600M 2m FM Transceiver

60w • 134-174MHz rcvr • 175 mem. • Built-in CTCSS/DCS enc/dec • Smart Search™ • Auto repeater shift • S-Meter squelch • Extensive menu • Key freq. entry from mic • 1200/9600 bps packet • Compact .....**Special $189.99**

FT-1500M 2m FM Mobile

144-148MHz tx/137-174MHz rx • 50w • 1200/9600bps packet compatible • CTCSS enc/decode • 130 mem. • 10 weather channels • Windows programm ..... **CALL**

NEW!

FT-817 Backpack Transceiver

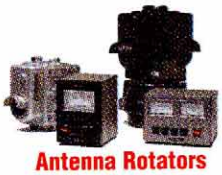
HF/VHF/UHF • 160-10M, 50MHz, 144MHz, 430-450MHz, Alaska emergency tx • 100kHz-56MHz, 76-154MHz, 420-470MHz rx • 5/2.5/1.5/0.7w power output • DSP • USB/LSB/CW/AM/FM/W-FM/AFSK/Packet/RTTY • Built-in CTCSS/DCS • 200 mem. • IF shift • Built-in noise blanker • VOX • Dual VFOs • Spectrum scope • SmartSearch™ auto load • ARTS • Auto repeater shift • Built-in CW keyer • 5.31"w x 1.5"h x 6.5"d **$769.99**

VHF/UHF Repeaters

25w • 8 channels • PLL synthesized • Fully programmable • CTCSS encode/decode • Time out & hang timers • Wall/ rack mt. • 13.8V @ 6A • 14¾" x 1¾" x 4¾", 25 lbs

VXR-5000VADC 135–175MHz **$1199.99**
VXR-5000UCDC 400–512MHz **1199.99**
VXR-5000V/TA 2m rptr w/PS..... **1399.99**
VXR-5000U/TC 440 rptr w/PS..... **1399.99**
VXD-40UB 440 Duplexer..... **199.99**

Prices subject to change without notice.



Antenna Rotators

Light, medium, heavy & extra heavy-duty models, plus elevation & azimuth – elevation.

G-450A Lt/medium, 10 sq. ft **$259.99**
G-550 Elevation 12 sq ft..... **Special 249.99**
G-800SA Medium, 17 sq. ft **339.99**
G-800DXA Same, w/presets..... **429.99**
G-1000DXA 23 sq. ft. w/presets..... **519.99**
G-2800SDX Extra HD, 23 sq. ft .**c/o 1099.99**
G-2800DXA Extra HD, 23 sq. ft **1139.99**
G-5500 Azimuth/elevation 11 sq ft ... **629.99**

Handhelds

FT-23MKII/12 5w 2m HT.. **Special $149.99**
FT-33R 5w 220 MHz FM HT **Special 249.99**
FT-50RD/41B 5w 2m/440 .....**Special 234.99**
FT-411MKII/12 5w 2m HT..... **CALL**
VR-500 100kHz - 1300MHz AM/FM/SSB handheld receiver ..... **CALL**
VX-150 5w 2m FM HT..... **CALL**
VX-1R 500mw 2m/440 HT ...**Special 149.99**
EDC-15 DC adapt.; VX-1R/FRS**Special 19.99**
VX-5R 5w 6m/2m/440 HT ....**Special 299.99**
VXA-100-16/41B 5w air HT w/VOR .. **499.99**
VXA-120 4w air HT..... **299.99**

NEW!

VR-5000 Scanning Receiver

100kHz-2.6GHz (cell blocked) contin., multimode • 2000 mem. channels, 100 banks • Dual receive • SmartSearch™ auto mem. load • Direct keypad freq. entry • World clock • 7.1"w x 2.75"h x 8"d **$899.99**

FRG-100B Receiver

50kHz-30MHz, SSB/CW/AM modes • 50 mem. • Selectable bandwidths • Dual ant. inputs • 9¼"w x 3⅜"h x 9¾"d .**Spec $569.99**

HF - ON THE GO!

•BASE STATIONS • BOATS • PLANES • AUTOMOBILES•

The World's Smallest Full-Featured HF-SSB Radio

$25 FACTORY REBATE (EXPIRES JAN 15, 2001)

The SG-2020 is the perfect choice for base, backpacks or business trips. • Weighing in at just 4.5 pounds, the SG-2020 features fully adjustable output power from 0 to 20 watts PEP. • Low current requirements in receive mode allow practical battery pack operation. • A bullet-proof front end provides third order intercept at better than +18dB, virtually eliminating adjacent channel interference. • Designed with the portable user in mind, it comes complete with built-in, fully adjustable mode 'B' lambic keyer, VOGAD baseband speech processing and RF clipping. • All this plus legendary SGC quality and reliability at an incredibly low price.

SG-2020

For complete details on the SG-2020, see your SGC dealer, or check out our website.

SGC

1-800-259-7331
www.sgcworld.com

MADE IN USA

P.O. Box 3526 Bellevue, WA 98009 USA
Phone: (425) 746-6310 Fax: (425) 746-6384 Email: sgc@sgcworld.com

---

W7FG
Vintage Manuals

Over *350* Manufacturers and over *6,000* Manuals
Radio, Test Equip., Audio

FREE CATALOG

VISA MasterCard

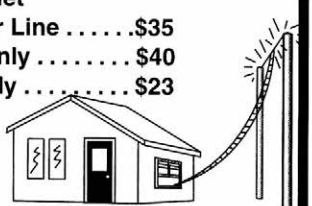
(800) 807-6146
www.w7fg.com

True Ladder Line

- *Nominal Impedance – 600 OHMs • Spreaders – Light Weight, Low Wind-Loading & Long Life • Wire – 16-Gauge, 26-Strand, 100% Copper*
- *One conductor from equipment to far-end antenna insulator (supplied)*
- *No Splices • 100 ft. of Ladder Line with each Doublet Antenna*

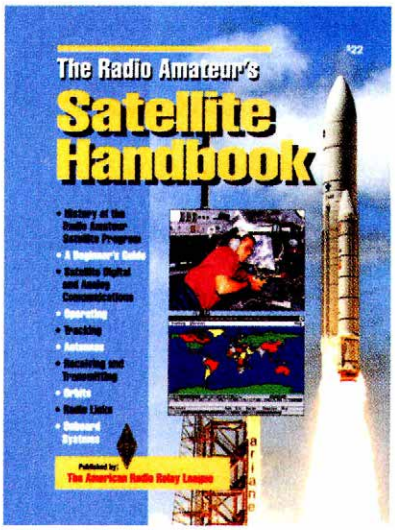
160-10 Meter Doublet Antenna $74
80-10 Meter Doublet Antenna $60
40-10 Meter Doublet Antenna $52
G5RV 80-10meter Doublet with 31 feet of Ladder Line $35
100 ft. of Ladder Line Only $40
50 ft. of Ladder Line Only $23

(800) 807-6146
www.w7fg.com



"Set Your Sights High With

The Radio Amateur's Satellite Handbook"



ARRL Order No. 6583
Only $22*
*Shipping: US $5 (UPS) International $6.50

The most complete book for every satellite operator and beginner!

The Radio Amateur's Satellite Handbook is the most comprehensive book ever written about amateur satellites! Long-time satellite operators and beginners will enjoy its in-depth coverage:

- Introduction to the Radio Amateur Satellite Program
- **Getting started** with satellite communications
- **Setting up a station!**
- Choosing the right **antenna** for the right satellite
- **Tracking** the "birds"

Includes information on AO-40 (Phase 3D), and profiles for all active Amateur Radio satellites

Order Your Copy, Today!

Order Toll-Free
1-888-277-5289

ARRL
225 Main Street, Newington, CT 06111
email: pubsales@arrl.org
http://www.arrl.org/
Toll-Free 1-888-277-5289
Phone 860-594-0355
fax 860-594-0303

QST 1/2001

Super Deal!

IC-746 HF/VHF Transceiver

HF+6m/2m • 5-100w • All-mode • IF-DSP APF/ANF • Twin passband tuning • All band automatic antenna tuner • 11"w x 4⅛"h x 12½"d • **FREE** Logbook for a limited time.....**Special © $1349.99**

IC-756PRO HF/6M Transceiver

HF+6m • 5-100w • All mode • 32-bit floating pt. DSP • 24-bit AD/DA convert. • DSP controlled AGC loops • 51 IF filters • Spectral scope • Auto notch • Digital voice record • **FREE** world clock/service manual from Icom thru 12/31/00.**Spec $2799.99**

IC-718 HF Transceiver

.03-29.9MHz receive • Adjustable power 5-100w SSB, CW, RTTY, 2-40w AM • 10-button keypad - direct freq. input • Auto tuning steps • IF shift • VSWR • Digital S/RF meter .....**Special © $599.99**

IC-775DSP HF Transceiver

200w–all modes • IF-DSP • Auto IF Notch DSP noise reduction • Noise Blanker • PSN modulation • Auto peak filter • Dual watch • CW pitch control • Electronic and memory keyer • Power MOS FET final • Built-in pwr supply...**Special $3499.99**

HOT!

IC-706 MK II-G Transceiver

HF+ 6m (100w); 2m (50w), 440 (20w) • 101 mem. • .03-200MHz broadband all mode • Cross band split • Noise blanker • IF shift • DSP • Auto repeater • Preamp/attenuator • CW keyer • Full break-in (QSK) • Speech processor • VOX/XFC • Tone encoder/decoder • 9½"w x 3¾"h x 9⅞"d, 9.1 lbs .....**Special © $999.99**

IC-706MKIIG w/AH4....**Spec © $1289.98**

IC-706MKIIG w/AT180 Spec © $1449.98

Custom Heil boom mic/headset FREE from Icom w/IC-706MKIIG and ant. tuner packages thru 12/31/00

PW-1 Amplifier

HF + 6m • 1KW PEP SSB and 1kw CW/RTTY output • Auto band change • Built-in auto antenna tuner • Wide ALC adjust. range • Full break-in CW operation • Built-in 110/220VAC • Auto input voltage selector • 14"w x 10⅜"h x 14⅛"d, 56 lbs **$5399.99**

R-75 Receiver

.03-60MHz • Triple conversion • Twin passband tuning (PBT) • Synchronous AM detection • Large front-mt. spkr • **FREE UT-106 DSP from Icom** thru 12/31/00 .....**© $584.99**

R-8500 Receiver

0.1-2GHz (cell blocked) • All mode • IF shift • Noise blanker • Auto peak filter • 1000 memory channels • PC controllable w/built-in CI-V and RS-232C port.....**Special $1464.99**

RECEIVER FOR PC

PCR-1000 .5-1300MHz PC-controlled • Power supply • AM/FM/SSB • Built-in speaker • Antenna • RS-232 cable and software • cell-blocked..... **Special © $349.99**

PCR-100-12 .01-1300MHz PC-controlled • AM/FM/WFM • CTCSS • Ant .....**Spec © $199.99**

Super LOW

IC-2100H FM Transceiver

144MHz, 55w • PC ready • 14 channel DTMF • 113 alphanumeric memory channels • Selectable squelch delay • Optional HM-90A 5½"w x 1⅜"h x 7⅝"d .....**Special $169.99**

IC-207H Dual Band Mobile

2m/440MHz FM • 50w/35w • Wideband receive • 182 memory channels • 9600 baud capability,PC ready • 50 frequency encode /decode • Backlit TTP mic..**Special $294.99**

IC-2800H FM Mobile

50w/2m, 35w/440MHz • CTCSS enc/dec • S meter • Memory names • Simple band scope • 6 pin data port • External video input • Full function microphone • Independent band controls • Separate control head • 3" TFT color LCD screen .....**Special © $489.99**

HANDHELD COMM. RECEIVERS

NEW!

R-3-26 (pictured) 0.5-2450MHz (cell blkd) • FM/WFM/AM/AM TV/FM TV modes • 450 memories • 6 character alphanumeric LCD • Computer programmable • PL decode/scan • Audio/video outputs..... **$479.99**

R-10-05* 0.5-1300MHz (cell blkd) • FM/WFM/AM/USB/LSB/CW modes • 1000 mem. • 8 character alphanumeric LCD • 7 scan modes with priority • Cloning.....**Special © $299.99**

R-2-06* .5-1300MHz • AM/FM/WFM • w/chgr/batt **Spec $179.99**

*FREE software from Icom thru 12/31/00

FREE SHIPPING! via UPS Ground on Orders over $1,500

HANDHELDS

IC-T22A IC-T2H IC-T81A IC-Q7ABC IC-W32A

IC-T22A 2m • 3w (5w @ 13.5V) • Small, easy to use • Alphanumeric display • Air band receive • 80 memories; 40 with alpha-numeric display..... **$249.99**

IC-T2H 2m 6w • Wide band rcvr • 43 mem. • 8 program. keys • 8 AA batt**Spec $139.99**

IC-T7H 2m/440MHz • Dual bander at single bander size & price • Easy! Works one band at a time • 6w 2m/440MHz @ 13.5V • No function key and "intuitive" help function • CTCSS encode/decode... **Special $199.99**

IC-Q7ABC 2m/440 • 300mw • wideband receive • 200 memories.... **Special $134.99**

IC-W32A 2m/440MHz dual bander • 3w, 5w w/BP-173 • Independent band controls • Simultaneous receive of both bands • 200 mem. (100 per band) w/name capability • PC/radio-to-radio cloning capability • Built-in enc/dec • Auto repeater func. • Weather channel rcve capability..... **Special $264.99**

IC-T81A Quad-band HT • 5w 6m/2m/440 MHz, 1w 1.2 GHz.....**Special $289.99**

CS-T81 Windows software for T81A. **$13.99**

CSW-HH4 Windows software with cable for the T2H, T7H, W32A **$50.99**

Other ICOMs not Pictured

A-22 5w Navicom Air HT **$499.99**

AH-4 80-6m/120w/auto wire tuner **319.99**

AT-180 Auto coax tuner HF + 6m **499.99**

IC-2GXAT/HP 7w 2m HT **249.99**

IC-4008A Family radio service HT **79.99**

IC-M3A 5w VHF marine HT..... **159.99**

IC-M45AW 25w VHF marine xcvr **179.99**

© w/Instant Coupon, coupon expire 12/31/00

Prices subject to change without notice.

AMATEUR ELECTRONIC SUPPLY® LLC

5710 W. Good Hope Road Milwaukee, WI 53223 • 414-358-0333 • Fax 414-358-3337 • Service 414-358-4087

BRANCH STORES

28940 Euclid Ave
Cleveland, OH 44092
440-585-7388
1-800-321-3594
Fax 440-585-1024
cleveland@aesham.com

621 Commonwealth Ave
Orlando, FL 32803
407-894-3238
1-800-327-1917
Fax 407-894-7553
orlando@aesham.com

4640 South Polaris Ave
Las Vegas, NV 89103
702-647-3114
1-800-634-6227
Fax 702-647-3412
lasvegas@aesham.com

STORE HOURS

Monday-Friday
9am to 5:30pm
Saturday
9am to 3pm
Over 44 Years in Amateur Radio

Web www.aesham.com • E-mail info@aesham.com • Toll Free 1-800-558-0411

ORDER TOLL FREE 1-800-558-0411

6:00 A.M. Pacific to 8:30 P.M. Eastern
Monday – Friday • Saturday to 6:00 P.M.

