Official Journal of
ARRL
The national association for AMATEUR RADIO

QST

devoted entirely to
AMATEUR RADIO

April 2000

QST reviews

- **Multimode communication processors**
- **HTX-10 10-meter transceiver**

An amateur satellite primer

The W3RW long wire for 6 and 10 meters

High-resolution images from OSCAR 36!

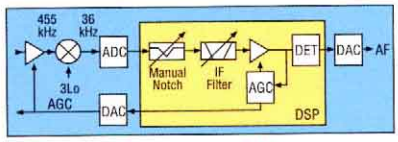
$4.99 U.S. $6.99 Can.
04
0 09128 47322 2

ICOM IC-756PRO

This is not your father's HF rig. This is all new, 32-bit DSP digital processing.

THE GREATEST THING TO HIT HF SINCE...

The new IC-756PRO sets a new standard in ham radio design and construction. At the heart of the 'PRO is a new, 32-bit floating point DSP. Older 16-bit fixed point DSP units limited the performance of earlier rigs. Not on the 'PRO.



DSP IN THE IF, BEFORE THE AGC. *Dual loop digital AGC eliminates strong signal pumping.*

THE DX ADVANTAGE YOU'VE ALWAYS WANTED

The 144 dB dynamic range of 32-bit floating point technology blows away the limitations of older 16-bit technology. If your ear had that range, you could still hear a whisper while standing next to a jet engine. With the 'PRO, you may not get the full theoretical performance, but you will get amazingly clear, crisp reception and almost no background noise.

YOU'LL NEVER BUY ANOTHER FILTER

The IC-756PRO features 41 built-in, front panel selectable levels of DSP filtering. No additional filters or high stability crystal oscillators are available or needed. Our filters are the sharpest–more selective than any crystal or mechanical filters. The selectivity lets you pull out weak signals like never before.

CD VS VINYL

The 'PRO's audio quality is revolutionary. You've got to hear it to believe it.

Customize the screen's look by changing colors, fonts, brightness, contrast, and more.

Keep tabs on memory channels with an alpha-numeric readout of mode, frequency, filters & more.

A digital voice recorder has 4 slots for RX and 4 for TX, each 15 seconds long–a contesting bonus!

Copy RTTY DX without firing up your computer. A dual auto peak filter makes it easy.

Visual indicators of filter selection let you tweak the band pass. Choose from 31 steps of 100Hz between 3600–600Hz and 10 steps of 50Hz between 500–50Hz.

If the AGC is too fast or too slow, make it "just right" with a quick settings change. Use different settings for different modes.

EASY TO USE, EASY ON THE EYES. *The IC-756PRO's front panel is well laid out and easy to control. The TFT LCD display is easy to see from wide angles, day or night. This handsome rig will great in any home or shack.*

SPECS & FEATURES

Subject to change without notice or obligation

Transmit: ..... All Amateur HF, 6 Meters
Receive: ..... 0.03 – 60 MHz
Mode: ..... USB, LSB, CW, RTTY, AM, FM
Power: ..... 5–100W (5–40W AM)
Power Supply Requirement: 13.8VDC, 23A
Memory Channels: ..... 101 Total
Size & Weight : .... 13.4(W) x 4.4(H) x 11.2(D) in. 340(W) x 111(H) x 285(D) mm., 21 lb / 9.6 kg

- **5" TFT Color LCD**
  - Wide viewing angle, more information
  - Adjustable colors and settings
- **32 Bit Floating Point DSP Processor**
  - Digital AGC loop operation
  - Digital IF filter, 41 selectable bandwidths
  - Built-in RTTY demodulator / dual peak APF
  - Built-in microphone equalizer
  - Manual notch function
- **8 Channel Digital Voice Memory**
- **Digital Twin Pass Band Tuning**
- **Built-In Auto Antenna Tuner**
- **Dual Watch • VOX**
- **Triple Band Stacking Register**
- **Built-In Memory / Electronic Keyer**
- **Independent RIT / ΔXT Control**
- **2 TX/RX, 1 RX Only Antenna Connectors**
- **100% Duty Cycle**

Whether it's voice, CW or data, the new IC-756PRO offers the details and performance capable of topping the contest charts. Contact your ICOM dealer today, or call for a free brochure. 425-450-6088

Are you a PRO?

ICOM®

www.icomamerica.com

The new IC-718 and new licensing makes getting into HF a . . .

IC-718. The HF radio for everyone.
See it at Dayton.

- *Simple operation*
  - *One touch band switching*
  - *Direct frequency input via 10 button key pad*
  - *Auto tuning steps (TS). Senses the rate the knob is turned*
- *Microphone compressor*
- *IF Shift*
- *100w of power (40w on AM)*
- *Meter functions (Output Power, ALC, VSWR)*
- *Easy to use front panel controls*
- *Built-in keyer*
- *VOX*
- *Large front firing speaker*
- *Optional DSP*

Ready for HF?

ICOM®

www.icomamerica.com

Providing Battery & Charging Solutions

MH-C777
SMART UNIVERSAL CHARGER & CONDITIONER

- Rapid charge and rejuvenate almost any NiCD/NiMH battery packs for your two-way radio, camcorder, cellular, and notebook computer battery packs.
- Conditioning feature may rejuvenate dead battery packs!
- Microprocessor driven -deltaV and temperature sensor allow accurate charges.
- Car kit included.
- Support 4.8V to 12V battery packs. Automatic polarity protection.

MH-C888 FLEX
SMART UNIVERSAL DROP-IN CHARGER & CONDITIONER

- Convenient universal drop-in design. Rapid charge and rejuvenate NiCD/NiMH battery packs for your two-way radio battery packs.
- Special FLEX Negative Pulse feature prevents crystallization of your battery pack, and extends battery life by keeping it at cooler temperature during the charge.
- Deep-conditioning battery care feature allows 3 consecutive charge and discharge.
- Informative digital LCD display that indicates charging progress.
- Bank up to 12 chargers on a single power source, hassle-free.
- Built-in switching power supply, for home, office, and 12V portable use.

NiMH Battery Packs
ULTRA HIGH CAPACITY FOR TWO-WAY RADIOS

- Ultra high capacity Nickel Metal Hydride rechargeable battery packs.
- Memory-free operation. Can be charged any time without been fully drained.
- Recharge up to 500 times.
- Environment friendly.
- A diverse selection of battery packs for different two-way radios, backed by Maha's One-Year Limited Warranty. Visit our website for complete selection.

MAHACELL NEW
AA CONSUMER BATTERY & CHARGERS

AA NiMH Battery Cells

- Ultra high capacity at 1550mAh.
- Can be used in your handheld battery case, FRS, GPS, and scanners.
- Recharge up to 500 times.
- Also available in AAA, C, D, and 9V sizes.