KENWOOD

TM-V7A Dual Band FM Transceiver
50w 2m/35w 440 • 5-in-1 programmable memory • 280 multi-function memory positions • 180 channels • Auto band change • Built-in duplxr • CTCSS enc/dec • 10 DTMF mem. • Cross band repeat. func. • Reversed LCD • 5⅞"w x 1⅜"h x 7½"d ...**Special $429.99**

TH-G71A Dual Band Handheld
5w 2m/440 dual band • Multiple scan modes • Wide range receive including aircraft • CTCSS enc/dec • One band at a time • 10 DTMF autopatch mem. • PC programmable plus DTMF remote control to your Kenwood TM-V7A • 2⅜"w x 4⅛"h x ⅞"d ..**Special $264.99**

Mobiles
TM-D700A 50w 144MHz, 35w 440MHz • 118-1300MHz rx (cell blkd) • Built-in 1200/9600bps • 200 mem. • CTCSS enc/dec • Alphanumeric.....**Special $589.99**
TM-261A 50w • 144-148MHz tx, 118-174MHz rx • 61 multi-func. mem. • DTMF mem. func. • CTCSS enc.... **Special 169.99**
TM-331A 25w 220 FM xcvr..... **499.99**
TM-461A Same as TM-261A • 35w • 438-450MHz tx, 400-470MHz rx..... **439.99**
TM-541A 10w 1.2GHz FM xcvr **449.99**
TM-642AD 2m/220 dual-band FM... **739.99**
TM-742AD 2m/440 50/35w.....**Spec 629.99**

SSTV
VC-H1 Visual communicator.**Spec $309.99**

Family Radio
UBZ-AL14BK Black FRS HT .**Special $39.99**
UBZ-LH14BK Black FRS HT ....**Special 79.99**

Handhelds
TH-22ATH 5w • 144MHz • DTMF keypad • 40 memories • Multiple scan functions **$199.99**
TH-42AT 2.5w 440MHz.....**Closeout 229.99**
TH-79AKSS 2m/440MHz • 5w • MOS FET power module • Dual receive cross band repeat • 82 mem. • ID and DTMF mem. • Built-in CTCSS enc/dec ....**Milwaukee Only 379.99**

HF Radios
TS-50S 160–10m • 500kHz–30MHz general coverage receiver • 100w • Dual VFOs • 100 mem. • Dual-menu system .**Special $689.99**
TS-570D(G) 160–10m • 500kHz–30MHz rx • 100w • 16-bit DSP.....**Special 989.99**
TS-570S(G) 160-10m/6m ....**Special 1199.99**
TS-870S 160–10m • 100kHz–30MHz • 100w • IF-digital • Multi scan modes .**Spec 2089.99**

Prices subject to change without notice.

FREE SHIPPING! via UPS Ground on Orders over $1,500

TM-G707A Dual Band FM Transceiver
50w 2m/35w 440 • High visibility LCD Detachable front panel • 180 memory channels • Alpha numeric display • CTCSS enc/dec • Duplexer built-in • Priority scan • 5¼"w x 2⅛"h x 7½"d.....**Special $299.99**

TH-D7A(G) Dual Band Handheld
5w 2m/440 HT • Dual receive on same band • Aircraft receive • 1200/9600 TNC • APRS ready • 200 mem. (10 autodial) • VC-H1 messaging control • DX packet cluster monitor • **FREE** PB-38 batt. from Kenwood thru 12/31/00 ..... **CALL**

ALINCO

DJ-V5TH VHF/UHF Dual Band HT
2m and UHF Amateur • 700 mAh NiCad battery pack – up to 5W output • 3 output settings • 76–999MHz (cell blocked), includes wide FM capability • Split-band operation capability • 8 tuning steps • 200 memory channels • CTCSS enc/dec • DTMF • 4 scan modes • 5 program. scan banks • Up to 13.8V DC input .....© **$239.99**
DJ-V5TDCH All features of DJ-V5TH housed in a blue, see-thru case. • See-thru batt. case, black NiCad and charger.....© **$259.99**

DJ-G5TH VHF/UHF Twin Band HT
144–147.995/438–449.995MHz tx, 108– 173.995 (including AM)/438–449.995MHz rx • 5W @ 13.8V DC • CTCSS tone squelch • Memory channels: VHF 80, UHF 80 • Scanning: memory, band or programmed • ChannelScope™ • DSQ selective call • 20 auto-dialer memories • Full duplex cross band repeater and cloning func. • Low battery indicator.....© **$279.99**

Handhelds
DJ-C5T 2m/440 300mw w/spkr.© **$149.99**
DJ-S11T 340mw 2m/batt. holder ..*© **79.99**
DJ-S41T 340mw 440, batt holder..*© **79.99**
DJ-X10T .1MHz-2GHz HT rcvr.....© **319.99**
DJ-X2T Credit card size receiver .© **259.99**
DJ-180TH 5w 2m FM HT/TTP.....© **149.99**
DJ-196T 5w 2m FM HT/TTP.....© **159.99**
DJ-280TH 5w 220 FM/TTP .....© **169.99**
DJ-496T 5w 440 HT/TTP .....© **169.99**

FRS
DJ-S46 Handheld family radio ....*© **$99.99**

Mobiles
DR-M03SX 10w 10m FM/enc ..*© **$164.99**
DR-M06TH 20w 6m FM/TTP .....*© **249.99**
DR-135T 50w 2m FM/TTP...**Spec** © **184.99**
DR-135TP above w/TNC ..**Special** ©**279.99**
DR-150TQ 50w 2m/CTCSS dec....© **229.99**

Prices subject to change without notice.

HF Radios
DX-70TH (pictured) HF/100w 6m.© **$749.99**
DX-77T 160-10m HF transceiver ....© **699.99**
DM-330MVT 30A switching ps **189.99**
DM-340MVT 30 Amp power supply... **179.99**

Antenna Tuners
EDX-1 Manual coax antenna tuner.. **$269.99**
EDX-2 Automatic wire ant. tuner..... **319.99**

© w/Instant Coupon, coupons expire 12/31/00
*© w/Instant Coupon, coupons expire 1/31/01

DR-605TQ 144/430MHZ FM Dual Band Mobile Transceiver
144–147.995MHz, 430-449.995MHz tx; 136–173.995MHz, 420–470MHz rx • 50w 2m/35w 440 • 50 mem. channels • Cross band repeat & full duplex • Direct freq. via DTMF mic • Multiple scan func. • CTCSS enc • 1200/9600bps packet compatible • Cable cloning func..**Special** *© **$329.99**

DR-610TQ 144/430MHZ FM Dual Band Mobile Transceiver
144–147.995MHz, 438-449.995MHz tx; 108–173.995MHz, 420–470 MHz rx • Full duplex • 50w 2m/35w 440 • 2 VFOs per band • Direct freq. via DTMF mic • Channel scope™ monitors 7 freq. • 120 mem. channels • Multiple scan func. • CTCSS enc • 1200/9600bps packet compatible • Over-air cloning function.....*© **$439.99**

AMATEUR ELECTRONIC SUPPLY® LLC

5710 W. Good Hope Road Milwaukee, WI 53223 • 414-358-0333 • Fax 414-358-3337 • Service 414-358-4087

BRANCH STORES

28940 Euclid Ave
Cleveland, OH 44092
440-585-7388
1-800-321-3594
Fax 440-585-1024
cleveland@aesham.com

621 Commonwealth Ave
Orlando, FL 32803
407-894-3238
1-800-327-1917
Fax 407-894-7553
orlando@aesham.com

4640 South Polaris Ave
Las Vegas, NV 89103
702-647-3114
1-800-634-6227
Fax 702-647-3412
lasvegas@aesham.com

STORE HOURS
Monday-Friday
9am to 5:30pm
Saturday
9am to 3pm
Over 44 Years in Amateur Radio

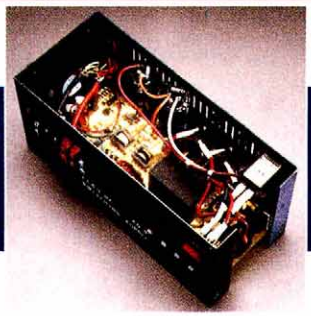
Web www.aesham.com • E-mail info@aesham.com • Toll Free 1-800-558-0411

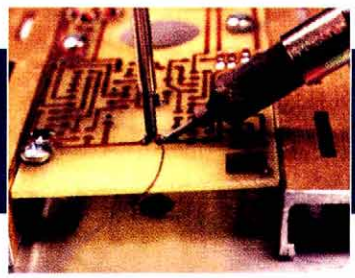
ORDER TOLL FREE 1-800-558-0411

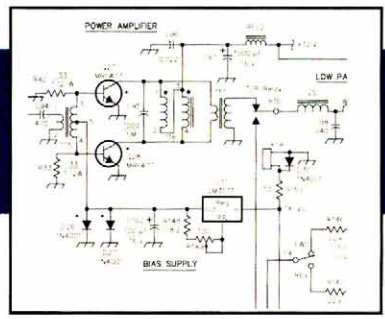
6:00 A.M. Pacific to 8:30 P.M. Eastern
Monday – Friday • Saturday to 6:00 P.M.

THE ARRL HANDBOOK 2001

Use it, and you'll tackle Amateur Radio state of the art.







Technology

This latest edition features up to date discussions and explanations in applied electronics and communications. The contents are enhanced by more than a thousand drawings, photos, and tables. Learn how to put new technology to work. Explore a new chapter on digital signal processing.

Projects

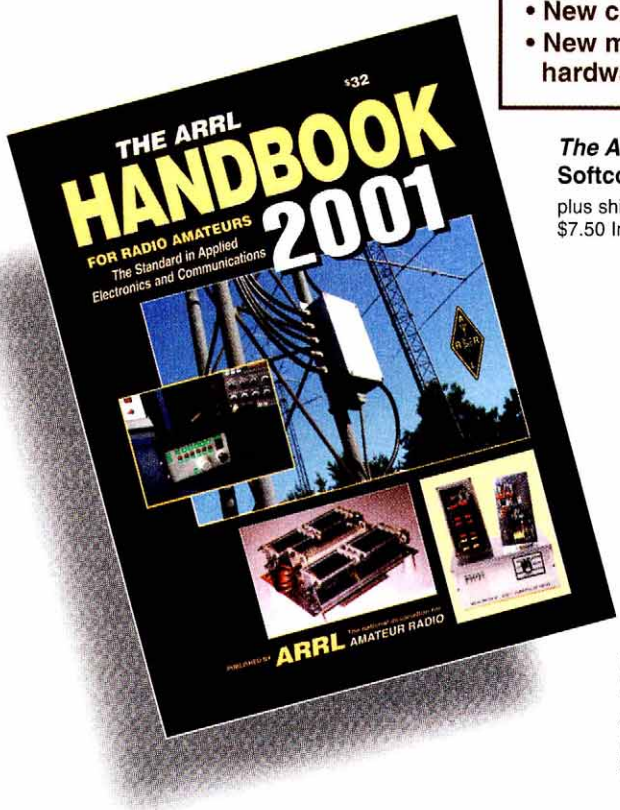
The ARRL Handbook is a winning combination of informative theory and practical projects—for a variety of skill levels. Includes PC-board layouts and templates for weekend projects, and contact information for parts suppliers and manufacturers. Build to success!

Reliability

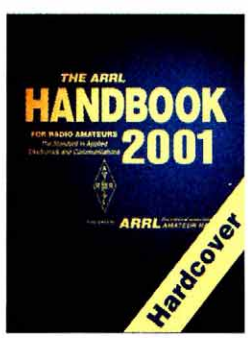
Experts in many fields have labored to make this edition the best ever! See for yourself why generations of hams and others interested in radio electronics have trusted The ARRL Handbook.

ALWAYS UPDATED!

- New chapter on DSP
- New material on computer hardware
- Computer connector pinouts
- New remote antenna switch project



The ARRL Handbook for Radio Amateurs
Softcover. ARRL Order No. 1867 ..... **$32**
plus shipping: $6 US (UPS).
$7.50 International (surface mail).



The ARRL Handbook for Radio Amateurs
Hardcover.
ARRL Order No. H186.... **$49.95**
plus shipping: $7 US (UPS).
$8.50 International (surface mail).

The ARRL Handbook CD for Radio Amateurs
Version 5.0—for *Windows* and Macintosh*
View, Search and Print from the entire 2001 edition book!
CD-ROM.
ARRL Order No. 1883 ..... **$39.95**
plus shipping: $4 US (UPS).
$5.50 International (surface mail).

*Some supplementary software utilities included, for *Windows* and DOS only.

Sales Tax is required for shipments to CT, MI, VA, CA and Canada.

ARRL *The national association for AMATEUR RADIO*

225 Main Street, Newington, CT 06111-1494 tel: 860-594-0355 fax: 860-594-0303
e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/

In the US call our toll-free number **1-888-277-5289** 8 AM-8 PM Eastern time Mon.-Fri.

QT12/2000

Celebrating 50 Shows

Hamvention

DAYTON HARA ARENA

DAYTON, OHIO

May 18, 19 & 20 2001

Please watch your mailbox for pre-show mailers!

www.hamvention.org

"The Northwest's Largest Ham Convention"

SEAPAC

NORTHWEST DIVISION HAM CONVENTION

June 1, 2 & 3, 2001

Seaside Convention Center, Seaside Oregon

Special Seminar on Friday, June 1, 2001

Commercial Exhibits
Banquet
30+ Seminars
YLRL Luncheon
QCWA Luncheon

NO SALES TAX IN OREGON

Over 100 Flea Market Tables
Special Interest Group Meetings
V. E. Testing

And Much More - Right on the Beautiful Pacific Northwest Ocean Beach

GENERAL AND FLEA MARKET INFORMATION
CONTACT: RANDY STIMSON, KZ7T
Phone: (503) 641-3776 • E-mail: kz7t@arrl.net

EXHIBITOR INFORMATION
CONTACT: AL BERG, W7SIC
Phone: (503) 816-7098

Look for updates on our Web Site: www.seapac.org

Stay Informed!

ARRL
The national association for AMATEUR RADIO

Member-Only Benefits and Services

- QST delivered to you each month
- "Members Only" access to ARRL Web Site features
- E-Mail forwarding service —"your callsign"@arrl.net

Technical help
Equipment insurance available
The fun of contesting and awards
Outgoing QSL service
Regulatory assistance
National voice of Amateur Radio

#1 US Ham Magazine

- Product reviews
- Construction projects
- Fascinating activities and stories
- News and happenings

Discover ARRL

Join Today! http://www.arrl.org/join.html

One Year Membership: US, $34; Canada, $47; outside US and Canada, $54

ARRL MAGAZINES

QEX Forum for Communications Experimenters—provides a platform for exchanging the latest technical ideas and information. No other publication brings you more practical and theoretical work in the field of Amateur Radio. From PSK31—to future radio design concepts—you'll explore it and build it in *QEX*! At 64 pages bimonthly, *QEX* appeals to those seeking more technical content. One year: US, $22; US, Canada and Mexico by first class mail, $35; elsewhere by surface mail, $27; airmail, $55. Nonmembers add $12 to these rates.

Subscribe on the Web at http://www.arrl.org/qex/

NCJ The National Contest Journal—a bimonthly magazine dedicated to the competitive aspects of Amateur Radio. In each issue, you'll find: contest tips, tricks and techniques, VHF-UHF Contesting!, International Contests, Contesting for Fun, DXpeditions, Scores & statistics and much more!

One year: US, $18; US, Canada and Mexico by first class mail, $26; elsewhere by surface mail, $28; airmail, $36.

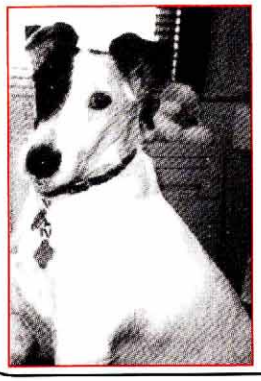
Subscribe on the Web at http://www.arrl.org/ncj/

ARRL *The national association for AMATEUR RADIO*
225 Main Street, Newington, CT 06111-1494 tel: 860-594-0355 fax: 860-594-0303
e-mail: circulation@arrl.org World Wide Web: http://www.arrl.org/

In the US call our toll-free number **1-888-277-5289** 8 AM-8 PM Eastern time Mon.-Fri. or use the handy postpaid envelope in QST

CABLE X-PERTS, INC.

January 2001 Special



JAKE, sez start your new year's projects with....

500ft RG8X-Mini 50 Ohm Coax

Special Price: $79.95/ea

(On this special only UPS shipping and handling included within the 48 states only) Shipping and handling applies to all other products and destinations listed herein. Minimum order: $30.00 in product. Prices subject to change without notice. Sorry. No COD's. Illinois residents 8.25% sales tax added. offer expires 01/31/01.

COAX (50 OHM"LOW LOSS" GROUP)

	100FT/UP	500FT	1000FT
"FLEXIBLE" 9913 STRD BC CNTR FOIL + 95% BRAID 2.7dB@ 400MHz NC/DB/UV JKT	.60/FT	.58/FT	.56/FT
LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.64/FT	.62/FT	.60/FT
LMR 400 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	.89/FT	.87/FT	.85/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JKT	1.27/FT	1.25/FT	1.23/FT
LMR 600 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 2.1dB @ 450MHz TPE JKT	1.95/FT	1.93/FT	1.90/FT

COAX (50 OHM "HF" GROUP)

	100FT/UP	500FT	1000FT
RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.40/FT	.38/FT	.36/FT
RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.18/FT	.16/FT	.14/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.18/FT	.16/FT	.14/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.19/FT	.17/FT	.15/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz	.25FT/UP	1.75/FT.	
RG142/U SOLID SCCS 2-95% SILVER BRAIDS *Teflon®* JKT 8.2dB/1100WATTS @ 400MHz	.25FT/UP	1.50/FT.	