MH-C204F Intelligent Rapid Charger & Conditioners

- Rapid charge 2 or 4 AA / AAA NiCD / NiMH batteries.
- Rejuvenate and restore dead batteries.
- Can be used on a 12V power supply and in a car with the optional car kit.

MAHA

"Your Supplier, Your Partner, Your Friend!"

Maha Communications, Inc. Amateur Radio Division
545-C W. Lambert Rd., Brea, CA 92821
Tel: 714-990-4557 or 800-376-9992 Fax: 714-990-1325

http://www.maha-comm.com/

NEW IC-R75 HF RECEIVER

Cutting edge technology for today's serious DX'er, yet easy & affordable for a casual listener.

SAVE $100

FREE DSP

Mail in offer for a free UT-106 DSP module. Limited time offers. See your dealer for details.

Hear MORE of what's out there. Pick up more amateur, marine and shortwave broadcasts. The new 'R75 covers from **0.03 – 60.0 MHz*** – wider than most other HF receivers.

Pull out the weak signals. The IC-R75 sports a remarkable arsenal of signal detection weapons, ready for your command: A **triple conversion** receive system rejects image and spurious signals. An **automatic notch filter** reduces interference by minimizing "beat" and "howl" signals. Use **Twin Passband Tuning (PBT)** to zero in on signals by shaping the IF passband. ICOM's all new **Synchronous AM detection (S-AM)** technology reduces signal fading in AM broadcasts. Optional **Digital Signal Processing (DSP)** noise reduction in the AF stage converts analog SSB, AM and FM signals to crisp, clear audio output (you'll hear the difference on the 'R75's **large front mounted speaker**). Further tailor the 'R75 to meet your listening needs by installing **up to two optional filters**.

There's much more. Plan to test drive a surprisingly affordable new IC-R75 at your authorized ICOM dealer's showroom soon.

ICOM brings you the BEST in wide band receivers

SAVE $50 FREE CD

Get a frequency database on CD ROM with each new IC-PCR1000. Limited time offers. See your dealer for details.

IC-PCR1000

The original "World in a Little Black Box". 100% PC hardware external. Impressive 0.01 –1300 MHz* wide band reception, all modes. Listen to your favorite broadcasts while working in foreground applications. Designed for Windows® 3.1 or 95.

Computer not included.

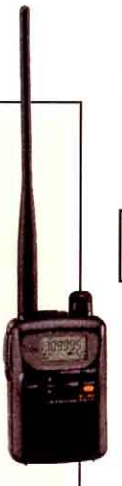
"The PCR1000 has something to intrigue and satisfy everyone. This is a fun product." *– QST, 7/98*

SAVE $50 FREE PC

On the IC-R10. Also receive free PC software and connection cable. Limited time offers. See your dealer for details.

IC-R10 (left) Advanced performance and features. 0.5 – 1300 MHz*; all mode; alphanumeric backlit display; attenuator; 7 different scan modes; beginner mode; 1000 memory channels; band scope; includes AA Ni-Cds and charger.

IC-R2 (right) Excellent audio, tiny package. 0.5 – 1300 MHz*; AM, FM, WFM; easy band switching; CTCSS decode; 400 memory channels; large internal speaker; priority watch; auto power off; MIL SPEC 810 C/D/E (shock/vibration); weather resistant; includes 2 AA Ni-Cds and charger.



IC-R8500 The expert's choice.

0.5 – 2000 MHz*; commercial grade; all mode; IF shift; noise blanker; audio peak filter (APF); 1000 memory channels; built-in CI-V command control and RS-232C port for PC remote control with ICOM software for Windows®.

"If you want a receiver that is both a superior world band radio and a solid scanner, the new Icom IC-R8500 is the best choice."

– Passport to World Band Radio, 1998

SAVE $50

On the IC-PCR100. Limited time offer. See your dealer for details.

IC-PCR100 A little different look, a little fewer features, a little lower price.

Enjoy wide band 0.01 – 1300 MHz* reception on AM, FM and WFM. Outstanding performance. Designed for Windows® 95 or 98. Download the full version software today: <www.icomamerica.com>

Computer not included.

ICOM®

www.icomamerica.com

*Cellular frequencies blocked: unblocked versions available only to FCC approved users. ©1999 ICOM America, Inc. 2380 116th Ave NE, Bellevue, WA 98004 • 425-454-8155. The ICOM logo is a registered trademark of ICOM, Inc. Questions? Contact your authorized ICOM dealer, or contact ICOM America Tech Support through the HamNet forum on CompuServe® at 75540,525 (e-mail:75540.525@compuserve.com) All specifications subject to change without notice or obligation. CompuServe is a registered trademark of CompuServe, Inc. Windows is a registered trademark of Microsoft Corporation. R75/RCVRQST1299

April 2000 ♦ Volume 84 Number 4

CONTENTS

Technical

70

News and Features

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.

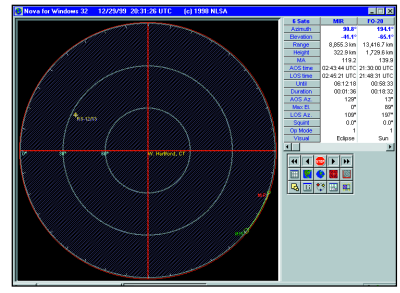
Telephone: 860-594-0200
Fax: 860-594-0259

QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494. ARRL yearly membership dues (including a subscription to *QST*), are $34 worldwide. To compensate for additional postage for mailing outside the US, please remit $47 for Canada and $54 for other countries. Complete membership information is shown on page 5. Periodicals postage paid at Hartford, CT, and at additional mailing offices.

POSTMASTER: Form 3579 requested. Send address changes to:
QST, 225 Main St, Newington, CT 06111-1494 Volume 84, Number 4

QST Workbench

53



65

Operating

Departments

Our Cover

This month we're treated to stunning images from the OSCAR 36 satellite. The background image is the Nile River with the Aswan dam clearly visible. Inset views (top to bottom): Las Vegas, the Grand Canyon and San Jose, California. All of these images were downloaded from OSCAR 36 with assistance from Chris Jackson, G7UPN, at Surrey Satellite Technology Ltd. See "Step Up to the 38,400 Bps Digital Satellites" by Stacey E. Mills, W4SM, in this issue.

Membership in the ARRL, including a subscription to *QST*, is available to individuals at the following rates: $34 per year in the US and possessions, $47 Canada, $54 elsewhere, payable in US funds. Age 65 and over, with proof of age, $28 (US only). Licensed radio amateurs age 21 and under may qualify for special rates; write for application. Life membership is also available. Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Subscription rate for libraries and institutions: $34 per year postpaid in the US and possessions, $47 Canada, $54 elsewhere. Single copies $5 in the US.

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

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)

One-Stop Shopping for HF

Factory-Direct for Big Savings!

$895

$139

PEGASUS

Combining the power of your PC with cutting-edge IF-DSP yields unmatched performance at this price. 34 built-in DSP filters on receive. Tailor the sound of your transmit audio with 18 different bandwidths! Installation is simple, no need to go inside your PC. Just load the software provided, connect to a serial port, and you're on the air! Runs on Windows 3.1, 95/98®. 100 watts out on all 9 HF bands and general coverage receive. Add optional model 302 remote tuning control for armchair operation. Download actual operating software from our website for a test drive.
Ship wt. 13 lbs.

$2585

OMNI VI *PLUS*

The finest ham band receiver in the world! You'll work the weakest signals under the worst band conditions, signals the competition can't even hear. Our unique crystal mixing makes it possible by eliminating phase noise as a performance factor. Even the most active contesters and DXers operate for hours on end with little or no listening fatigue. The power of DSP noise reduction makes signals "jump" out of the noise.
Ship wt. 25 lbs.

SCOUT

Have fun on HF without spending a fortune. Master every feature in minutes, no modern rig is as easy to use. Ideal for mobile, portable, or a 2nd rig in the shack. Everyone's favorite Field Day choice. Receiver performance runs circles around rigs at twice the price. Patented variable bandwidth "Jones" filter, 50 watts out, includes one band module of your choice, others only $29 each.
Ship wt. 9 lbs.

$549

Every TEN-TEC Transceiver and Amplifier includes our legendary, silky-smooth QSK!

Call 800-833-7373
or visit us at www.tentec.com

$1795

CENTURION

1300 watts PEP, 1000 watts CW from a pair of classic graphite 3-500Z's. Conservative design assures maximum tube and power supply life. Instant on, no warmup. Simultaneous metering of average and peak power. Only $1495 if you already own tubes. *Ship wt. 70 lbs.*

$2990

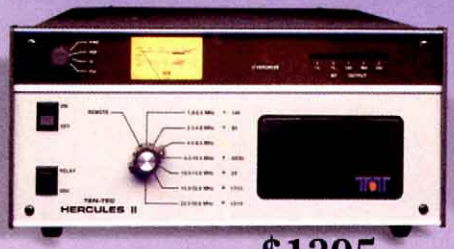
TITAN II

Comfortably delivers 1500 watts output from single Svetlana 4CX1600B. Our unique L-Pi-L tank design assures cool operation, balanced Q, and excellent harmonic suppression. Built-in protective circuitry makes TITAN II virtually indestructible. 3 YEAR warranty. *Ship wt. 93 lbs.*

$295

PC RADIO

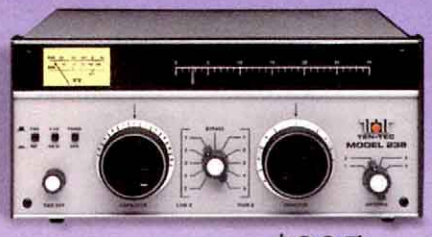
Shortwave listening is only a mouse click away. General coverage from 100 kHz - 30 MHz. Connects to your PC via one serial port. Runs on Windows 3.1, 95/98®. Download the actual operating software from our website. *Ship wt. 5 lbs.*



$1395

HERCULES II

Solid state, no tuning required! 50 - 70 watts provides 550 watts out, all modes. Use direct from 13.5 VDC battery for mobile or base operation or optional power supply. Model 9420, $749. *Ship wt. 25 lbs.*



$395

HIGH POWER TUNER

Our superior "L" network utilizing heavy-duty, hand-built roller inductor. Matches up to 10:1 SWR at any phase angle. Handles 1500 watts with ease, even on 160 meters. *Ship wt. 14 lbs.*

Model 239 - 300 watt Dummy Load (1 lb.)	$ 27.95
Model 291 - 200 watt Antenna Tuner (4 lbs.)	$ 89.00
Model 701 - Hand Microphone (1 lb.)	$ 24.00
Model 705 - Desk Microphone (2 lbs.)	$ 79.95
Model 937 - 13.8 VDC 11 amp Power Supply (14 lbs.)	$ 79.00
Model 962 - Power Supply/Speaker Console (21 lbs.)	$275.00

Ship Wt. (lbs.)	<3	3-9	10-19	20-34	35-69	70-100
Continental U.S.	$6	$9	$15	$20	$31	$60
Alaska, Hawaii, Canada - Call Toll-Free for Quote						

*Customer pays shipping both ways.

NO-RISK 30-DAY MONEY-BACK GUARANTEE!*

Call for Free T-Kit Catalog

Over 30 Budget-Priced Kits for Hams and SWL's

Ask about Club Fundraising or Club Quantity Discounts

You can reach us at:

1185 Dolly Parton Parkway
Sevierville, TN 37862
Sales Dept: 800-833-7373
Monday - Friday 9:00 - 5:30 EST
We accept VISA, Mastercard, and Discover

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

TEN-TEC

MADE IN USA

. . . Into the Light!

ADI

"The Best Value in Amateur Radio"

Finally, a dual band handheld that is powerful, loaded with features, *AND* easy to use!

Our ADI AT-600HP has a large dot matrix display, which *QST* magazine called "...the best we've seen in awhile," and a full-sized keypad, the largest keypad of any dual band HT on the market today. For night operation, the AT-600HP features bright green back lighting on both the LCD display and the entire 16-digit DTMF keypad, making operation even in the darkest environments a snap. The AT-600 even programs intuitively. Even the reviewers at *QST* commented that they "were able to execute most basic functions without cracking the manual." (**Source:** March '98 *QST*) The AT-600HP is simply the most user friendly HT on the market today!

HAM RADIO'S FIRST "PLUG AND PLAY" HT

The ADI AT-600 comes pre-programmed with over 100 channels including popular ham radio repeater pairs and receive only frequencies including marine, fire, police, aircraft, and business. These frequencies were picked by author and instructor **Gordon West, WB6NOA**, himself! Wherever you live, you should find these frequencies to be quite active! Your AT-600 will "play" right out of the box, without any programming! With 200 memory channels, the AT-600 has plenty of memory for your own local frequencies as well!

AT-600HP Dual Bander 2M / 70CM Handheld

TX range: 144-148, 430-450 MHz • RX range: 108-174 MHz (including AM air band), 400-470 MHz, plus 830-985 MHz (cellular blocked) • MARS and CAP capable (permits are required) • simultaneous VHF/UHF receive • single band, or full duplex operation • cross band repeat • separate volume and squelch controls for each band • six-character alphanumeric display • 200 memories store any offset or tone • CTCSS encode / decode / tone scan • 10 DTMF auto dialer memories • DTMF paging • Auto Power Off • battery save • 5 Watts out with supplied battery (HP version only) • PC programmable • on-the-air cloning • Large backlit keypad and display • Battery voltage meter function • Small! 4.25" (H) x 2" (W) x 1.5" (D) excluding battery pack

ADI AT-600HP

$259.95

includes $40 instant coupon valid until 4-30-00

PRYME *Radio Products*

by **PREMIER Communications Corp.**

480 Apollo St. #E • Brea, CA 92821

Phone: 714-257-0300 • **Fax:** 714-257-0600

E-mail: premier@adi-radio.com

*Win **FREE** **ADI** equipment on the web at www.adi-radio.com!*

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

* The prices shown above are estimated street prices including all applicable coupons and incentives. Actual dealer prices may vary. Call your local dealer for their price.