COAX (75 OHM GROUP)

	100FT/UP	500FT	1000FT
RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS	.44/FT	.42/FT	.40/FT
RG6/U CATV FOAM 18GA CW FOIL + 60% ALUM BRAID	.20/FT	.13/FT	.11/FT
RG6/U CATV FOAM 18GA CW FOIL *QUAD SHIELD*	.25/FT	.18/FT	.16/FT

LADDER LINE GROUP

	100FT/UP	500FT	1000FT
"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.23/FT	.21/FT	.19/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.28/FT	.26/FT	.24/FT
300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

ROTOR & CONTROL CABLES

	100FT/UP	500FT	1000FT
5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft	.22/FT	.20/FT	.18/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.37/FT	.36/FT	.34/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.49/FT	.47/FT	.45/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.80/FT	.76/FT	.72/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.25/FT	.23/FT	.21/FT

ANTENNA WIRE

	100FT	300FT	500FT	1000FT
14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	19.00ea	48.00ea	60.00ea	100.00ea
14GA 7 STRD *"HARD DRAWN" (perfect for permanent Dipoles etc.)*	15.00ea	36.00ea	40.00ea	60.00ea
14GA SOLID *"COPPERWELD" (for long spans etc.)*	15.00ea	36.00ea	40.00ea	60.00ea
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	15.00ea	36.00ea	40.00ea	60.00ea

ANTENNA & TOWER SUPPORT ROPE

	100FT	250FT	500FT	1000FT
3/32" DOUBLE BRAID *"POLYESTER"* 260# TEST WEATHERPROOF	7.50ea	15.00ea	22.50ea	40.00ea
1/8" DOUBLE BRAID *"POLYESTER"* 420# TEST WEATHERPROOF	10.00ea	20.00ea	35.00ea	57.00ea
3/16" DOUBLE BRAID *"POLYESTER"* 770# TEST WEATHERPROOF	15.00ea	30.00ea	50.00ea	80.00ea
5/16" DOUBLE BRAID *"POLYESTER"* 1790# TEST WEATHERPROOF	20.00ea	42.50ea	70.00ea	130.00ea

FLEXIBLE 2/COND RED/BLK DC POWER "ZIP" CORD

8GA (rated:40 amps)	50FT $24.50	100FT $44.50	250FT $107.50
10GA (rated:30 amps)	50FT $15.50	100FT $28.00	250FT $65.00
12GA (rated:20 amps)	50FT $10.50	100FT $19.00	250FT $42.50
14GA (rated:15 amps)	50FT $8.50	100FT $15.00	250FT $32.50
16GA (rated:12 amps)	50FT $5.50	100FT $10.00	250FT $22.50
18GA (rated: 8 amps)	50FT $4.50	100FT $8.00	250FT $17.50

COAX CABLE ASSEMBLIES

with USA made Silver/Teflon® Gold Pin PL259 connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
200' $136.95 175' $120.95 150' $104.95 125' $88.95 100' $73.95 75' $57.95 50' $41.95
25' $25.95 15' $22.95 10' $19.95 6' $13.95 3' $12.95 1' $11.95

Assemblies now available at all AES locations

RG213/U strd BC Mil-Spec NC/BD/UV JKT. 1.2dB 2500 watts @ 30MHz.
200' $94.95 175' $83.95 150' $73.95 125' $62.95 100' $52.95 75' $41.95 60' $36.95
50' $31.95 25' $20.95 15' $18.95 10' $16.95 6' $12.95 3' $10.95 1' $9.95

Assemblies now available at all AES locations

RG8/U strd BC foam 95% braid UV resistant JKT. 0.9dB 1350 watts @ 30MHz.
175' $78.95 150' $67.95 125' $57.95 100' $46.95 75' $36.95 50' $25.95
25' $18.95 15' $16.95 10' $14.95 6' $12.95 3' $10.95 1' $9.95

Assemblies now available at all AES locations

RG8 MINI(X) strd BC foam 95% braid UV resistant JKT. 2.0dB/875watts@ 30 MHz
150' $35.95 125' $31.95 100' $27.95 75' $23.95 50' $19.95 25' $15.95
CLR JKT: 18' $13.95 12' $12.95 9' $11.95 6' $10.95 3' $9.95 1' $8.95
18' PL259-Mini UHF Fem & PL259. $22.95/ea.

Assemblies now available at all AES locations

With USA made Silver/Teflon®/Gold Pin male "N" connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
150' $116.95 125' $98.95 100' $83.95 75' $69.95 50' $56.95
35' $46.95 25' $40.95 15' $33.95 10' $26.95 6' $17.95 3' $16.95 1' $15.95

Assemblies now available at all AES locations

With USA made Silver/Teflon®/Gold Pin PL259 to male "N"

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
200' $146.95 175' $126.95 150' $107.95 125' $92.95 100' $76.95 75' $61.95
50' $45.95 25' $30.95 15' $27.95 10' $24.95 6' $15.95 3' $14.95 1' $13.95

Assemblies now available at all AES locations

RG142/U 50 OHM COAX ASSEMBLIES

Double Silver Braid Shields, High Power Teflon® Dielectric & Jacket

PL259 ea end: 1ft $9.95 ea, 3ft $12.95 ea, 6ft $17.95 ea, 9ft $21.95 ea, 12ft $26.95 ea, 18ft $36.95 ea ● "N" male ea end: 1ft $13.95 ea, 3ft $18.95 ea, 6ft $21.95 ea ● 3 ft jumpers $19.95 ea: RA BNC male-"N" male, RA BNC male-"N" female, SMA, male-BNC female, SMA female-"N" female, RA SMA male-"N" female, SMA female-"N" male, SMA Male-"N" male.

HT SOLUTION ASSEMBLIES

These jumpers will help improve the performance and life of your Hand Held Transceiver. RG58A/U Group: 1ft R.A. SMA Male-SO239 (UHF Female) $14.95ea ● 1ft R.A. SMA Male-"N" Female $15.95ea ● 1ft R.A. SMA Male-BNC Female $14.95ea ● 3ft R.A. SMA Male-PL259 $13.95ea. RG58/U Group: 3ft R.A. BNC Male-SO239 (UHF Female) $14.95ea 3ft R.A. BNC Male-PL259 $12.95ea. RG8X Mini Group: 6ft PL259-BNC Male $9.95ea.

All connector terminations are soldered, Hi-Pot® tested @ 5kv for one minute, continuity checked, ultra violet resistant heat shrink tubing, and red protective caps, which can also be used as a boot.

CONNECTORS

Both connectors fit 9913 types and LMR400 types MADE IN USA

PL 259 SILVER/*Teflon®*/GOLD TIP.....10PC $12.50.....25PC $27.50.....50PC $52.50....100PC $100.00
"N" (2PC) SILVER *Teflon®* /GOLD TIP...10PC $37.50.....25PC $87.50.....50PC $162.50..100PC $300.00

For our other connectors and adapters see http://www.cablexperts.com

TINNED COPPER "FLAT" GROUNDING BRAID

1 INCH WIDE (equivalent to 7ga).....25FT $24.00.....50FT $47.00.....100FT $94.00
1/2 INCH WIDE (equivalent to 10ga)..... 25FT $14.00.....50FT $27.00.....100FT $53.00
1/2 INCH x 6FT Copper Plated Ground Rod w/clamp.....$20.95/3 pk (sold in packages of 3 only)

JAKE's Featured Products of the Month

407TS: 4 Hole Chasis UHF Connector Silver Teflon® Gold Pin

1-9 $3.00/ea
10-24 $2 .70/ea

406
2" LONG UHF BULKHEAD

1-9 $3.00/ea
10-24 $2 .70/ea
25/UP $2.40/ea

http://www.cablexperts.com

FAX: 847-520-3444

TECH INFO: 847-520-3003

ORDERS ONLY:

800-828-3340

416 Diens Drive, Wheeling, IL 60090

HOURS: M-F 9AM-5PM CST.

MasterCard VISA DISCOVER

Visit us on line at www.cablexperts.com for Discounts, Specials and to get our complete catalog

Teflon® is a registered trademark of DuPont.

CABLE X-PERTS, INC.

TROPICAL HAMBOREE®

Communications & Computer Show

February 3-4, 2001

Fair Expo Center, Miami, Florida

Commercial Booths, Swap Tables, Forums, Programs,

License Exams, Transmitter Hunts

www.hamboree.org

w4wyr@arrl.net or wd4sfg@bellsouth.net

TEL: 305-642-4139

FLORIDA STATE CONVENTION

Teach Your Children Well

— with Ham Radio in the Classroom

visit: www.arrl.org/ead/teacher/

Integrate ham radio fun into your curriculum. Science, Math, Geography, and Social Studies. Ham Radio Makes Learning Fun! For more info, e-mail teach@arrl.org or call 860-594-0267.

- DIP switch programmable
- Miniature in size
- 37 EIA tones. 27 non-standard tones from 33.0 to 254.1 Hz included
- Reverse Burst built-in
- Easy 3 wire hookup

SS-64 CTCSS Encoder
.66" x 1.08" x .21"

SS-64 DIP Switch Programmable CTCSS Encoder $28.95

- Fully enclosed CTCSS encoder
- All 32 EIA tones from 67.0 to 203.5 Hz included
- Perfect for mobile / base applications

TE-32
5.25" x 3.3" x 1.7"

TE-32 Multi-Tone CTCSS Encoder $49.95

TP-3200 Shared Repeater Tone Panel

- 51 CTCSS Tones
- 106 DCS Codes
- Supports 157 Repeater Subscribers
- On-Line Computer Help
- Repeater CW ID
- Air Time Loading & Analysis Graphs
- Signalling Formats: CTCSS DCS & DTMF

- Eight programmable, selectable messages
- Fully field programmable via included keypad
- Meets all FCC identification requirements

ID-8 Automatic Morse Code Identifier
1.85" x 1.12" x .35"

TP-3200D Table Top Version $269.95 each
TP-3200RM-A Single Rack Mount version $279.95 each
***TP-3200RM-B Triple Rack Mount version $279.95 each**
*Holds up to three TP-3200s

ID-8 Automatic Morse Station Identifier $69.95

MasterCard VISA

Call or write to receive our full Product Catalog or visit our Web site for complete information at: http://www.com-spec.com

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE • ORANGE, CA 92865-4296
(714) 998-3021 • FAX (714) 974-3420
Entire U.S.A. (800) 854-0547 • FAX (800) 850-0547
http://www.com-spec.com

Software for Active Hams

ABW++, KCal+, NERDAlert, ID Wizard, more

FREE to download from:

http://www.taborsoft.com/

Home of CAPMan & WinCAP Wizard 2

K2AW'S FAMOUS HI-VOLTAGE MODULES

20,000 IN USE IN OVER 50 COUNTRIES

SAME DAY SHIPPING MADE IN USA

HV14-1	14KV-1A	250A. SURGE	$15.00
HV10-1	10KV-1A	250A. SURGE	12.00
HV 8-1	8KV-1A	250A. SURGE	10.00
HV 6-1	6KV-1A	150A. SURGE	5.00

PLUS $4.00 SHIPPING - NY RESIDENTS ADD 8% TAX

K2AW'S "SILICON ALLEY"

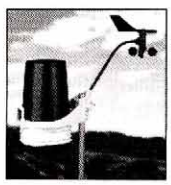
175 FRIENDS LANE WESTBURY NY 11590 516-334-7024

THE BEST HOME WEATHER STATION EVER MADE.

BRAND NEW! $595.00

QST0101

Davis unleashes its Vantage Pro wireless weather station! Revolutionary thinking, with professional quality, accuracy, and performance.



Forecasts 30 different weather conditions, shows over 80 graphs, and sounds over 70 weather alarms. All in a display that's easy to read and use.

It's the best value you'll find anywhere!

CALL TODAY FOR YOUR FREE CATALOG!

1-800-678-3669 • www.davisnet.com

Davis Instruments 3465 Diablo Ave. Hayward, CA 94545

ORDER ONLINE!

BATTERIES

www.batteryprice.com

Call for current specials, or visit us online!

(800) 634-8132 Periphex™

Visit Your Local Dealer

Amateur & Adv. Comm
3208 Concord Pike
Wilmington, DE 19803
1-302-478-2757
e-mail K3WAJ@erols.com
"Closed Mon • No tax in DE • est 1977"

ComDaC
1051 Main St.
St. Joseph, MI 49085
1-800-382-2562
www.comdac.com
"We stock all major brands"

KJI Electronics
PO Box 438
Cedar Grove, NJ 07009-0438
1-973-239-4389
www.kjielectronics.com
"Serving Amateur Radio since 1978"

Advanced Specialties
114 Essex St.
Lodi, NJ 07644
1-800-926-9426
home.att.net/~advancedspec
"New Jersey's Amateur Radio Source"

Ham Central
3 Neptune Road
Poughkeepsie, NY 12601
1-800-721-4426
http://www.ham-central.com/
"New York's Ham Radio Dealer"

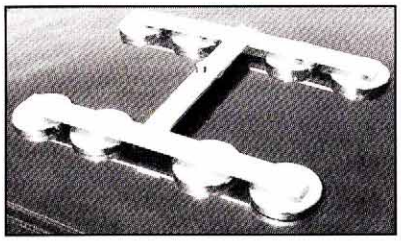
No. Ohio Amateur Radio
821 Pearl Road
Brunswick, OH 44212
1-877-964-5566
www.noard.com
"Serving NE/Central OHIO Hams"

Your Customers are reading *QST*
To reach them, call (860) 594-0207
or e-mail jbee@arrl.org

Radio Depot
5963 Corson Ave S.
Seattle, WA 98108
1-206-763-2936
www.hammall.com
"Alinco • Icom • Kenwood Yaesu"

Please Support Our Advertisers

Tell your dealer you saw them in *QST*



We now offer a new 8 magnet W3BMW mount. Double the holding power of our popular 4 magnet mount gives you even more peace of mind at highway speeds. Order today for just $111.95 plus $12.95 S&H. Both models available with either 3/8 - 24 stud or SO-239 Connector.

We also manufacture a commercial grade W3BMW mount using 1/8" x 13" x 18" 6061-T6 Aluminum plate. The superior ground plane, coupling, and holding power offer many options. Available in 4 or 8 magnet models. Ideal for mounting multiple antennas and other hardware ***without drilling holes*** in Leased or Owned vehicles.

Copper Foil

.003"x3" pure copper foil is great for ground planes and hobby or commercial applications. Light yet tough. 25 feet - $30.45, 50 feet - $50.75 includes shipping to all cont. U.S. locations.

Copper grounding strip

.011"x2" copper grounding strip available in coil lengths of 50 to 500 feet. 50' - $54.50, 100' -$86.00, 250' - $169.50, 500' - $298.50. Price includes shipping to all cont. U.S. locations.

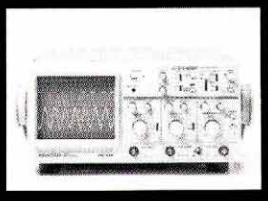
Engineering Grade 6061 - T6 Aluminum Tubing

Masts and .058" wall telescoping tubing. We offer pre-drilled tubing for easy assembly of verticals and portable masts.

Metal & Cable Corp., Inc.
P.O.Box 117, Twinsburg, OH 44087
Phone (330)425-8455, Fax (330)963-7246
e-mail david@metal-cable.com
Please visit our web site at www.metal-cable.com

KENWOOD
Analog Oscilloscopes

FREE



Model
PCS-4125
Price
$399.00

Act Now!
Receive a Free B&K 5360 Digital Multimeter $229.00 Value with PCS-4125 Purchase
Offer expires 12/15/00

PCS-4125 Features:
- 20MHz,2ch
- High Withstand Voltage to 400V
- Relay attenuator
- Wide bandwidth & fast sweep
- One touch X-Y switching
- VERT mode / FIX triggering

CALL FOR YOUR FREE CATALOG 800-638-2020
- Digital Multimeters
- Frequency Counters
- Power Supplies
- Function Generators
- Oscilloscopes
- Signal Generators

PRODUCTS INTERNATIONAL www.prodintl.com
9893 Brewer's Court Laurel, Maryland 20723-1990
Phone: 800-638-2020 Fax: 800-545-0058
Int'l Phone: (240)568-3940 Int'l Fax: (240)568-3948
E-mail: sales@prodintl.com Web: www.prodintl.com

Ham Ads

1) Advertising must pertain to products and services which are related to Amateur Radio.