"IT SEEMS TO US..."

Extra Value

Do you remember the last time you took an FCC exam?

I do–but just barely. The year was 1965. The Amateur Extra Class license carried no special privileges at the time, but a nerdy teenager could see the handwriting on the wall and it seemed like a good idea to get the Extra exam out of the way before the rush.

The written exam had 100 questions, including ten that required the applicant to draw diagrams. The Morse receiving exam required one minute of solid copy out of five at 20 words per minute. There was also a sending exam.

Some would have you believe that because I passed the Extra in 1965, that makes me a better ham than someone who did it later—or who will do it after April 15.

Nonsense.

Let's pretend that someone knew just enough to pass the Extra exam 35 years ago and hasn't learned anything since. Today they would know nothing about spread spectrum, packet radio, slow-scan television, or satellites. For that matter, they would know nothing about repeaters or semiconductors! They would recognize the schematic symbol for a vacuum-tube rectifier but not for a solid-state rectifier. They would not know the frequency limits for the amateur bands at 10, 18, 24, and 902 MHz; those bands did not exist until after 1979. Unlike any recently licensed Technician, they would know nothing about RF exposure limits.

"Oh, but in the 'good old days' the question pools weren't published, so there was no way to know what would be on the exam." Not exactly. Perhaps we should republish a '60s-vintage *ARRL License Manual* to put that particular misconception to rest. I don't remember everything that was on the 1965 Extra exam, but from looking at the 21 pages of Extra Class study material contained in the *License Manual* of the time–consisting of 240 sample questions with thumbnail explanations–I can tell you that both the first and the last sample questions were on it verbatim. Not only that, but the book gave the exact answer to each.

The point is *not* that yesteryear's Extra exam was easy. Unless you were an engineer, it wasn't. For example, there were questions about television and radar that were well beyond the scope of what most amateurs had any reason to know. There were questions about single sideband long before SSB was popular. The March 1952 *QST* editorial said the Extra Class exam was on a par with the first-class commercial, and no doubt it was. Still, it was possible to pass on the strength of a few hours' study and without an in-depth understanding of the subject matter.

The real point is twofold.

First, the fact that someone–I or anyone else–passed an FCC exam a long time ago says nothing about their ability today to fulfill the basis and purpose of Amateur Radio. Earning a license is not the end of the road. It's just the beginning. The measure of the ham is what one *does* with the license, be it Novice or Extra.

Second, today's exams are easily on a par with yesterday's, as will be tomorrow's. Today's Advanced exam is at least as challenging as the old Extra written exam and is more difficult than the present one. After April 15, the new Extra–which will be drawn from a combined Advanced/Extra pool–will be a challenge worthy of anyone aspiring to the top rung on the licensing ladder. Yes, it will have "only" 50 questions, but they will be drawn from a pool that is broader in scope than any previous FCC amateur exam and the passing grade will be the same.

But if you pass, what then? Earning an Extra Class license in 1952, when it was first offered, did not mark the end of any worthwhile amateur's ascension of the learning curve. It didn't in 1965. It doesn't now, and it won't after April 15. We owe it to ourselves to extend our self-education beyond the licensing requirements of the moment, whatever they may be.

The ARRL already encourages continuing education in myriad ways. Our technical publications are the most obvious, but there are many others. We co-sponsor technical conferences. We support others by publishing their conference proceedings. We provide technical programs for conventions and hamfests. But we could do more, and soon we *will* do more.

In a report to the ARRL Board last July I identified a certification program to promote continuing education in Amateur Radio as one of the key initiatives the ARRL should undertake. "At the present time we rely on FCC licensing and the volunteer examination system to perform the function of encouraging radio amateurs to learn more than the bare minimum," the report said. "We would be selling ourselves short if we were to limit amateurs' continuing education merely to what one needs to know in order to pass the license tests. To do so is analogous to awarding a college diploma in recognition of good SAT scores."

The Board responded very positively to a follow-up report in January and established the ARRL Certification Program. The Board mandated that this is not to be a top-down, imposed-from-above program; members will have an opportunity to participate from the early design stages. The first step will be the creation of a Web-based message board where interested members can discuss the initial topics that should be included in the ARRL Certification Program. Prioritization of the topics, consideration of the standards to be required for ARRL certification and the development of appropriate means of measurement will follow.

The program is dedicated to the memory of Ethel M. Smith, K4LMB, whose bequest to the ARRL will provide the startup funding. For those who were fortunate enough to know Ethel, the dedication requires no explanation. For others, perhaps it will suffice to say that one of her last notes to me, sent just a few months before she succumbed after a long battle with cancer, was proudly signed "K4LMB/AE." She had earned her Extra—at age 79.—*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. Our address is: 225 Main St, Newington, CT 06111-1494. You can call us at 860-594-0200, or fax us at 860-594-0259.

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

	Contact	*Telephone*	*Electronic Mail*
Joining ARRL	Membership Desk	888-277-5289	circulation@arrl.org
***QST* Delivery**	Circulation Desk	860-594-0338	circulation@arrl.org
Publication Orders	Sales Desk	888-277-5289	pubsales@arrl.org
M-F Only, 8 AM to 8 PM Eastern Time (toll free)			
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.

Technical Information Server

If you have Internet e-mail capability, you can tap into the ARRL Technical Information Server, otherwise known as the *Info Server*. To have user instructions and a handy index sent to you automatically, simply address an e-mail message to: info@arrl.org
Subject: **Info Request**
In the body of your message enter:

HELP
SEND INDEX
QUIT

ARRL on the World Wide Web

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

http://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 http://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!

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 http://www.arrl.org/qst/aguide/.) The guide contains all the information you'll need to craft an article to meet our requirements. Send article ideas or manuscripts to the attention of the *QST* Editor (e-mail qst@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).

Strays and Up Front

Send your Strays and Up Front materials to the *QST* Features Editor (e-mail upfront@arrl.org). Be sure to include your name, address and daytime telephone number.

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 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 http://www.arrl.org/arrlletter/audio/.

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
EDMOND A. METZGER, W9PRN
1917 Lindsay Rd, Springfield, IL 62704
(217-546-6870);
w9prn@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
(651-222-7253); 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
(606-341-7477); ki4la@arrl.org

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

Vice Director: J. P. Kleinhaus, W2XX
29 Dirubbo Dr, Cortlandt Manor, NY 10567 (914-837-3720); w2xx@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: Marshall Quiat, AG0X
PO Box 200878, Denver, CO 80220-0878 (303-331-3456);
ag0x@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

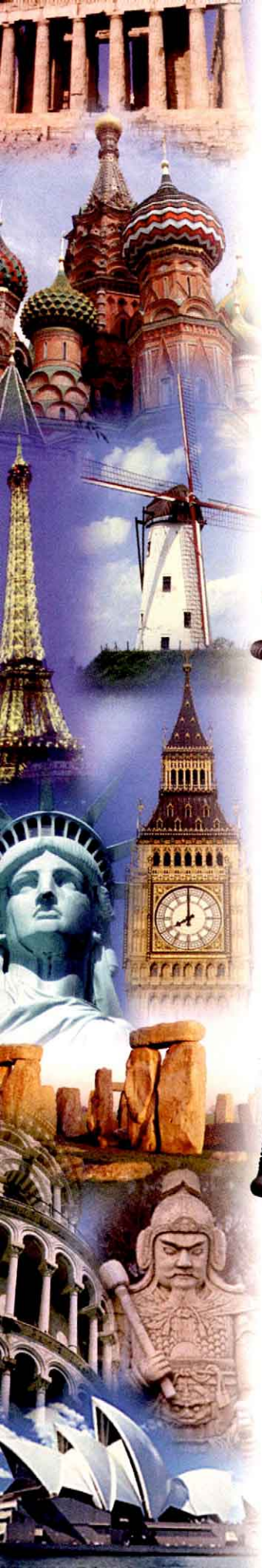
Vice Director: Art Goddard, W6XD, 2901 Palau Pl, Costa Mesa, CA 92626 (714-556-4396);
w6xd@arrl.org

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

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.

*Executive Committee Member



Work the World With Alinco!

Base, mobile, portable or marine, Alinco HF transceivers open a world of possibilities at prices that are down to earth. Check out these great radios and the low Alinco price at your favorite dealer!

DX-70T, DX-70TH HF+6m

Mobile/Base/Portable

Rugged and versatile, DX-70 radios are recognized around the world as proven performers!

160m ~ 6m Amateur Band TX in all modes, general coverage RX 150 Khz ~ 30 MHz and 50 ~ 54 MHz, 2 VFOs, 100 memories, removable face for remote mounting, speech compressor, SSB, CW and AM narrow filters, full, semi or automatic break-in, multi-function control, RIT, TXIT, easy split operation, RF gain, CTCSS for 10 and 6 m repeaters. Both models feature 100w output on HF, DX-70TH has 100w output on 6m, DX-70T has 10w output on 6m.

DX-77T HF Desktop Transceiver

It's the radio Amateurs asked us to build!

Not a "channelized conversion", the DX-77T was built from the ground up to be a great performing HF radio. 160 ~ 10 m Amateur Band TX in all modes, general coverage RX 500 Khz ~ 30 MHz, 2 VFOs, internal keyer (6 ~ 50 wpm), 100 memories, 13.8 VDC input, optional computer control capability, CTCSS encoder (front panel programmable), RIT, easy split operation, speech compressor, selectable AGC, large front panel speaker. The value leader in HF desktop radios!

DM-340 DC Power Supply

30 amps nominal, 35 amps peak, 0~15 VDC variable output, meters included at no extra cost, convenient front panel connections, output connections include binding posts, spring clips and cigar lighter, circuit protection, perfect for base station operation or bench testing.

EDX-2 Automatic Wire Antenna Tuner

Equip your DX-70 or DX-77 with the Alinco EDX-2 Automatic Antenna Tuner. Quickly tunes antennas from 8 to 80 feet, for any band from 10 through 160 meters (minimum 40 foot wire antenna required for 160 meter use). Perfect for base, mobile or marine use. Plugs directly into Alinco DX-70 and DX-77 transceivers. You don't have to pay more for great performance!

Simple ▪ Clean ▪ Dependable

ALINCO®

AMATEUR RADIO'S VALUE LEADER℠

U.S.A. Alinco Branch: 438 Amapola Ave. • Suite 130 • Torrance, CA 90501
Phone: (310) 618-8616 • Fax: (310) 618-8758 • Internet: http: //www.alinco.com

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.

Atlantic Division

Delaware	Randall K. Carlson, WB0JJX, 121 Scarborough Park Dr, No 10, Wilmington, DE 19804 (302-655-6179); **wb0jjx@arrl.org**
Eastern Pennsylvania	Allen R. Breiner Sr, W3TI, 212 Race St, Tamaqua, PA 18252 (570-668-3098); **w3ti@arrl.org**
Maryland-DC	William Howard, WB3V, 2304 Snowflake Dr, Odenton, MD 21113 (410-551-6775); **wb3v@arrl.org**
Northern New York	Chuck Orem, KD2AJ, 3981 State Route 22, Plattsburgh, NY 12901-5554; (518-563-6851); **kd2aj@arrl.org**
Southern New Jersey	Jean Priestley, KA2YKN, 7158 Chandler Ave, Pennsauken, NJ 08105 (609-662-3587); **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 43711 (608-274-1886); **w9ixg@arrl.org**

Dakota Division

Minnesota	Randy "Max" Wendel, N0FKU, 8539 Bryant Ave S, Bloomington, MN 55420-2147 (612-888-5953); **n0fku@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 Road, 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 (513-552-8324); **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, (516-286-7562); **n2ga@arrl.org**
Northern New Jersey	Jeffrey M. Friedman, K3JF, 1 Churchill Dr, Succasunna, NJ 07876-1803 (973-827-8182); **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, GA 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 (987-448-5678); **wu1f@arrl.org**
Maine	William Woodhead, N1KAT, 63 1st Ave, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**
New Hampshire	Michael Graham, K7CTW, 50 Joppa Rd, Merrimack, NH 03054 (603-424-6987); **k7ctw@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, KF7ZQ, 9832 W Gurdon Ct, Boise, ID 83704-4080 (208-376-3458); **kf7zq@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	Robert Davis, K7IY, PO Box 20361, Reno, NV 89515-0361 (702-856-2826); **k7iy@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 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**
San Francisco	Leonard Gwinn, WA6KLK, 2960 Blackhawk Dr, Willits, CA 95490-9704; **wa6klk@arrl.org**

Roanoke Division

North Carolina	John Covington, W4CC, PO Box 217122, Charlotte, NC 28221 (704-843-7266); **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, N5UVP, 2166 East 2100 North, Layton, UT 84040 (801-547-1753); **n5uvp@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, 960 Ralph McGill Blvd, Atlanta NE, GA 30306 (404-875-9450); **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 Pkwy, 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 Ambrust, AE4MR, 1641 Baywinds Ln, Sarasota, FL 34231-3040 (941-923-1688); **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, K6ZEC, 3122 E 2nd St, National City, CA 91950 (619-475-7333); **k6zec@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**

This Could Be One of the Most Useful Station Accessories You Will Ever Buy——————Whether You're on HF, VHF or UHF!