2) The Ham-Ad rate for commercial firms offering products or services for sale is $1.00 per word. Individuals selling or buying personal equipment: ARRL member 50¢ per word. Non-ARRL member $1 per word. **Bolding** is available for $1.50 a word.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied.

4) Send ads to: the ARRL, 225 Main St., Newington, CT 06111 ATTN: Ham Ads. Or via fax 860-594-0259 or e-mail: hamads@arrl.org Submitted ads should be typed or clearly printed. Payment must be included with ads (check or any major credit card accepted).

5) Closing date for Ham-Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received December 16th through January 15th will appear in March *QST*. If the 15th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day. Please contact Melissa Yrayta at 860-594-0231 for further information.

6) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

7) New firms or individuals offering products or services for sale must check with us to determine if a production sample (which will be returned) should be submitted for examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must stand by and support all claims and specifications mentioned in your advertising.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The American Radio Relay League does not discriminate in its advertising on the basis of race, color, religion, age, sex, sexual orientation, marital status, or national origin.

The League reserves the right to decline or discontinue advertising for any other reason.

QST HAM ADS ON THE WEB — UPDATED MONTHLY
http://www.arrl.org/ads/ham-ads.html

SELL YOUR RADIO TODAY! Check out *RADIOS ON-LINE* on the ARRL web site: http://www.arrl.org/ads/RadiosOnline/

CLUBS/HAMFESTS/NETS

BICYCLE MOBILE HAMS OF AMERICA. We mix hamming with biking! VHF and HF. 450 members in 46 states, 6 countries. 10th annual forum at HamVention. To receive more info., sample newsletter, e-mail your **street address** to menicko@avalon.net. Or write to BMHA, Mike Nickolaus, NF0N, 316 East 32nd St.-Q South Sioux City, NE 68776.

COUNTY HUNTERS: Worked All Texas Award Beautiful Certificate. Temple Amateur Radio Club P.O. Box 616, Temple, TX 76503 www.tarc.org

FRIEND OF BILL W.?? - Join HAAM net Saturdays at 12:30 Eastern on 14.290; Sundays at 09:00 Pacific on 7.283.5; Sundays at 09:30 Pacific on 14.340/2. K6LX.

Join "No Code = No Theory" today!
http://www.neteze.com/radions/amateur.htm
or write to: WB6TMY at Zip Code 95402-4694 for literature.

JOIN the **Lambda Amateur Radio Club** (LARC) since 1975, the only open and visible public service-oriented ham club for gay and lesbian hams. Monthly newsletter, HF skeds, internet listserv and IRC, hamfest meetings, chapters, DXpeditions. Write LARC, POB 56069, Philadelphia, PA 19130-6069 or e-mail: lambda-arc@geocities.com

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Grand Rounds: 14.308 MHz Sunday mornings at 10:00 am Eastern time. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. Inquiries to: MARCO, 2650 Head of The Tide Rd, RR 4, Belfast, Maine 04915-9624. Web:http://www.smbs.buffalo.edu/med/marco/

QCWA—Quarter Century Wireless Association. If you were first licensed 25 years ago and currently licensed you are eligible. Be one of us! Write Dept. T, 159 E 16th Ave, Eugene, OR 97401-4017. Call 541-683-0987.

RAINBOW AMATEUR RADIO ASSOCIATION - The gay/lesbian club. Active weekly H.F. nets, monthly newsletter, e-mail reflector, web page: www.rara.org. Chat Room. Privacy respected. E-mail: rara@qsl.net or P.O. Box 191, Chesterland, OH 44026-0191.

THE ARRL LETTER — The League's news digest for active amateurs, professionally produced and edited and now available in a weekly electronic edition via the World Wide Web at http://www.arrl.org/arrlletter

THE Veteran Wireless Operators Association, a 74-year old, non-profit organization of communications professionals invites your inquiries and application for membership. Write VWOA, Edward Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863. Visit our web site for activities, history, membership: http://www.vwoa.org

ANTIQUE/VINTAGE/CLASSIC

ANTIQUE RADIO CLASSIFIED. Free sample copy! Antique radio's largest-circulation monthly magazine. Old radios, TVs, ham equip., 40s & 50s radios, telegraph, books & more. Ads & articles. Free 20-word ad monthly. Subscribe today. Six-month trial: $19.95. Yearly rates: $39.49 ($57.95 by 1st Class). Foreign: write. ARC, PO Box 802-B22A, Carlisle, MA 01741. Phone: 978-371-0512, Fax: 978-371-7129, Web: www.antiqueradio.com

BROADCAST MICROPHONES and accessories (call letter plates, stands) wanted: early carbon, condenser, ribbon, dynamic models. Cash or trade. James Steele, Box 620, Kingsland, GA 31548. 912-729-6106. jsteele@k-bay106.com; http://www.k-bay106.com/mics.htm

CLASSIC RADIOS FOR SALE: Good used equipment wanted. The Radio Finder, 11803 Priscilla Lane, Plymouth, MI 48170. Tel/Fax 1-734-454-1890. finder@radiofinder.com or http://www.radiofinder.com

CRYPTOGRAPHY items wanted: KL-7, M-94, M-209, others. WB2EZK, 17 Alfred Road West, Merrick, NY 11566. 516-378-0263, louk17@optonline.net

DRAKE: Order your copy of "A Family Affair - The R.L. Drake Story", 300+ pages of history, pictures and technical information, from TSG, 15 Saddle Ridge Trail, Alexandria KY 41001. $29.95 + $5.50 S&H. U.S. customers may order via secure credit card online at http://home.fuse.net/tsg.

MANUALS FOR MOST OLD HAM GEAR. Best source for 20 years and now at lower prices! Most USA made ham gear. Our catalog "P" $3 required to order or get free info via internet at www.hi-manuals.com. Hi-Manuals, Box P-802, Council Bluffs, IA 51502.

QST collection complete. Serious offers. W6TD. tdowney@qnet.com

"Repair - Restoration - Tube-type receivers, transmitters, amplifiers. 45 years experience." N4PZ/W9OJI, 815-734-4255.

Autotuner Choices

To meet your shack needs

Coming to your Local Dealer

"All I want for Christmas is...
An AT-11MP Autotuner From LDG Electronics!"

- ☐ Kit with Enclosure
- ☐ Assembled
- ☐ Remote Head
- ☐ Alinco Cable
- ☐ Icom Cable

Toll Free:
877-890-3003
www.ldgelectronics.com

* Official Hint *

Instructions: Cut out, place in obvious location

AT-11MP $199 Kit
150 Watts $239 Assembled
Crossneedle Meters
Icom or Alinco Interface

Z-11 QRP Tuner
30 Watts
Zero Current Draw
Once Tuned
$145 Kit
$179 Assembled

All Tuners Feature:
Microprocessor Control
10 to 160 Meter operation
12VDC input
1 Year Warranty
Call or see our website for additional specs and options

AT-11 2.5 $160 Kit
150 Watts $179 Assembled
LED Status

www.ldgelectronics.com

LDG Electronics, Inc.
1445 Parran Rd.
PO Box 48
St. Leonard, MD 20688
Voice: 410-586-2177
Fax: 410-586-8475
sales@ldgelectronics.com

LDG ELECTRONICS

M²

WHY COMPARE ROTATORS WHEN YOU CAN OWN THE STANDARD OF THE INDUSTRY ?

DESIGNS BY K6MYC

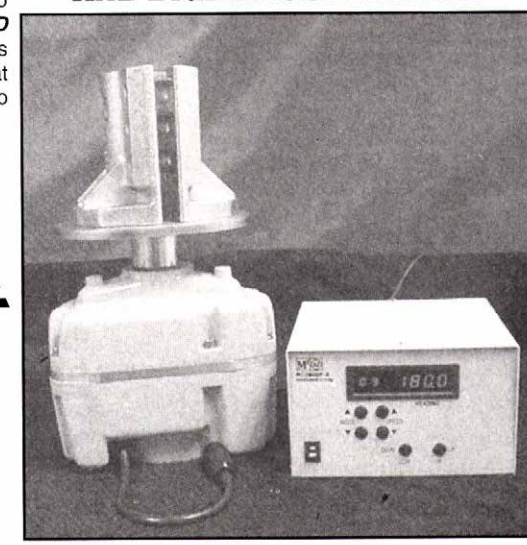
Do you ever wonder why our ***OR2800*** rotator is always at the top of other manufactures comparisons of rotators ? It's simple....we manufacture the best rotator for it's size on the market...period ! Don't be confused by competitors comparisons when it comes to reliability and performance. ***N.A.S.A., BOEING*** and ***LOCKHEED MARTIN***, don't just use our rotators because there the only one's available on the market. They use them because they know that when it comes down to the wire, they can count on our rotators to deliver reliability and performance every time.

OR2800P SPECIFICATIONS

Wind Area Capacity	35 sq. ft.
Starting Torque	3500 in./lbs.
Rotating Torque	2800 in./lbs.
Braking Torque	17000 in./lbs.
VerticalLoadCapacity	1800 lbs.
Height of Rotator only	9.75"
Total Height	15.75"
Mast Size (O.D.)	1.75-3"
Rotation Speed, max.	50-270 sec.
Rotation Range	0-360° ±14°
Display / Travel Res	0.1° / .5°
Input Voltage	110 / 220 AC
Motor voltage	28 - 42 VDC
Cable requirements	2-#18, 2-#22
Weight (rotator unit)	42 lbs.

MADE IN THE USA

OR2800 AZIMUTH ROTATOR AND DIGITAL CONTROLLER



Complete Catalog now available from our Website

On-line ordering is easy-get on line at www.m2inc.com grab your basket and go shopping !

7560 N. Del Mar Ave. Fresno, CA 93711 559-432-8873 Fax 559-432-3059
E-Mail: wyatt@m2inc.com Website : www.m2inc.com

MasterCard VISA DISC

TELEGRAPH KEYS wanted by collector. Bugs and unusual or unique straight keys or sounders, and tube electronic keyers. Also pre1950 callbooks. Vince Thompson, K5VT, 3410 N. 4th Ave., Phoenix, AZ 85013. 602-840-2653.

TELEGRAPH MUSEUM/COLLECTOR'S INFORMATION: http://www.w1tp.com

WANTED: Electronic estates, hi-fi, broadcasting. Cash paid. KB8CCY, 1-877-288-1280.

WANTED: Electronic estates purchased. Ham radio, tubes, broadcasting, Hi-Fi, transformers, military, etc. Top cash paid! McDaniel, 800-251-5454.

WANTED: pre-1925 battery radios, crystal sets, and vacuum tubes. Also early telegraph keys and pre-1900 electrical apparatus. Jim Kreuzer, N2GHD, Box 398, Elma, NY 14059. 716-681-3186. wireless@pce.net

WANTED: Western Electric audio equipment. Amplifiers, pre-amps, tubes, speakers, parts, mixing boards, etc. McDaniel, 800-251-5454.

WANTED: Western Electric Audio Equipment, Amplifiers, Tubes, Parts, Speakers, all Microphones. Top Cash Paid Toll Free: 877-288-1280.

WWII MILITARY TELEVISION EQUIPMENT WANTED, cameras both round and square case, transmitters, receivers, dynamotors, camera tubes, manuals needed for preservation project. Maurice Schechter, 590 Willis Ave., Williston Park, NY 11596. 516-294-4416 MAURICSCH@CS.COM.

ANTIQUE/VINTAGE/CLASSIC

100 QSL Cards $8.50 postpaid. Send Stamp for Sample. ARTIST, P. O. Box 148652, Nashville, TN 37214.

AFFORDABLE QSL CARDS,available in small quantities with lots of options. Parma Graphics, K2BKA, 5 Rondout Harbor, Port Ewen, NY 12466. 845-339-1996.

BRASS BELT BUCKLE with your call letters. Raised/cast - not engraved. Each one-One of a kind. View at www.urcall.net

CALL SIGN NAME BADGES. Club logos our specialty. Certified ARRL engraver. Capital Engraving, 3109 Marigold St. Longview, Washington 98632-3415. Al, WA7UQE. capengrave@kalama.com. http://www.open.org/capengrv

DOC'S QSL CARDS. Full color cards - send SASE for samples & price list. 10630 Lone Star Way, Knoxville, TN 37932. 865-691-8288, or docs@icx.net. http://www.user.icx.net/~docs

ENGRAVING: Callsign/name badges by WØLQV. Send for price list. Box 4133, Overland Park, KS 66204-0133. E-mail: lqveng@juno.com

FREE SAMPLES. The QSLMAN®, Box 73, Monetta, SC 29105. Phone/FAX (803) 685-7117 anytime. Email: w4mpy@qslman.com. Always 100% satisfaction guarantee on anything we do. Check the web site at: http://www.qslman.com

QSL CARDS: Fast quality service. Samples $1 (refundable with order). WordWise Services, 107 Giles Court, Newark, DE 19702.

QSL CARDS Many styles. Top quality. Order Risk Free. Plastic cardholders, T-shirts, Personalized caps, mugs, shirts. Other ham shack accessories. Free Call. Free samples. **Rusprint, 800-962-5783/**913-491-6689, Fax 913-491-3732. **http://www.rusprint.com**

QSL SAMPLES $1 refundable, Bud Smith, Box 1948, Blaine, WA 98231.

QSLKIT at home micro-perf printing on your ink jet printer. CardBox filing systems, index cards and more. www.HamStuff.com by W7NN.

QSLs -Many designs! Custom cards, "Eyeball" cards. Samples: Free, $1, $2 packs. Charlie Hansen, NØTT, 8655 Hwy D, Napoleon, MO 64074.

DISCOUNT CENTER

The finest parts, and not a DOG in the pack.

PL-259ST	Silver-Teflon®, USA	SALE $1.00
PL-259GT	Gold-Teflon®, USA	$1.49 or $30 pk of /25
N/9913	For 9913, 9086, 9086, Flexi, etc.	$3.25
N-200ST	"N" Silver-Tef, installs like PL-259	$3.25

Coax and Cable Prices <100'/100'+

RG-8X+	95%, Type IIA, non-contaminating	26¢/22¢
RG-213+	Top quality, 97% shield, IIA jacket	45¢/38¢
	International 9096 flexible 9913-type Highest quality	65¢/59¢
	International 9086, the best solid 9913-type	56¢/51¢

SALE on 100' or more

RG-8X Premium, 95%, black 13¢
RG-213 95%, Mil-Type Excellent 35¢

R1 Rotator	8 cond. (2 x #18, 6 x #22)	SALE 26¢/20¢
R2 Rotator	8 cond. (2 x #16, 6 x #18)	SALE 47¢/35¢
#14	Hard-drawn, 7x22, all copper, bare	8¢
#14 FlexWeave™	168-strand, bare copper	14¢
#12 FlexWeave™	259-strand, bare copper	19¢
HD Ladder Line	450 ohms, stranded #16 cond.	22¢/16¢
Super Ladder Line	stranded #14 cond. Sale	30¢/24¢
1/2" Tinned Copper Braid ground strap, any length		65¢
LadderLock™	Center insulator for ladder-line	$11.95
Copper Ground Strap, 6" all copper		$1.49

Custom Coax Jumpers - made to order.

Pulleys - for antenna support rope. Highest quality, sailboat-type. Small, lightweight, for fibrous rope. For 3/16" rope @ $11.95 and for 5/16" rope @ $14.95

New RFI Quick Fix

Built-in ground strap
Breaks up ground loops
Ends RF feedback problems

For really tough RFI problems, the new T-4G is the ultimate fix, shunting stray RF on your coax directly to ground. Stray RF and feed line radiation doesn't have a chance. It solved all my RF feedback problems in my second floor shack. (W4THU) Don't be misled by $100+ imitations. Our Line Isolators are still unequaled.