The Alpha Delta Model DELTA-4C Surge Protected Desktop Coaxial Switch Console. There Has Never Been Another Station Accessory that Offers the Antenna and Equipment Switching Convenience of This One

- The Model DELTA-4C, 4 position Coax Switch console is designed to sit conveniently next to your station equipment with no wall or desk mounting required. The connector and console design prevents coax cable from pulling the console backward. It stays put.
- The DELTA-4C retains the excellent performance features of the proven DELTA-4 switch series. In fact, the internal design is the same with micro-strip channels, positive detent switching and excellent co-channel isolation. The DELTA-4C can switch multiple antennas to your station, or multiple equipment to your antenna
- The DELTA-4C provides station surge protection with a built-in ARC-PLUG gas tube module, easily replaceable from the front panel. All circuits are protected during operation, and unused positions are grounded. A master center-off position grounds all circuits for maximum possible protection.
- The console is built with a heavy aluminum casting and "battleship" construction. Models offer both "SO-239" and type "N" connectors for complete versatility. The **DELTA-4C Console is a wonderful addition to the family of DELTA-4 coax switches.**

At your Alpha Delta Dealer or add $5.00 ea. for U.S. order. Exports quoted

Model DELTA-4C Console, SO-239 Connectors, 4 Position ——————$139.95 ea.
Model DELTA-4CN Console, Type N Connectors, 4 Position——————$149.95 ea.

ALPHA DELTA COMMUNICATIONS, INC. AA

P.O. Box 620, Manchester, KY 40962 • Phone (606) 598-2029 • Fax (606) 598-4413

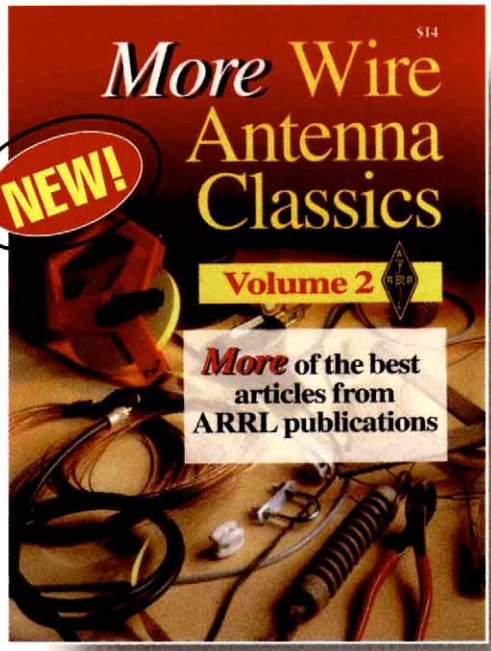
Toll Free Order Line: 888-302-8777

Alpha Delta - Where Imagination And Reality Merge

Website: www.alphadeltacom.com

MasterCard VISA

ARRL brings you.... *MORE* Wire Antennas!



Now you can enjoy even ***MORE*** wire antennas! This book is filled with innovative designs from the pages of *QST* and other ARRL publications. Experience the satisfaction and enjoy the benefits of building your own wire antennas. Inside, you'll find more than just creative ideas. These versatile antennas work! If you have the original *ARRL's Wire Antenna Classics*—you'll want **MORE!**

ARRL Order No. 7709—$14 plus shipping*

Here's some of what you'll find in Volume 2:

Dipoles: Nifty portable, permanent and temporary antennas.

Off-Center-Fed Dipoles: Solid projects and sound analysis.

Multiband Antennas: More ways to use the same antenna on many bands.

Loop Antennas: Use them on 10 through 160 meters.

Collinear Antennas: Discover the extended double Zepp and other gain antennas.

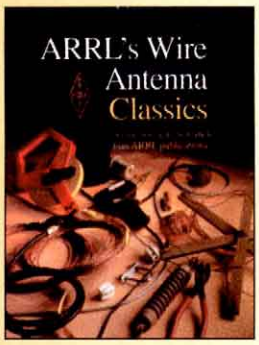
Wire Beams: From modest to superior performance.

Vertically Polarized: These may help you snag that elusive DX.

Receiving Antennas: Enjoy low-noise reception on the low bands.

Miscelanea: A potpourri of ideas, including use of balloons for antenna supports.

Additional books from the ARRL Antenna Classics series!



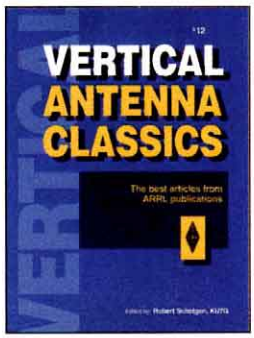
The Original!

ARRL's Wire Antenna Classics

Antennas to Build—ideas to Experiment With! So many wire antenna designs have proven to be first class performers! Here's an entire book devoted to wire antennas, from the simple to the complex. Includes articles on dipoles, loops, rhombics, wire beams and receive antennas—and some time-proven classics! An ideal book for Field Day planners or the next wire antenna project at your home station. Volume 1. ARRL Order No. 7075—**$14** plus shipping*

Winning Performance!

Vertical Antenna Classics



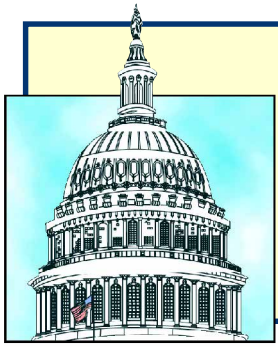
Vertical antennas are everywhere—on cell phones, broadcast towers and portable radios. You'll also see them on the roofs, towers and vehicles from Altoona to Australia. And for good reason! Here are some top-notch performers from ARRL publications, brought together in one book. Vertical antenna theory and modeling, VHF and UHF, HF, directional arrays, radials and ground systems, and more. Get Vertical! ARRL Order No. 5218—**$12** plus shipping*

*Shipping Charges: US orders add $4 for one book ordered plus $1 for each additional book ($9 max). Non-US addresses add $1.50 to US rate ($10.50 max).

Call our toll-free number 1-888-277-5289 to order or to find a dealer near you.

QT 4/2000

ARRL
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/



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.

Spectrum Issues Back on The Hill

The telecommunications "*issue du jour*" in Washington these days involves spectrum (again). This time it's how the FCC treats licenses coughed up by wireless companies that couldn't meet their auction payments, and what to do with an additional 60 MHz of spectrum now occupied by television channels 60-69 but slated to be reallocated to public safety, broadband access and next-generation wireless.

The wireless licenses are supposed to be re-auctioned, but the FCC, industry groups and some wireless service providers are quarreling over just how that ought to be done, and they've taken their case to Congress. At the center of the controversy are 95 licenses that were supposed to be owned by NextWave Telecom, which couldn't come up with the cash to complete its purchase at auction. The licenses were reserved for small companies with annual revenues of less than $40 million. The debate now is over whether the licenses should be continue to be reserved for small companies, or should be opened up to the big players.