Antenna Support Line

Mil Spec, Dacron® Antenna Support Line, single braid, sun resistant, 3/16" 700# test 100' hank $8

Kevlar - Dacron® Jacket for sun protection, 500# test, for guying verticals, booms, etc. .075" dia. 200' spool $15.95

RADIO WORKS
Antenna Fever

For 15 years, The RADIO WORKS has brought you the best made, best performing wire antennas. No warmed over handbook designs - just performance engineered antenna systems.

SuperLoop 80,	122' long, 80 -10 m.	If you want the best, this is it!	$105
CAROLINA WINDOM 160,	265', 160 - 10 m.	Big Sig on 160, Killer Sig on 80	$125.95
CAROLINA WINDOM 80,	132' long, 80 - 10 m	If you hear one, you'll want one!	$89.95
CAROLINA WINDOM 40,	66' long, 40 - 10 m.	It helped set two 40 meter records.	$87.95
CAROLINA BEAM 80,	80 - 10 m, 100' long.	Join the fun, the DX is here.	$109.95
	160 - 10m, 132' long.	All bands	$129.95
G5RV Plus,	80 - 10 m, 102'	High Power Current Balun, heavy-duty Ladder-line	$59.95

Jim's New Book - "Frequently Asked Questions about Antenna Systems and Baluns."
This revealing 124 page book answers questions and dispels myths. The material is presented in a style that's easy to read and Jim, W4THU, is not beyond poking fun at jealously held concepts. However, at the book's heart are questions that hams ask over and over. Available now - $10.95 + $3 postage.

CURRENT BALUNS

Models for every application

B1-2K	1:1	2 KW	Current-type	80-10 m	$22.95
B1-5K	1:1	5 KW	Current-type	160-10 m	$33.95
B1-1KV	1:1	1 KW	Current -type VHF	15 - 2 m	$27.95
Y1-5K	1:1	5 KW	Current YagiBalun	160-10	$35.95
B4-1KXV	4:1	1 KW	Current-type VHF	10- 2 m	$31.95
B4-1.5K	4:1	1.5 KW	Voltage-type	80-10 m	$29.95
B4-2K	4:1	2 KW	Voltage-type	80-10 m	$37.95
B4-2KX	4:1	2 KW+	Current-type	160-10 m	$45.00
RemoteBalun	4:1		High Pwr, current-type	160 -10 m	$49.95

Here's the new Super Line Isolator Lineup

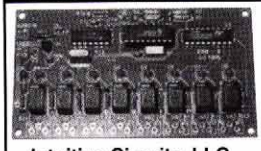
T-4	Ultra Line Isolator, replaces 4KV, 4KRF, T-3	$32.95
T-4G	As above, but direct grounding version	$35.95
T-5G	Marine version, maximum HF + VHF isolation	$59.95
T-6	10 & 6 m Line Isolator, SO-239 in and out	$28.95
T-6G	As above, but direct grounding version	$32.95

Check out our HUGE Web Site
RadioWorks.com
http://www.radioworks.com
e-mail W4THU@radioworks.com

Free **NEW! General Catalog**
Catalog 991. 80 pages of complete high performance antenna systems, baluns, Line Isolators, wire, cable, coax, station goodies. If you don't shop here, you won't get the best prices. Allow 2 or 3 weeks for bulk mail delivery or send $2 for delivery by Priority Mail.

The RADIO WORKS
Order Hotline (800) 280-8327
FAX (757) 483-1873
Orders & Technical (757) 484-0140
Box 6159 Portsmouth, VA 23703
VISA and MC welcome. Give card #, exp. date, signature.
Add shipping (figure 10%, $8 min.) Mention this ad for sale prices. Prices/specs subject to change.

DTMF decoder board with eight relays



Remote control eight devices via radio audio. Password protection against unauthorized entry. Unique board ID. Comes assembled with relays. 4.5" x 2.5".

Intuitive Circuits, LLC
Voice: (248) 524-1918
http://www.icircuits.com

DTMF-8 $119.00
Visa • MC • Prepayment

Repeaters

6 & 2 meters & 440 MHz
On your freq, plug & play
$399.95 & $499.95

Repeater Controllers

RC-1000V w/voice ID, CW ID, autopatch, remote base and more....$259.95
RC-1000 w/o voice ID... $199.95
RC-100...$129.95

Micro Computer Concepts
8849 Gum Tree Ave
New Port Richey, FL 34653
727-376-6575 10 AM-10 PM
e-mail n9ee@akos.net
http://mcc.stormfan.com

RIGblaster rig to sound card interface

PSK31, SSTV, RTTY, Voice Keyer & other modes!

A RIGblaster and a computer .....

The powerful replacement for old expensive adapters or TNC's.

- **Ready to go**....with mic. cable, power supply and 3rd party software CD.
- **Compatible with all rigs**....3 versions; 8pin mic, 4pin mic. and RJ45.
- **Supports all sound card ham software**....discounts on several licenses.
- **RF and ground loop proof**....audio transformer, relays and optical isolation.
- **Audio matched**....level adjustment and channel selector switch.
- **Fully automatic operation**....serial PTT and automatic audio switching.
- **Mode selector switch**....selects serial control or VOX operation.
- **Normal station operation**....leave it connected; no manual switching!
- **Mic override and mic interrupt**....convenient for voice/digital operating.
- **Quality construction**....made in USA to IPC610, with aluminum case, mini toggle switches and fiberglass pcb.

Only $89.95 plus shipping
For complete info and ordering:
http://www.westmountainradio.com

West Mountain Radio de N1ZZ and K1UHF
18 Sheehan Avenue, Norwalk, CT 06854 (203) 853 8080

QUALITY QSLs By WX9X from $18.95. See our display ad in this issue.

SKYWARN, RACES, MARS patches, decals, caps, more. Write/fax for info. CAPS Unlimited, PO Box 460118C, Garland, TX 75046. 972-276-0413. E-Mail: k5hgl@home.com, www.skywarnsupply.com

www.callstuff.com

PROPERTY/VACATION RENTALS

BAHAMAS RENTAL: Abaco villa w/station. N4JQQ, 407-894-2519 or strutledge@aol.com

BAHAMAS, Treasure Cay Resort. Beach house/ contest station rental. Many world records. 3 BR/ 2 Bath. KC4SZE, 256-734-7300 or kennethh@hiwaay.net

BLUE RIDGE MT. of VA. - Build your vacation QTH on a beautiful mountain top near Blue Ridge Parkway - Floyd, VA. Info www.public.usit.net/dlarsen or www.bfrog.com/zig/land/ E-mail: kk4ww@fairs.org. Dave, KK4WW, phone 540-763-2321.

DXshack FG, J6, 3W, XU, XW. TRX+kWAMP+Beam ANTs & Bed. Yonezuka, JA2EZD. URL://qth.com/dxshack. DXshack@wwdx.net

HAM HOME FOR SALE. RETIRE TO NC. Moderate 4-season climate. One-floor living on PGA Tour golf course. Golf membership with sale. 4 BR, 2 1/2 baths, 2250 sq ft. Double garage. Large basement. Wooded. Beautiful view. 115 ft frontage. 50 ft Rohn tower with TA33 tri-band plus 2M and 70cm vertical. Also GAP Titan plus 80/40M horizontal. Security system. Automatic landscape irrigation system. Solar assist hot water. Emergency power plant and ham equipment negotiable. $219,000. W9HU, Greensboro, NC. Tel: 336-674-0148. email gabesell@aol.com

HOUSE, QUAD, ARIZONA SUNSHINE: $73,900. Smaller 2-bedroom home in attractive Sun City West neighborhood. New roof & heat pump 1999. Tiltover tower and multiband quad. Also available furnished, with KW. Don Steele, Ken Meade Realty, 800-977-1776 ve3pfc@arrl.net

KH6SQ - http://www.seaqmaui.com

OCALA, FLORIDA, HAM LOCATION. For Sale: Three bedroom ranch 1-3/4 bath home with 125 ft by 100 ft lot and 70 ft lot and 70 ft, 3 section motorized crank-up tower with tri-bander, 40m dipole and 2m beam. Two car garage and workshop. House recently carpeted and painted. For information e-mail rbenn39528@aol.com or call 708-748-9414.

P49V/AI6V's ARUBA Cottage for rent; 2 bedrooms, rig and antennas. For info write: Carl Cook, 2191 Empire Ave., Brentwood, CA 94513.

QTH FOR SALE: Punta Gorda. Florida. 56 foot crank over tower. Hygain Tailtwister. Sommer XP706 beam with all options. 2m Hustler. 1+1/2 lots, 3 bedroom, 2 bathroom, 1300 square feet, 11x20 porch, hurricane shutters, 2 car garage, ceiling fans, irrigation pump, fruit trees, mile to shopping. $94K. Got new job. Had to move. WB9JTK alan.dewey@usa.net

TURKS AND CAICOS "HAM-LET" VACATION: House with station located **Providenciales** hillside above ocean. Jody Millspaugh, 649-946-4436 or Box 694800, Miami, Florida 33269 USA. **E-mail: jody@tciway.tc**

VACATION IN BAVARIA - Modern apartments by DL6SX "Arno". Info. at www.schmahl.de

VP5B Contest Station; North Caicos Beach Front. 3BR/2BA; RIGS, AMPS, Antennas Deluxe Accomodations, www.qth.com/vp5. Email: K4ISV@KIH.NET; 270-259-4530.

GENERAL

#1 CALLSIGN CD-ROM. "HamCall" contains U.S. and International callsigns with lat/long, grid square, e-mail addresses and more. Updated monthly. Check/Visa/MC. $50, $5 ship/handling. Buckmaster, 6196 Jefferson Hwy., Mineral, VA 23117. 800-282-5628 or http://www.buck.com/haminfo.html

Drake Wanted: RV-75, TR-7/7A, R-7/7A and all 7-line accessories. Also wanted C-line gear, L4B. Please call Neil, K1VY at (603)-465-2788, or toll free (800) 962-2949. Email to K1VY@arrl.net

DUSTCOVERS: Sturdy plastic dustcovers for various cw paddles with callsign engraved. $17 includes S&H. Larry Stamm 28 Topton Rd. Kutztown, PA 19530 http://www8.bcity.com/covers

DWM COMMUNICATIONS-SASE brings catalog or visit: http://www.qth.com/dwm

ELECTRIC RADIO Magazine in our twelfth year. Articles on vintage ham and military gear, repair/restoration, history, and AM operation. Large classified section. $3 for a sample copy, ER, 14643 County Road G, Cortez, CO 81321.

ELECTRON TUBES. Bought and sold. Large inventory equals fast delivery. Daily Electronics, 10914 NE 39th St. Ste. B-6, Vancouver, WA 98682. **800-346-6667**, fax 360-896-5476. daily@worldaccessnet.com

Electronic Kits/Components/Software - Amateur radio, internet broadcaster, fiber optic, voice changers. Diodes, transistors. Schematic / PCB software. Call J-Tron 888-595-8766, www.j-tron.com

"EVERYTHING FOR THE MORSE ENTHUSIAST." **Morse Express.** Keys, keyers, kits, books. 303-752-3382. http://www.MorseX.com

FOR SALE - Government Surplus. Sea PRC-68 Radios, on 6 meters w/7" rubber duck and 30" tape ant., 8 Nicad Batt. packs. New, camo cases, all original, good condition. 1 each PRC-77 with AM 2060A AMP, speaker, power supply, shock mount in good operating condition. All alignment & test sets, on 6 meters. $1500. Stanley Wright W1SWW 207-583-2851 or W1SWW@BEARFACTSME.COM.

FREE Ham Gospel Tracts; youth leaders needed for national outreach. SASE, W1REZ, P. O. Box 8, Harmony, ME 04942.

FREE!!! Ham Radio and other CD-Roms & Software disk catalog. **MOM 'N' POP'S SOFTWARE,** P. O. Box 15003-HA, Springhill, FL 34604-0111. 1-352-688-9108. momnpop@gate.net

FREE: Ham Radio Gospel Tracts, SASE. KW3A, 265 West Ave., Springfield, PA 19064.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify model numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

Ham Helper Software: **www.awrsoftware.com/hamhelper**

HEATHKIT AMATEUR RADIO REPAIR by RTO Electronics, 7280 Territorial Road, Benton Harbor, MI 49022. 616-468-7780. E-mail: hamtech@rtoham.com. www.rtoham.com

Heathkit, Yaesu, Kenwood repair, Ed, WA1LJY, 616-429-4295.

HEATHKITS WANTED: Top dollar paid for unassembled kits. Michael Seedman, 847-831-8823 eve., or mseedman@interaccess.com

HEATHKITS WANTED: Unassembled kits, catalogs, manuals and older gear. Bill, WA8CDU, 616-375-7978. billrobb@net-link.net

HF/6M AMP KITS, 14VDC, 500W $395, KW $719, 300W(6M) $495. SASE, Lee, KD4YBC, 197 Chickasaw Lane, Myrtle Beach, SC 29577. http://users.aol.com/rfelectron/rfelect.htm

ICOM repair most ICOM radios COMTEK w7jv@aol.com. Kuni, 360-779-9730

INTERNATIONAL RADIO (Service Division) offers kits that add new features to your rig! Also repairs, alignments of Kenwood, Icom, Yaesu, Atlas equipment. 1118 Raymond Ave., Fort Pierce, FL 34950. intlradio@juno.com or 561-489-6302. http://www.qth.com/irsd

K8CX Ham Gallery http://hamgallery.com

KA1INX - www.recycledradio.com

KENWOOD TS940 with Antenna Tuner Speech Processor other interests now. 1239 Bluestone Drive, Bethlehem PA 18017. 610-867-5983.

LEARN CODE by Hypnosis, http://www.qth.com/cweasy/ or WB2D 800-425-2552.

Low Cost Soviet Military Straight Keys, $18 www.qsl.net/kc0afx - jbide@lisco.net WB0UYQ

MACINTOSH ham logging program on CD-ROM. http://www.peachtree-solutions.com

MORSE 0-20 WPM 90 days guaranteed! Codemaster V for IBM compatible PC $29.95. Morse Express, 800-238-8205. **http://www.MorseX.com**

MOTOROLA MICOR REPEATERS: 2m and 70cm, $400. 727-394-9665 evenings, ka9rix@arrl.net

PACE Soldering/Desoldering: Replacement parts, tips, new systems for SMT and Thru-hole PCB repair are in stock! Also a stocking distributor of a wide assortment of solders, fluxes, cutters and hand tools. **Technimark, Inc. Tel: 847-639-6324.** www.technimark-inc.com

POEM "The Silent Key" by Eddie Phillips - KG4HKY. Send two dollars (US): 4343 Old B'Ham Hwy, Jasper, Alabama 35501

PRINTED CIRCUIT BOARDS for Amateur Radio projects. Internet: www.cl.ais.net/farcir. E-mail: farcir@ais.net. List SASE. FAR Circuits, 18N640 Field Ct., Dundee, IL 60118.

RADIO REPAIR! Reasonable, Jim Dan Rupe, 998 Whipple, Grayland, WA 98547. 360-267-4011. Email: w7ddf@yahoo.com

ROSS $$$$ New Specials: Kenwood, BC-6, $75.00; THG-71A, $269.00; HMC-1, $36.50; YK-88A, $75.00; MFJ; MFJ-872, $94.00; MFJ-4225MV, $139.00; MFJ-321, $65.00; MFJ-332, $49.50; Yaesu, FT-811, $275.00; FT-8100R, $459.00; FT-90R, $398.50; FT-73RTT, $220.00; PRICES WITH COUPONS. Call or visit our Web page for complete list and more Specials http://www.rossdist.com, Phone (208)852-0830 All prices Cash FOB Preston. Ross Distributing Company, 78 South State Preston, Idaho 83263

SALE: YAESU FT-1000-D in MINT CONDITION, performs flawlessly, ONLY $2950.00 FOB. W9SHE, 623-546-0010.

San Diego Hams: Kenwood Station TS430S, PS430, AT250, SP430, MC425, HS5. Plus 10 meter 3 El beam, 40-10 meter dipule, V-O meter, SWR Bridge, Grid Dip. All $700. W6RET 619-562-1774 Santee.

STOP INTERMOD. 2M, 70cM, custom notch filters. Use with dual/triple band radios. Insertion loss less than 0.5dB. No power required. PAR Electronics, Inc. par@parelectronics.com www.parelectronics.com (828)743-1338.

Surplus Andrews & R.F.S Cablewave connectors, ground kits, and cable. Save from 30 to 50 %. We have a complete line of 60 to 700 ft runs of cable in inventory. We carry all different size and type Andrews & R.F.S Cablewave cable. Call for pricing and availablity - supplies are limited.