The channels 60-69 controversy involves whether or not to auction a six MHz "guard band" that was supposed to stand between 24 MHz of the reallocated TV frequencies and a 30 MHz block that was to be auctioned for a variety of commercial uses.

The FCC does seem to be sensitive to some of the public relations implications of using auctions to generate government revenues. At a recent Senate Budget Committee hearing on "Spectrum Budget Issues" FCC Chairman Kennard, responding to a question from Senator Gregg (R-NH) about who owned the spectrum, said, "Spectrum is a natural resource." (Just what the ARRL has been telling them for years!)

The spectrum flames on The Hill are also being fanned by the FCC's decision to go ahead in creating a new, low-power FM radio service that will consist of two classes of stations with maximum power levels of 10 W and 100 W. These stations would operate throughout the FM band. The new service will be exclusively noncommercial. The proposed new service is not popular with all members of Congress.

HR.783 Cosponsor List Growing Again

♦ After the year-end layoff, Congress has returned to work and the cosponsor list is now beginning to grow again. Since last reported in the January *QST*, 10 new House cosponsors have signed on. The new cosponsors are:

Jennifer Dunn (R-WA-8th)
Asa Hutchinson (R-AR-3rd
Roscoe Bartlett (R-MD-6th)
Robert Wise (D-WV-2nd)
Jim DeMint (R-SC-4th)
Joseph Crowley (D-NY-7th)
Sue Kelly (R-NY-19th)
James Moran (D-VA-8th)
David Minge (D-FL-MN-2nd)
Donald Manzullo (R-IL-16th)

We anticipate that the Senate companion bill will be in the hopper by the time you read this.

Virginia Legislature Praises Hams For Emergency Work

Hams in Virginia received a well-deserved vote of appreciation from the State General Assembly for their hard work on behalf of the stranded residents of the city of Franklin following Hurricane Floyd last September. In a House Joint Resolution introduced by House members Joe T. May of Leesburg, William K Barlow of Smithfield, J. Paul Councill of Frankin, and Senator John S. Edwards of Roanoke, the Assembly singled out the "147 Virginia ARES/RACES volunteers" who "worked more than 9,500 hours to help coordinate emergency operations in Franklin."

HOUSE JOINT RESOLUTION NO. 81

Offered January 18, 2000

Commending the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES).

———

Patrons— May, Barlow and Councill; Senator: Edwards

———

WHEREAS, on September 16, 1999, Hurricane Floyd totally isolated the City of Franklin, and rising flood waters forced city officials to abandon their Emergency Operations Center; and

WHEREAS, the flooding caused all electrical power and communications into and out of Franklin to be cut off; and

WHEREAS, amateur radio operators from across the Commonwealth, trained to respond to civil emergencies, volunteered their communication skills; and

WHEREAS, with traditional lines of communication inoperable, the amateur radio operators, members of the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES), provided the only reliable communication throughout the flood-ravaged Franklin area; and

WHEREAS, in the widest geographical and longest-running ARES/RACES activation in Virginia's history, 147 Virginia ARES/RACES volunteers worked more than 9,500 hours to help coordinate emergency operations in Franklin; and

WHEREAS, ARES/RACES volunteers carried requests for emergency assistance, food, medicine, water, ice, sandbags, pumps, cots and all other supplies needed to sustain life and ease the suffering of Franklin residents; and

WHEREAS, amateur radio operators stayed in constant communication with local emergency management officials, firefighters, police officers, the National Guard, the State Police, the Virginia Forestry Department, and the National Weather Service; and

WHEREAS, due to the tireless efforts of these amateur radio volunteers, the tragic effects of Hurricane Floyd were mitigated, the lives of those in the flood zone safeguarded, and the suffering of Franklin's residents alleviated; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the General Assembly commend the Amateur Radio Emergency Service and the Radio Amateur Civil Emergency Service volunteers, whose vital communication links were instrumental in minimizing the impact of this disaster; and, be it

RESOLVED FURTHER, That the Clerk of the House of Delegates prepare a copy of this resolution for presentation to ARES/RACES as an expression of the General Assembly's admiration and gratitude for the vital contributions of Virginia's amateur radio operators.

More States Introduce Bills on "Driving While Cellular"

Seven more states have jumped on the "driving while cellular" bandwagon since we last reported on the issue (see "DC Currents," March 2000). They are Georgia, Hawaii, Indiana, Iowa, Kansas, Nebraska and Rhode Island. The list of states contemplating legislation that would affect driving while using a cellular telephone has now grown to 16. In addition, four states mentioned last month, Kentucky, New Jersey, New York and Pennsylvania have seen additional legislation introduced. The Colorado state legislature has reportedly tied up HB.1156 in committee after opposition by state police, truckers and the cell phone industry.

Excerpts—State Legislative Proposals Affecting Cell Phone Use While Driving

Georgia SB.298

"A driver…shall not engage in any use of a mobile telephone while such vehicle is in motion…provided that the proper use of a radio or citizens band radio shall not be a violation…"

Georgia SB.323

"A driver…shall not engage in any actions which shall distract such driver from the safe operation of such vehicle, including without limitation any use of a radio, citizens band radio or mobile telephone which involves more than one hand simultaneously…" [The law currently exempts "radio, citizen band radio or mobile telephone."]

Georgia SB.353

"Any use of a mobile telephone by a driver while he or she operates a moving motor vehicle in violation of any other provisions of this chapter shall be a violation…"

Hawaii HB.2079

"It shall be unlawful for any person to operate…a motor vehicle while the operator is using a cellular hand-held phone…Nothing in this section shall interfere with the use of a citizen's band radio or the use of speaker phones which are voice activated…"

Indiana SB.386

"A person may not operate a motor vehicle and simultaneously operate a mobile telephone." [Exempts emergency, medical and volunteer fire personnel]

Iowa HF.2051

"…a person shall not operate a motor vehicle on the highways of this state while using a cellular telephone." [Gives driver one minute to make or complete a call while vehicle is in motion.]

Kansas HB.2705

"It shall be unlawful for any person to operate a motor vehicle on a public highway while using a hand held cellular or cellular car telephone." [Gives a two-minute grace period and exempts citizen band radio and voice activated phones.]

Kentucky HB.172

"The operator of a motor vehicle shall not operate a wireless telephone while the car is on a public highway…"

Nebraska LB.993

"Use of a mobile telephone while simultaneously operating a motor vehicle creates a rebuttable presumption of contributory negligence if the operator of the motor vehicle is involved in a traffic accident during such use."

It shall be unlawful for any person to operate a motor vehicle while using a cellular telephone." [AB.1929, SB.849]

"A driver shall not operate a telephone in a motor vehicle that is in motion." [SB.480]

Note: SB.408 was cited last month in error. It has nothing to do with cellular telephones.

New York SB.6339

"No person shall operate a motor vehicle on a public highway while using a hand held cellular or cellular car telephone."