Svetlana Tubes For Sale: 4CX800A matched pairs $200. 4CX400A matched pairs $180. SK1A sockets, new $39.95. I also have other Svetlana tubes GS35B, GS23B, GS91B, and many others. All tubes are unused and have a warranty. For more information and references, please see my web-site at http://msnhomepages.talkcity.com/ClassifiedsCt/tomstubes/ Phone:256-593-0077. Email: w4th@webtv.net

SX88 HALLICRAFTERS receiver wanted. Jim, W6OU, 714-528-5652.

ULTRA LOW NOISE PREAMPLIFIERS FROM SSB ELECTRONIC

Model	MHz	.NF	GAIN	PTT/VOX	$
SP-6	50	<.8	20 Adj.	750/200W	249.95
SP-2000	144	<.8	20 Adj.	750/200W	249.95
SP-220	222	<.9	20 Adj.	650/200W	249.95
SP-7000	70cm	<.9	20 Adj.	500/100W	249.95
SP-23	1296	<.9	18	100/10W	359.95
SP-13	2304	1.2	18	50/10W	379.95
LNA	144	<.4	18	NA	219.95
LNA	432	<.5	18	NA	219.95
SLN	1296	<.4	30	NA	279.95
SLN	2304	<.4	30	NA	279.95

The SP-2000 and SP-7000 are NEW Ultra Low Noise mast mounted GaAsFET Preamplifiers with Helical Filters for the ultimate in weak signal performance. SSB Electronic's SP Series preamplifers feature: Low Noise figures, high dynamic range, dual stage design, adjustable gain, Helical or Bandpass filters, voltage feed via the coax or a separate line plus the highest RF-Sensed (VOX) and PTT power ratings available of any preamplifiers on the market today.

NEW PHASE III D PRODUCTS - WE'RE READY!

MKU13-OTX	.5 W 1268 TX-UPCONVERTER	C
UTM-1200-DLX	15W MAST-MOUNT 1268 TX-UPCONVERTER	A
UTM-1200-1	1 W 1268 TX-UPCONVERTER	L
MKU57-OTX	5.6GHz OSCAR TX-UPCONVERTER	L
UEK-3000S	2400MHz. MastMount Mode "S" Converter 0.8db	459.95
	Downconverters from DB6NT for 2400 & 10451 plus more....	
LT230S	1296MHz 30W Transverter NF < 0.9 dB	1400.00
GaAsPa20	20 Watt 2304 / 2400 MHz. Linear Amplifier	Call!
TLA1270MC	100 Watt Solid State 1250-1296MHZ Linear Amplifier	Call!

DB6NT 1268MHz. - 47GHz. MICROWAVE EQUIPMENT

MKU13G2	1296MHz. Transverter NF <0.8dB 1.5W out	**424.95**
MKU23G2	2304MHz. Transverter NF <0.8dB 1 W output	**499.95**
MKU34G	3456MHz. Transverter NF <1.0dB 200mW output	**649.95**
MKU57G2	5760MHz Transverter NF <1.0dB 200mW output	**579.95**
MKU10G2	10.368GHz Transverter NF 1.2typ 200mW output	**579.95**
MKU47G	47GHz. Transverter & LO	**939.95**
DB6NT	**TRANSVERTER KITS 1296, 2304, 5760 & 10GHz**	**Call!**
Specials!	**MKU25LO + MKU10G** 10 GHz.10 mW Transverter	**429.95**
	MKU12LO + MKU24G 24GHz. .2 mW Transverter	**475.95**

M2 Antennas & Rotors *Lowest Prices in the USA*

Call us for all your M2 HF - VHF - UHF Antennas

OR2800PDC ROTOR .....1085.00 Everyday low Price!

6M5X/6M7/6M7JHV	184/267/230	**2M12/2M5WL/2M18XXX**	147/184/211
2MCP14 / 2MCP22	156/211	**436CP30 / 436CP42UG**	211/248
432-9WL / 432-13WL	156/211	**6/2/222/70cm HO Loops**	**.....Call!**

HF Antennas: Call for ***Super Prices*** on the new **KT-36XA Tri-bander**

Aircom Plus is the new .425(OD) 50 ohm European coaxial cable that everyone is talking about. Due to its outstanding electrical and mechanical specifications and its ultra low loss characteristics AIRCOM PLUS is extremely suited for VHF, UHF & SHF applications. AIRCOM PLUS outperforms any cable in its price class. Aircom Plus's mechanical construction incorporates a solid flexible copper conductor, unmovable honeycomb expander, a coated solid copper foil plus copper braid for 100% shielding. The cable is then covered with a tough UV protected exterior jacket. Unlike other cables that change impedance when sharply bent AIRCOM PLUS's unique honeycomb expander allows no migration of the center conductor. A high quality waterproof N-conn. which is rated past 10GHz. has been developed for AIRCOM PLUS.

AIRCOM PLUS DB Loss per 100 feet							
Freq. MHz.	10	145	432	1296	2304	3000	5000
Loss per 100ft	.27	1.37	2.50	4.63	6.55	7.62	10.39

25 Mtrs/82ft. $71.00 50Mtrs/164ft.$134.00 100Mtrs/328ft $252.00

AIRCOM PLUS Connectors Type N / PL259 / N-Female / BNC....$ 8.95

WiNRADiO WiNRADIO is a new concept in radio communications that turns your PC into a wide band scanner/receiver covering 150KHz. - 1.5GHz. Internal and external models are available. Cellular Freq's. are excluded.

WR1500E - External receiver ***—SUPER SPECIAL —*** **439.95**

SSB Electronic USA

www.ssbusa.com 570-868-5643

NEW Hours: MTWTFSS 9:00AM - 11:00PM

MC/VISA Send 2 stamps for current flyer.

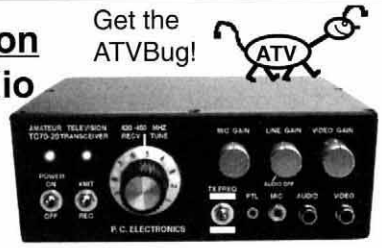
124 Cherrywood Dr. Mountaintop, Pa. 18707

AMATEUR TELEVISION

Web site: http://www.hamtv.com

Transmit Live Action Color Video & Audio *New* TC70-20 20 watt pep 70cm ATV Transceiver

Get the ATVBug!



PLUG-IN & PLAY ATV **Only $529**

Includes 1 TX crystal & UPS surface shipping in contiguous USA. Can be shipped within 24 hrs of your call using Visa or MC. Opt. 2nd TX crystal add $20. Specify: 439.25 (cable ch60), 434.0, 427.25 or 426.25 MHz.

DX is over 100 miles line of sight using 14 dBd gain beams at both ends. It's easy to get on with this Transceiver. Just plug in your camcorder or camera, TV set, mic, antenna and 13.8Vdc @5A power supply - *that's it!* Full motion color and sound just like broadcast TV, no other black boxes or computers are necessary. Any Tech class can get on ATV. Show the shack, family, projects, home video tapes, computer programs, radio club meetings, do public service events - RACES, etc.

Hams, call or email for our 10 page ATV catalogue or down load from our web site. We have it all for the 420 MHz to 10.4 gHz ham bands: ATV transmitters - AM and FM, downconverters starting at $49, receivers, modules, antennas, etc., for base, repeaters, portable, R/C, rockets, balloons and more.

CALL (626) 447-4565 M-Th 8AM - 5:30 PM PST.

Email: tom@hamtv.com

Web: www.hamtv.com

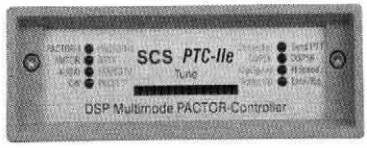
24hr FAX: (626) 447-0489

P. C. ELECTRONICS Since 1965

2522-Q Paxson Lane Arcadia CA 91007

Tom (W6ORG) & Mary Ann (WB6YSS)

Fast Data



www.yachtwire.com

Support for Pactor I, Pactor II, RTTY, AMTOR, CW, FAX, SSTV, PSK31 • Motorola DSP based

Up to 1200bps $US649.00

Farallon Electronics, 2346 B Marinship Way
Sausalito, CA 94965 USA
415•331•1924 415•331•2063/fax
pactor@yachtwire.com

IT'S HERE!!!

PROLOG2K

For Windows 95/98/2000

You've been waiting, and now, here it is! ProLog2K for Windows with: 36 Logbooks, tracking for all major awards, Rig Control, DX Packet Cluster, support for all CDROM databases, our exclusive 71,000 QSL Route Database and much more! Visit our website and see it for yourself. ProLog2K: $49.95. With QSL Route Database: $64.00. DOS ProLog upgrade to ProLog2K for Windows: $25.00. DX add $6.00. VISA, MC, AMEX and Discover accepted.

DATAMATRIX
5560 Jackson Loop NE Rio Rancho, NM 87124
Info: (505)-892-5669 Orders Only: 1-(800)-373-6564
Email: prolog@rt66.com
Web: http://www.qth.com/prolog

LOW PROFILE HF ANTENNAS

THAT REALLY WORK

"Work the World Without Working Up the Neighborhood"

ISOTRON

BILAL COMPANY

Call for a FREE Catalog:

719/687-0650

137 Manchester Dr.
Florissant, CO 80816

www.rayfield.net/isotron

MADE IN USA

THE ORIGINAL ULTIMATE PADDLE

- Non-skid feet
- Stainless steel adjustable spring for different fists
- Nylon & stainless self adjusting needle bearings
- Gold plated solid silver contact points
- Large Clear Plastic Handles
- Unmatched Responsiveness

Call For Free Color Brochure!

BENCHER, INC.

http://www.bencher.com
email:bencher@bencher.com

TEL: 630-238-1183 FAX: 630-238-1186
831 N. Central Ave., Wood Dale, IL 60191 USA

TELEGRAPH KEYS wanted by collector. Bugs and unusual or unique straight keys or sounders, and tube electronic keyers. Also pre1950 callbooks. Vince Thompson, K5VT, 3410 N. 4th Ave., Phoenix, AZ 85013. 602-840-2653.

Ten-Tec Scout with Noise Blanker, Mobile bracket, microphone, 10, 20, 30-meter modules - $460. Bob, KZ2G, Mauro@ldt.net, 516-579-4043.

The Dxer's Control Panel. Leno, http://www.HAMDX.com

TRIBANDER COMPARISON REPORT: Find out the real lowdown on HF antenna performance. K7LXC & NØAX test the KT34XA, TH7, TH11, C-3 Skyhawk and more. Over 60 pages. $17 + $3 s/h. CHAMPION RADIO PRODUCTS, www.championradio.com, 888-833-3104.

TRYLON SELF-SUPPORTING TOWERS: Steel towers available up to 96 feet. Terrific value and reliabilty. The popular T-200 is 96 feet and is only $1974. CHAMPION RADIO PRODUCTS, www.championradio.com, 888-833-3104.

TUBES - Buy, sell - SASE for list AD. Selling sockets, savers, Amphenol, Cinch-Jones plugs, sockets, HV ceramics. WANTED - 9-pin mini plug, phenolic, like bottom end of a 12AT7 tube. Any quantity. TYPETRONICS, Box 8873, Ft. Lauderdale, FL 33310-8873. 954-583-1340, Fax 954-583-0777. Fred Schmidt, N4TT.

TUBES for sale, all kinds. Send SASE for price availability. K9GTK, 2932 W. 99th St., Evergreen Park, IL 60805. Phone/fax 708-423-0528. E-mail: tivas@xnet.com

TUBES WANTED: Highest prices paid or will trade for all types of industrial, receiving and transmitter tubes. D & C Electronics, 3089 Deltona Blvd., Spring Hill, FL 34606. Tel: 800-881-2374.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 MacArthur Blvd., Oakland, CA 94602. 510-530-8840.

WANTED: AC power supply and cable for Swan 350, also manual. Condition, price? WBØMPG.

"WANTED: BROWN BROTHERS KEYER PADDLE. W7LCF 307-234-4465."

WANTED: Hallicrafters HT 20, Hammarlund-SP600, Collins 32 V or W Transmitters, Collins 75 A Receiver, KB0W, (916) 635-4994. frankdellechaie@sprintmail.com

WANTED: Hi capacity 12 volt solar panels for repeater. kk4ww@fairs.org or 540-763-2321.

WANTED: HP-plug-ins: HP5257 A for HP 5245 L; HP 8555 A and 8556 A for HP 141 T. R. Scholz, DK 5 BY,Gartenstrasse 89, D-24220 Flintbek, Germany, Tel.: 0431 9884667 and 04347 1895; e-mail reinhard.scholz@wimi.landsh.de

WANTED: KIM's; SYM's; AIM's & related literature; tty books; HP, TEKTRONIX, Marconi and similar hi-tech descriptive catalogs. John Rawley 1923 Susquehanna Rd. Abington, PA 19001. Phone: 215-884-9220, johnr750@aol.com

WANTED: Palamar 160-190 KHZ transmitter WBØMPG.

WANTED: Tubes. Nobody pays more or faster than us! Mike Forman, 1472 MacArthur Blvd, Oakland, CA 94602, 510-530-8840.

WANTED: Yaesu FT-127, FT-227, FT-627, all later versions RA, RB, Transceivers. Robert Milligan, 6608 N. 18th St. Arlington, VA 22205-1802 (703)-533-0650.

WB4AEJ - http://www.hamsearch.com

JOBS

WANTED FOR SUMMER OF 2001: Instructors in electronics, ham radio, computers and all other sciences. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, P.O. Box 356, Paupack, Pennsylvania 18451. 570-857-1401.

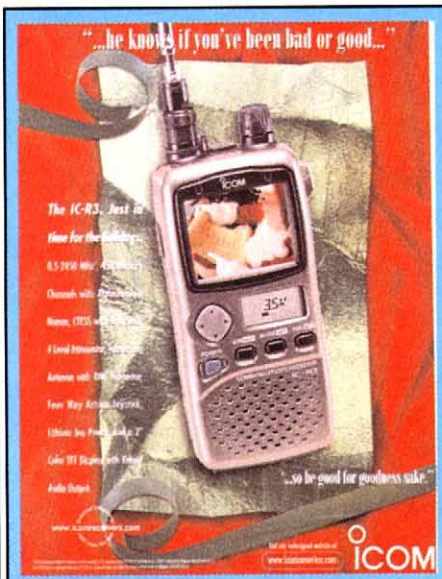
Burghardt INC.
AMATEUR CENTER

Proud to be "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER"
Serving Amateur Radio Operators Since 1937
710 10th St SW - P.O. Box 73 - Watertown, SD 57201

WE WANT TO BE "YOUR" RADIO DEALER. Write for our Updated Used Equipment Listing!

ICOM

SUPER RECEIVER SALE!



Icom IC-R3 – Color TFT
.5-2450MHZ, 450 MEM

HOLIDAY PRICES

Call Now for Special Prices!

ICOM IC-R2
.495-1309.995MHz

ICOM IC-R75

Features Include:
- Frequency Coverage .03-60MHz
- Synchronous AM Detection
- DSP Capabilities (UT-106 Free from Factory 12/31/00)
- Flexible Filter Selection
- Automatic Notch Filter & More!
- Alphanumeric Readout

Sales Order Line 1-800-927-4261

Technical & Info.
(605) 886-7314
FAX (605) 886-3444
Email
hamsales@burghardt-amateur.com
Home Page
www.burghardt-amateur.com
SECURE ON-LINE ORDERING

Closed Saturdays, Sundays, and Holidays

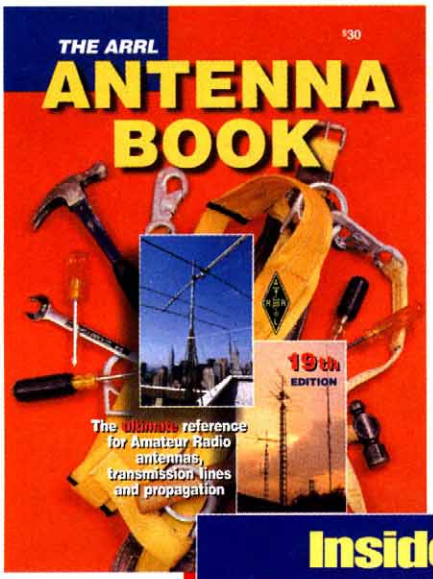
CALL, WRITE or email TODAY for our "TOP-DOLLAR" TRADE ALLOWANCE ON YOUR "GOOD and CLEAN" LATE MODEL HF, VHF, UHF, and Receiver EQUIPMENT.

DISCOVER NOVUS
VISA
MasterCard

Give our Friendly sales staff a Call for all your HAM RADIO Needs!

New Store Hours to serve you better!
Monday Thru Friday
9:00 AM thru 9:00 PM CST

THE Antenna Reference Standard



19th edition!

THE ARRL ANTENNA BOOK

Over 40% New and Updated Antenna Theory, Design and Projects!

Antenna Supports chapter—Thoroughly rewritten. Get that monster antenna safely up your tower!

Log Periodic Arrays chapter—New information debunks old performance claims.

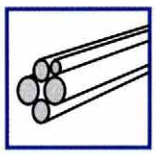
Multielement Arrays chapter—Updated using modern modeling techniques.

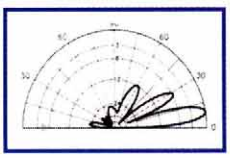
Multiband Antennas, **Quad Array** and **Long Wire and Traveling Wave** chapters—The power of computer modeling unlocks some performance surprises.

Broadband Antennas chapter—Years of material, finally tied together in one place.

Inside!


Antennas & Towers


Antenna Materials and Supports


Antenna Pattern Measurements


Transmission Lines


Signal Measurements

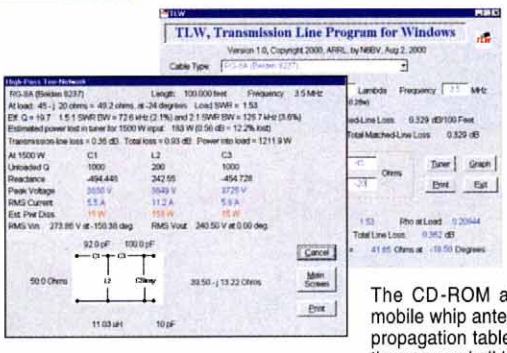

Mobile Systems

Direction Finding • Lightning Protection • Preamps • Tuners • Projects

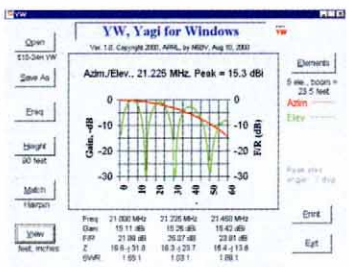
Software Included!

A CD-ROM included in the back of the book includes a wealth of software and data, including some new *Windows* programs:

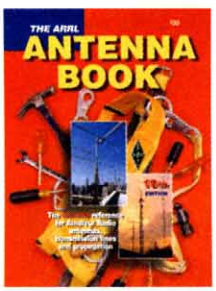
Transmission Line Program for Windows (TLW)
Analyze 32 standard types of coax or open-wire transmission lines, or "design your own" transmission line to analyze.



Yagi for Windows (YW).
Analyzes Yagis and displays front-to-rear ratio (or front-to-back) and SWR over a range of frequencies you specify.



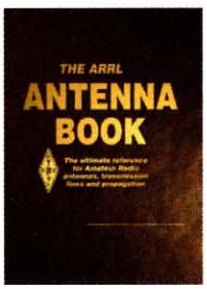
The CD-ROM also includes design and analysis software for Yagis, antenna tuners, mobile whip antennas, gamma matches, and log periodic dipole arrays. In addition, summary propagation tables are included for 155 different locations around the world for all months of the year and all levels of solar activity. **Use this data to tune in!**



The ARRL Antenna Book
Softcover. Available Now!
ARRL Order No. 8047 ..... **$30**
plus shipping: $5 US (UPS).
$6.50 International (surface mail).

Sales Tax is required for shipments to CT, MI, VA, CA and Canada.

The ARRL Antenna Book—Special Edition
Features gold-embossed leather hardcover. Each book is serial-numbered, and printed in limited quantities.
ARRL Order No. L804 ..... **$70**
plus shipping: $9 US (UPS). $37 International (Airmail).



The ARRL Antenna Book CD
Version 2.0—for *Windows* and Macintosh*
View, Search and Print from the entire 19th edition book!
CD-ROM.
ARRL Order No. 8179 ..... **$39.95**
plus shipping: $4 US (UPS). $5.50 International (surface mail).

*Some supplementary software utilities included, for *Windows* and DOS only.

ARRL *The national association for AMATEUR RADIO*
225 Main Street, Newington, CT 06111-1494 tel: 860-594-0355 fax: 860-594-0303
e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/

In the US call our toll-free number **1-888-277-5289** 8 AM-8 PM Eastern time Mon.-Fri.

ARRL Antenna Compendium Volume 5. *Includes IBM-format software.* Baluns, HF beams and Yagis, quads, verticals, and more. Order No. 5625 ..... **$20**

ARRL Antenna Compendium Volume 4. *Includes IBM-format software.* More antenna-ideas and practical projects. Order No. 4912 ..... **$20**

ARRL Antenna Compendium Volume 3. Discover a 12-meter quad, a discone, modeling and VHF/UHF ray tracing. Order No. 4017 ..... **$14**

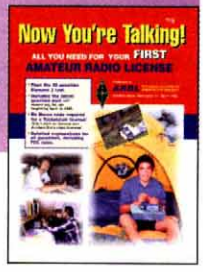
ARRL Antenna Compendium Volume 2. Verticals, an attic tribander, antenna modeling and propagation. Order No. 2545 ..... **$14**

ARRL Antenna Compendium Volume 1. Articles on multiband portable, quads and loops, baluns and the Smith Chart Order No. 0194 ..... **$10**

License Study Materials

Earning your Amateur Radio license...as easy as 1-2-3!

Each ARRL License Manual includes the theory and rules you need to pass your tests. The entire question pools are included, with correct answers.



Step 1 **Technician Class**

Exam:

- 35-question Technician test (Element 2)
- No Morse Code Exam

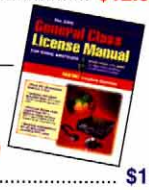
Now You're Talking!—4th edition. Amateur Radio's most popular **FIRST** license manual. Order No. 7970 ..... **$19**

ARRL's Tech Q&A—2nd edition. Review from the entire Technician question pool. Brief explanations follow each question. Quick & Easy! Order No. 7873 ..... **$12.95**

Step 2 **General Class (upgrade from Technician)**

Exams:

- 35-question General test (Element 3)
- 5 WPM Morse code test (Element 1)



ARRL General Class License Manual—4th edition Order No. 8004 ..... **$15**

Your Introduction to Morse Code. **Pass the 5 WPM code test.**

cassettes #5986 ..... **$12**

audio CDs #5811 ..... **$14**

Step 3 **Extra Class (upgrade from General)**

Exam:

- 50-question Extra test (Element 4)

ARRL Extra Class License Manual—7th edition Order No. 8101 ..... **$19**

Learning the Morse Code

ARRL code practice tapes and audio CDs take you from 0 to 22 words per minute. Each set includes two cassette tapes or two audio CDs with nearly 2-1/2 hours of practice. Start with ***Your Introduction to Morse Code*** to learn all the characters and pass the 5 WPM exam:

	Cassettes	Audio CDs
Your Intro. to Morse Code	#5986 ..... **$12**	#5811 .... **$14**
ARRL 5-10 WPM Code	#6567 ..... **$12**	#6575 .... **$14**
ARRL 10-15 WPM Code	#6397 ..... **$12**	#6400 .... **$14**
ARRL 15-22 WPM Code	#6931 ..... **$12**	#6923 .... **$14**

Morse Tutor Gold software for IBM PCs and compatibles teaches you the code and provides plenty of practice. 3.5-inch diskettes. Order No. 3258 ..... **$30**

Morse Code: The Essential Language Order No. 0356 ..... **$8**

Practical Circuits and Design

Introduction to Radio Frequency Design presents a treatment of the fundamental methods of radio frequency design using mathematics as needed to develop intuition for RF circuits and systems. Order No. 4920 ..... **$30**

Understanding Basic Electronics is for beginners and those who want to brush up on electronics principles. Order No. 3983 ..... **$20**

Solid State Design for the Radio Amateur. Order No. 0402 ..... **$15**

W1FB's Design Notebook: Practical Circuits for Experimenters is just the book for the avid builder of Amateur Radio equipment. Order No. 3207 ..... **$10**

The ARRL Spread Spectrum Sourcebook. Order No. 3177 ..... **$20**

ARRL's Low Power Communication—*The Art and Science of QRP.* Everything for the low power operator: kit sources, gear, antennas and more! Order No. 7334 ..... **$14.95**

W1FB's QRP Notebook is packed with construction projects for QRP transmitters, receivers and accessories. Order No. 3657 ..... **$10**

Packet and Digital

APRS Tracks, Maps and Mobiles—A Guide to the Automatic Position Reporting System. Track anything that moves, including marathon runners, emergency vehicles and weather systems. Use this book to get started! Covers APRS software installation, configuration, and hardware. There's also a summary of commands for all APRS versions! (Software not included.)

Order No. 7741 ..... **$14.95**

ARRL's HF Digital Handbook. Operating advice and technical details for exciting digital modes such as PSK31, PACTOR and PACTOR II, Clover, G-TOR, HF/Internet email connection and more! Order No. 7652 ..... **$15**

Packet: Speed, More Speed and Applications is for packet enthusiasts interested in medium- to high-speed packet systems. Order No. 6052 ..... **$15**

Practical Packet Radio. Set up a station, get on the DX packet cluster, and much more. Order No. 5307 ..... **$15.95**

Space and VHF/UHF/Microwave Communications

The Radio Amateur's Satellite Handbook. The most complete book for every satellite operator and beginner! Station setup, antennas, tracking, and operating details for active ham satellites and AO-40. Order No. 6583 ..... **$22**

The ARRL Satellite Anthology —5th Edition! The best source for information on the newest amateur satellites. Includes specific operating details.Order No. 7369 ..... **$15**

Weather Satellite Handbook. Order No. 4483 ..... **$20**

The ARRL UHF/Microwave Experimenter's Manual includes information on design and fabrication techniques, propagation, antennas and much more. Order No. 3126 ..... **$20**

The ARRL UHF/Microwave Projects Manuals. **Volume 1** has dozens of construction articles for transverters, preamplifiers, antennas, and test and measurement equipment. **Volume 2** has more practical projects, including amplifiers, antennas, using TVRO feed, and a no-tune transverter!

Vol. 1 Order No. 4491 ..... **$20**

Vol. 2 Order No. 6311 ..... **$15**

If you'd like a complete publications listing or would like to place an order, please contact us:

1. **To order or obtain the address of an ARRL Dealer near you, call toll-free (US): 1-888-277-5289 (non-US call 860-594-0355)—8 AM-8 PM Eastern time, Monday-Friday.**
2. **Fax 1-860-594-0303 24 hours a day, 7 days a week.**
3. **By mail to: ARRL, 225 Main St, Newington CT 06111-1494 or**
4. **Visit our World Wide Web site: http://www.arrl.org/shop**

Shipping and Handling Information

In the US, add the following amounts to your order to cover shipping and handling (S/H). Add an additional $1.50 to the US rate for shipment outside the US. US orders will be handled via UPS or comparable service where UPS delivery is not possible. International Air and other specialty forwarding methods are available. Please call or write for information. Sales Tax is required for shipments to CT 6% (including S/H), MI 6% (including S/H), VA 4.5% (excluding S/H), CA (add applicable tax, excluding S/H). Canadian Provinces NS, NB and NF add 15% HST, all other Provinces add 7% GST (excluding shipping/handling).

Amount of Order	Add	Amount of Order	Add
$10.00 or less	$3.00	40.01 - 50.00	7.00
10.01 - 20.00	4.00	50.01 - 75.00	8.00
20.01 - 30.00	5.00	Over $75.00	9.00
30.01 - 40.00	6.00	CD-ROM only	4.00

We accept the following major credit cards: American Express, MasterCard, Visa and Discover. Prices and product availability are subject to change without notice.

QST 1/2001

Back to Basics

LENTINI COMMUNICATIONS, INC.

1•800•666•0908

Local (860) 666•6227 • FAX (860) 667•3561
VISIT OUR WEB SITE AT
www.lentinicomm.com
21 GARFIELD STREET,
NEWINGTON, CT 06111
STORE HOURS: M-F 10:00am-6:00pm,
SAT., 10:00am - 4:00pm

Radio City, Inc.

1•800•426•2891

Local (763) 786•4475 • FAX (763) 786-6513
2663 County Road I, Mounds View, MN 55112
http://www.radioinc.com
Store Hours: M & Th 10:00am-7:30pm
Tu,W,F 10:00am-6:00pm
Sat, 10:00am-5:00pm

Austin Amateur Radio Supply

1•800•423•2604

Local (512) 454•2994
FAX (512) 454•3069
www.aaradio.com
5325 North I-35
Austin, Texas 78723

Universal Radio, Inc.

1•800•431•3939

Local (614) 866•4267 • FAX (614) 866-2339
www.universal-radio.com
6830 Americana Pkwy.,
Reynoldsburg, Ohio 43068
Universal is just east of Columbus.
Visit our showroom.
Store Hours: M-F 10-5:30, Thur. 10-7, Sat. 10-3

Scanners/ Receivers

R-2
R-10
R-8500
New R-3
$50* Coupon PCR-100
IC-R75

IC-T22A
IC-2100H
NEW LOW PRICE
IC-W32A
IC-T81A
6m
2m
440MHz & 1.2GHz
IC-Q7A
IC-T7A/HP
Dual Band HT
IC-746
$200 Coupon*

IC-718
Call
IC-2800
$50 Coupon*
IC-207H
2M/440 MHz mobile
IC-756-PRO

$75 Coupon*
New IC-706G*
*Now with DSP and 440 MHz included
NEW
IC-910H
VHF/UHF Variable Output

ICOM®
Call for January Specials

YAESU

FT-50R
Dual Band HT
FT-1000D
FT-2600M
FT-1000MP
FRG-100
$100 Coupon*
FT-100
FT-1500M
2M Mobile
FT-3000M
FT-100D
New Features
MARK V
FT-1000MP
VX-1R
VR-500
NEW
VX150
$200 Coupon*
FT-847
FT-817
Dual Band Mobile
TRUE DUAL BAND
FT-8100R
FT-920
ROTORS
VX-5R
FT-90R

New Product Announceme
FTV-1000
200 W 50 MHz TRANSVERT
The Mark-V "Magic Band" Evolutic
The FTV-1000 50 MHz
High-Performance Transverter!

ALINCO

AMATEUR RADIO'S VALUE LEADER

DJ-496
DJ-V5T
DJ-X2T
DR-135TP
DJ-196T

KENWOOD

TH-D7A
DATA COMMUNICATOR
FM Dual Bander
VC-H1
TH-G71A
TH-79AAKSS
Dual Band HT
TS-2000
TM-V7
Compact 2 Meter Mobile
TM-D700A Data Communicator
TS-570D & TS-570S w/6m
TM-261A

Prices, products and policies may vary between dealer locations. Not all dealers have all product lines.
All prices and promotions subject to change.
Not responsible for typographical errors.

MasterCard Master Card VISA

Index of Advertisers

ADVERTISING DEPARTMENT STAFF

John Bee, N1GNV, Advertising Manager
Hanan Rayyashi, KB1AFX, Production Coordinator
Melissa Yrayta, Advertising Assistant

Direct Line: 860-594-0207 **Fax:** 860-594-0259
e-mail: ads@arrl.org http://www.arrl.org/ads

If your company provides products or services of interest to our Members, please contact the ARRL Advertising Department today for information on building your business.

Your customers are reading.....*QST!*

February Issue Focus:	Phase 3D/Satellites	Deadline: January 17 , 2001
March Issue Focus:	Vintage Radio	Deadline: February 20 ,2001

SAVE BIG ON ANTENNAS , TOWERS & CABLE

TELESCOPING ALUMINUM TUBING

DRAWN 6063-T832

.375	$.60/ft	1.250"	$1.40/ft
.500"	$.70/ft	1.375"	$1.55/ft
.625"	$.80/ft	1.500"	$1.75/ft
.750"	$.90/ft	1.625"	$2.00/ft
.875"	$1.00/ft	1.750"	$2.25/ft
1.000"	$1.10/ft	1.875"	$2.50/ft
1.125"	$1.25/ft	2.000"	$2.75/ft
		2.125"	$3.00/ft

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

CUSHCRAFT ANTENNAS

X7/X740	$569/229
XM240	$599
R6000/R8	$269/389
A50-3S/5S/6S	$89/139/219
AR2/ARX2B	$45/65
AR270/AR270B	$69/99
ARX270N/ARX-450B	$219/65
13B2/17B2	$119/199
26B2/719B	$329/115
A270-6S/A270-10S	$59/79

Please call for more Cushcraft items

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el	$559
C3E	10/12/15/17/20m, 8 el	$599
C3S	10/12/15/17/20m, 6 el	$479
C3SS	10/12/15/17/20m, 6 el	$479
C4	10/12/15/17/20/40m, 8 el	$699
C4S	10/12/15/17/20/40m, 7 el	$629
C4SXL	10/12/15/17/20/40m, 8 el	$899
C4XL	10/12/15/17/20/40m, 9 el	$999
C19XR	10/15/20m, 11 el	$879
C31XR	10/15/20m, 14 el	$1169

Please call for more Force 12 items

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$989
T200-72	72', 15 square feet	$1199
T200-80	80', 15 square feet	$1439
T200-88	88', 15 square feet	$1689
T200-96	96', 15 square feet	$1999
T300-88	88', 22 square feet	$1989
T400-80	80', 34 square feet	$1939
T500-72	72', 45 square feet	$1879
T600-64	64', 60 square feet	$1799

Many more Trylon towers in stock!

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$1129
HF2V, 2 Band Vertical	$219
HF5B, 5 Band Minibeam	$429
HF6VX, 6 Band Vertical	$299
HF9VX, 9 Band Vertical	$349
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$119

More Bencher/Butternut–call

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/2M7/2M9	$89/109/119
2M12/2M5WL	$149/189
2M5-440XP, 2m/70cm	$159

420–450 MHz

440-470-5W/420-450-11	$129/89
432-9WL/432-13WL	$169/219
440-18/440-21ATV	$119/139

Satellite Antennas

2MCP14/2MCP22	$169/219
436CP30/436CP42UG	$219/259

ROHN TOWER

25G/45G/55G	$79/179/229
AS25G/AS455G	$39/89
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99
HBX32/HBX40	$349/439
HBX48/HBX56	$589/699
HDBX40/HDBX48	$549/699
BXB5/6/7-8	$39/49/59/59

Please call for more Rohn prices

US TOWER

MA40/MA550	$849/1399
MA770/MA850	$2359/3649
TMM433SS/HD	$1139/1379
TMM541SS	$1499
TX438/TX455	$1069/1599
TX472/TX489	$2649/4599
HDX538/HDX555	$1379/2399
HDX572MDPL	$6329

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$139
GP9, 2m/70cm Vertical	$179
B10NMO, 2m/70cm Mobile	$36
B20NMO, 2m/70cm Mobile	$49
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$49
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

Much more Comet in stock–call

M2 ANTENNAS

50–54 MHz

6M5X/6M7JHV	$199/239
6M2WLC/6M2.5WLC	$419/449

10/12/15/17/20m HF

10M4DX, 4 Element 10m	$379
12M4DX, 4 Element 12m	$379
15M4DX, 4 Element 15m	$419
17M3DX, 3 Element 17m	$379
20M4DX, 4 Element 20m	$499

More M2 models in stock–please call

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$229
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$499

Please call for Glen Martin info

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$519/739/1049
7-50'/60'/70'	$939/1369/1789
9-40'/50'/60'	$729/1049/1469
12-30'/40'	$559/869
15-40'/50'	$969/1399
23-30'/40'	$869/1289
35-30'/40'	$979/1509

Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X3200A	$129/210
X500HNA/700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B/269	$219/299
1798, 80–2m Vertical	$239
1796, 40/20/15/10/6/2m Vert.	$179
1793, 80/40/20m Vertical	$159
1792, 80/40m Vertical	$145
1788, 40–15m Loop	$399
1786, 30–10m Loop	$349
1780, 14–30 MHz Loop	$229
1768, 2m/70cm Beam	$65
1762, 3 Element 6m Beam	$65

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$10/11
1/2"x9"EE / EJ Turnbuckle	$15/16
1/2"x12"EE / EJ Turnbuckle	$17/18
3/16" / 1/4" Preformed Grips	$4/5

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18"	$35/59
10 FT x .12" / 11 FT x .18"	$65/120
15 FT x .12" / 17 FT x .18"	$95/180
20 FT x .12" / 22 FT x .18"	$120/219
12 FT x .25" / 17 FT x .25"	$189/267

GAP ANTENNAS

Challenger DX	$259
Challenger Counterpoise	$25
Challenger Guy Kit	$14
Eagle DX	$269
Eagle Guy Kit	$22
Titan DX	$299
Titan Guy Kit	$22
Voyager DX	$389
Voyager Counterpoise	$49
Voyager Guy Kit	$38

Please Call for Delivery Information

LAKEVIEW HAMSTICKS

9106 ... 6m	9115 ... 15m	9130 ... 30m
9110 ... 10m	9117 ... 17m	9140 ... 40m
9112 ... 12m	9120 ... 20m	9175 ... 75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/189
G6-270R, 2m/70cm Vertical	$149
G6-144B/G7-144B	$109/159

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800P	$1095
Yaesu G-450A	$239
Yaesu G-800SA/DXA	$319/399
Yaesu G-1000DXA	$479
Yaesu G-2800SDX	$1069
Yaesu G-550/G-5500	$289/589

ROTATOR CABLE

R51(#20)/R52 (#18)	$.22/.32/ft
R61 (#20)/R62 (#18)	$.28/32/ft.
R81/82/83/84	$.25/.39/.52/.85/ft

PHILLYSTRAN GUY CABLE

HPTG1200I	$.39/ft
HPTG2100I	$.52/ft
PLP2738 Big Grip (2100)	$5.50
HPTG4000I	$.79/ft
PLP2739 Big Grip (4000)	$7.65
HPTG6700I	$1.15/ft
PLP2755 Big Grip (6700)	$10.95
HPTG11200	$1.55/ft
PLP2558 Big Grip (11200)	$16.50

Please call for more info or help selecting the Phillystran size you need.

WEEKDAY HOURS:
9 AM–5 PM CST

SATURDAY HOURS:
9 AM–12 NOON CST

CREDIT CARDS:
M/C, VISA, DISCOVER

TEXAS TOWERS

A Division of Texas RF Distributors, Inc. • 1108 Summit Avenue, Suite #4 • Plano, TX 75074

(800) 272-3467

LOCAL CALLS:
(972) 422-7306

EMAIL ADDRESS:
sales@texastowers.com

INTERNET ADDRESS:
www.texastowers.com

HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-775 DSP ..New Lower Price!
The Icom IC-775DSP is a competition class HF transceiver featuring 200 watt RF output, digital signal processing, automatic antenna tuner, true dual RX, CW memory keyer, CTCSS tone encode, twin pass band tuning, dual antenna inputs, 101 memory chanels, built-in power supply, and much more. Supplied with AC power cord.

PW-1 .....New Lower Price!
The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746 .....Icom Special!
The Icom IC-746 is an all mode transceiver covering HF/6m/2m. The radio features digital signal processing, 100 watt RF output on all bands, twin PBT, a 4.9"multifunction LCD display with band scope, automatic antenna tuner, and more. Supplied with a hand mic and DC power cord.

IC-756PRO .....New!
The Icom IC-756 PRO is an all mode HF/6m transceiver featuring DSP, automatic antenna tuner, 100 watts RF output, digital twin PBT, a 5" multifunction LCD display with band scope function, and more. Supplied with hand mic and DC power cord.

FT-1000MP Mark-V .....New!
The Yaesu FT-1000MP Mark-V is a competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

FT-1000MP ..Closeout Special!
Competition class HF DSP transceiver.

FT-1000D .....In Stock!
The FT-1000D is a competition class HF XCVR featuring true dual RX, automatic tuner, 200 watts RF output, and more.

Quadra System ...Lower Price!
Solid state 1 kW autotuning amplifier.

FT-847 .....Yaesu Special!
The Yaesu FT-847 is an all mode transceiver covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features digital signal processing, built-in RS-232 interface, tone encode/decode, and more. Supplied with an up/down microphone and DC power cord.

FT-920 .....Yaesu Special!
The Yaesu FT-920 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, CW memory keyer, CTCSS tone encode/decode, 127 memories, and more. Supplied with up/down hand mic and DC power cord.

IC-706MK2G .....Icom Special!
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 .....New!
The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2800H .....Icom Special!
The Icom IC-2800H is a 2m/70cm dual band mobile FM transceiver with a 3" color TFT display. The radio features a separate control face, video input, bandscope display, 9600 bps Packet jack, CTCSS tone encode/decode/scan, 232 memories, cross band duplex, and more. With DTMF hand mic, mounting brackets, and power cord.

IC-2100H .....Great Low Price!
The IC-2100H is a rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color and more.

FT-90R .....New!
New ultra-compact 2m/70cm dual band mobile transceiver with detachable control panel, and huge extended RX range.

FT-2600M ...New Lower Price!
Rugged 2m mobile with intermod-proof receiver, big display, and an illuminated DTMF mic. Built to MIL-STD 810.

FT-8100 .....New Lower Price!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D .....New!
Ultra-compact all mode XCVR for HF/6m/2m/70cm.Features DSP, CW memory keyer, tone encode/decode, 200 memories, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-817 .....Now In Stock!
A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring DSP, tone encode/decode, 200 memories, VOX, and more! With hand mic, DC cord and bracket.

IC-W32A .....New Lower Price!
IC-Q7A .....Icom Special!
IC-T7H .....Icom Special!
IC-T81A .....New QuadBand HT!
IC-T2H .....Amazing Low Price!
IC-R3 .....Video RX, In Stock!

IC-207H .....Great Low Price!
The Icom IC-207H is a 2m/70cm dual band mobile transceiver featuring CTCSS tone encode/decode, 182 memory channels, removable front control panel, and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-PCR1000 .....Icom Special!
IC-PCR100 .....Icom Special!
IC-R8500 .....In Stock!
IC-R75 .....New, In Stock!
IC-R2 .....In Stock!
IC-R10 .....Icom Special!

G-2800SDX $1069
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $479
G-800SA/DXA $319/399
G-450A $239
G-5500 .....$589
G-550 .....$289.

VX-5R .....Now In Stock!
Tiny 6m/2m/70cm triband HT, with CTCSS tone encode/decode/scan, high capacity Lithium-Ion battery pack, extended RX with AM/FM and FW Wide modes, and more.

FT-50RD .....Yaesu Special!
VX-1R .....Yaesu Special!

WEEKDAY HOURS:
9AM–5PM CST

SATURDAY HOURS:
9AM–1PM CST

CREDIT CARDS:
M/C, VISA, DISCOVER

TEXAS TOWERS

A Division of Texas RF Distributors, Inc. • 1108 Summit Avenue, Suite #4 • Plano, TX 75074

(800) 272-3467

LOCAL CALLS:
(972) 422-7306

EMAIL ADDRESS:
sales@texastowers.com

INTERNET ADDRESS:
www.texastowers.com

The Ultimate Backpacker!

Ham Radio in the Great Outdoors: It's the Best with Yaesu's FT-817!

Actual Size

Bring Ham Radio along on your next hiking, camping, or business trip with Yaesu's amazing new FT-817 Multimode HF/VHF/UHF Portable Transceiver!

●**ULTRA COMPACT:** Measuring just 5.3" x 1.5" x 6.5" WHD (135 x 38 x 165 mm) and weighing about 2 1/2 pounds (1.17 kg, including the supplied antenna and alkaline cells), the FT-817 is small and light enough to take along wherever you're going.

●**WIDE FREQUENCY COVERAGE:** 160-10 meters on HF, plus the 50, 144, and 430 MHz Amateur bands. Plus FM Broadcast, AM Aircraft, and Public Safety receiver coverage.

●**MULTIMODE DESIGN:** Ready for action on SSB, CW, AM, FM, FM-Wide (Rx), 1200/9600 bps Packet, and Digital, including dedicated USB and LSB PSK-31 configurations.

●**5 WATTS POWER OUTPUT:** Using a new-technology all-band MOS FET power amplifier, the FT-817 provides 5 Watts of power output when using a 13.8 Volt DC source. When using Alkaline batteries or the optional FNB-72 Ni-Cd Battery Pack, power is automatically set to 2.5 Watts; via Menu, this can be changed to 0.5 Watt, 1 Watt, or up to 5 Watts.

●**WIDE CHOICE OF POWER SOURCES:** The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.

●**TWO ANTENNA PORTS:** A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.

●**OPTIONAL 10-POLE COLLINS MECHANICAL FILTERS:** An optional filter slot is provided, accommodating either the YF-122S (2.3 kHz) SSB filter or the YF-122C(500 Hz) CW filter. You get "base station" performance even from a mountain top.

●**INCREDIBLE MEMORY RESOURCES:** You get a total of 208 memories, including 200 "regular" memories which may be separated into ten groups of up to 20 channels each. And you can append an Alpha-Numeric "Tag" to each memory to aid in channel identification.

●**A CW OPERATOR'S DREAM MACHINE:** You get a built-in Electronic Keyer with adjustable weighting, adjustable CW Pitch, CW Normal/Reverse frequency tuning, and you can even use the microphone's UP and DOWN keys to send CW via the Keyer.

●**BUILT-IN CTCSS AND DCS:** The built-in CTCSS and DCS Encoder/Decoder systems provide you with the versatility you need for repeater access or selective calling.

●**DUAL - COLOR LIQUID CRYSTAL DISPLAY:** Select from Blue or Amber display illumination, which can also be switched off to conserve battery life. And while you're away, the Spectrum Scope will provide you with a visual record of activity ±5 channels from your current operating frequency.

ALL MODE PORTABLE TRANSCEIVER

FT-817

HF/50/144/430 MHz Multimode Transceiver

YAESU
Choice of the World's top DX'ers℠

Vertex Standard
US Headquarters
17210 Edwards Road,
Cerritos, CA 90703 (562)404-2700

For the latest Yaesu news,
Visit us on the Internet: http://www.vxstd.com

See the exciting new FT-817 at your Yaesu Dealer's showroom today!

TS-2000

Then There Was Light...

World's 1st HF Backlit Front Key Panel

...The All New TS-2000 Multi Band/Multi Mode Transceiver

Coming Soon!

The all new Kenwood **TS-2000** series transceiver offers today's demanding Amateur operator high performance standards without the compromising limitations found in other similar multi-band, multi-mode transceivers. The **TS-2000** offers users three distinct operation platforms, the traditional transceiver with full function front panel, or the high-tech looking "silver box" version that allows mobile operation with the new RC-2000 compact control head, or the ARCP-2000 computer control program making the **TS-B2000** functional from your personal computer. The new **TS-2000** offers 100 watts on HF, 6 meters and 2 meters, 50 watts on 70cm, and when you install the optional UT-20 1.2 GHz module at 10 watts, you will have assembled the most complete dual receiver multi-mode transceiver ever produced. If you are waiting for PH3D, you will be happy to know the **TS-2000** is transverter frequency display function ready to work the latest satellite frequencies available.

IF stage DSP in the main band and AF stage DSP in the sub-band provide unparalleled noise reduction performance. Because the **TS-2000** has a built-in TNC, DX Packet cluster is available on the sub-band and can automatically shift the desired HF or 6 Meter frequencies direct to the main band for instant contacts. A weekend DXer's dream come true. You will also be sure to enjoy the built-in antenna tuner, 5+1 antenna ports, RS-232 terminal and the world's first HF fully backlighted front control panel.

The **TS-2000** multi-band multi-mode transceiver, the most high performance Amateur Radio ever produced.

KENWOOD
COMMUNICATIONS CORPORATION

AMATEUR RADIO PRODUCTS GROUP
3975 Johns Creek Court, Suwanee, GA 30024
P.O. Box 22745, Long Beach, CA 90801-5745, U.S.A.
Customer Support: (310) 639-5300 Fax: (310) 537-8235
Y2ARD- 2047 #111000

ISO 9001
JQA-1205
Communications Equipment Division
Kenwood Corporation
ISO 9001 certification

INTERNET
Kenwood Website
http://www.kenwood.net
Kenwood Information
ftp://ftp.kenwood.net