Pennsylvania HB.2184

"The driver of a motor vehicle shall ensure that the use of a mobile phone does not impair the safe operation of the motor vehicle…the department or municipalities may ban the use of mobile phones by drivers…"

Pennsylvania SR.127

"(A resolution) to study and develop recommendations concerning the issue of highway safety and driver distractions, including communications technology and electronic equipment such as wireless telephones, pagers, facsimile machines, locator devices, AM/FM radios, compact disk players, audio cassette players, citizens band radios and dispatch radios, and all other forms of nontechnical distractions."

Rhode Island HB.6907

"A person shall not drive a bicycle or motor vehicle upon any highway while wearing earphones or a headset, or operate a device for the sole purpose of which is to provide mobile telephone service.

"…shall not apply to mobile telephone devices which allow so called "hands free" operation…nor to the operation of a federally licensed two way radio communications system…"

Kansas Antenna Bill Hits a Snag

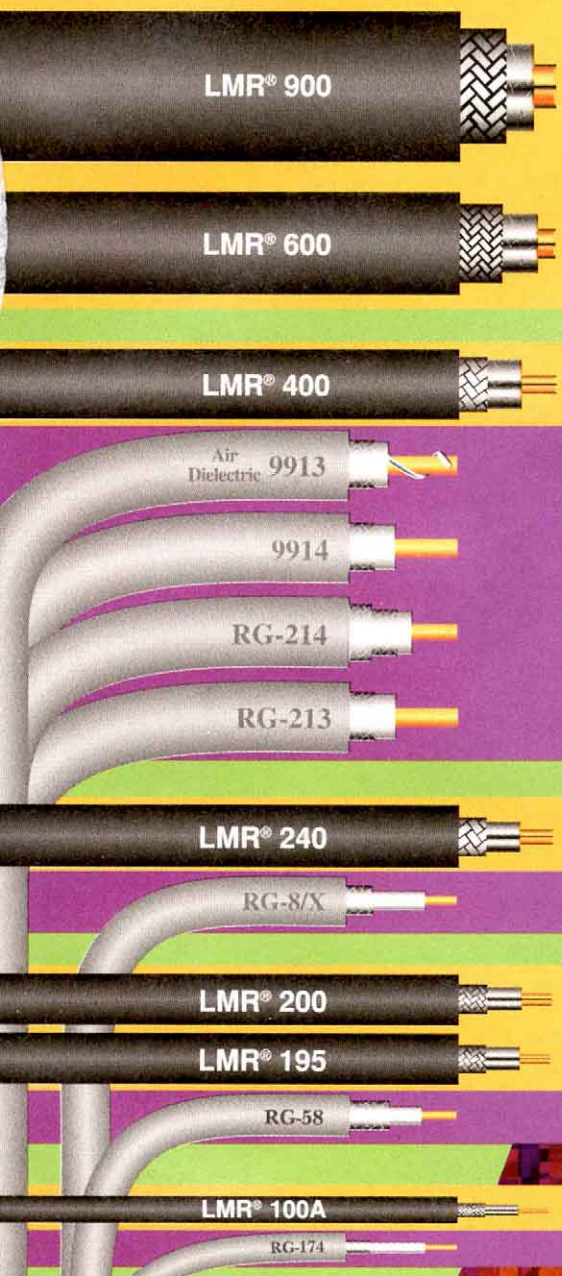
♦ A bill that would "enhance and preserve the operation of amateur radio" in Kansas by requiring that all city and county zoning ordinances conform to the requirements of the 1985 PRB-1 Amateur Radio preemption (101 FCC 2nd 952) may have hit a snag in the Kansas House, and will likely not reach the House floor this session. The bone of contention apparently is specific antenna heights mentioned in the bill, which were objected to by the League of Kansas Municipalities. Proponents of the bill say that they will work with LKM on possible compromise language this summer, and encourage amateurs to contact their representatives and senators in support of such legislation. A modified bill will likely be reintroduced next year.

Media Hits

- *The Detroit Free Press* featured an article on FCC license restructuring by writer Joel Thurtell, K8PSV. The article mentions Jim Wade, WB8SIW; George Goldstone, W8AP; Dan McCollough, WB8UXO; Clay Mitchell, W8JNZ; and Stan Briggs, K8SB, as well as Steve Ford, WB8IMY and Jennifer Hagy, N1TDY,of ARRL Headquarters.
- Vivian E. Douglas, WA2PUU, who writes a column on ham radio in the *Syracuse* (New York) *Herald Journal*, described the new licensing structure and featured information on how to find local licensing classes and club meetings.
- Another ham radio journalist, Bruce Grubbs, N7CEE, captured the front page of *Flagstaff Live*, in a wide ranging article on all major facets of Amateur Radio. Bruce's article also discussed restructuring in some detail.
- Long Island's *Newsday* also covered the buzz over restructuring. Mentioned in that article were Phil Lewis, N2MUN, the Rosner family: Nancy, N2TKA, Nicole, N2TKD, Lynda, N2WJK and Richard, N2STU, as well as Rich Moseson, W2VU, editor of *CQ* magazine, and Frank Fallon, N2FF, ARRL Hudson Division Director.
- A story in *The Tuscaloosa* (Alabama) *News* notes that Amateur Radio is "a popular hobby among young and old alike, with an estimated 2 million operators around the world." The article mentions activities of the West Alabama Amateur Radio Society.
- Susan Hamm, W9SVL of Hagerstown, Indiana didn't think an article on Y2K readiness in the Richmond, IN *Palladium Item* was quite accurate, apparently referring to ham operators as "CB operators." She wrote a fine letter to the editor correcting the error and outlining many of the useful emergency and public service activities offered by local radio amateurs.
- The Quincy, Massachusetts *Patriot Ledger* featured a profile of ham operator Gareth Linder, W1ACL, who says "you meet people you never thought you would meet" on the radio.
- The Sebring, Florida *News-Sun* showed Gordon Blauser, AF4HZ and Roger Warrick, K2CP, operating at the Lakeshore Mall in celebration of the inauguration of the new ARRL West Central Florida Section.

Low cost, low loss flexible LMR® cable!

for HF through Satellite Bands



	Diameter in Inches	Jacket Material	Shielding (dB)	*Attenuation (dB/100') 30 MHz	146MHz	440 MHz	2.4GHz
LMR® 900	**.870**	**Black PE**	**90**	**.29**	**.65**	**1.2**	**2.9**
LMR® 600	**.590**	**Black PE**	**90**	**.42**	**.95**	**1.7**	**4.3**
LMR® 400	**.405**	**Black PE**	**90**	**0.7**	**1.5**	**2.7**	**6.6**
Air Dielectric 9913	.405	PVC	90	0.8	1.5	2.8	7.5
9914	.403	PVC	90	1.0	2.1	3.8	8.7
RG-214	.425	PVC-IIA	60	1.2	2.8	5.1	13.7
RG-213	.405	PVC-IIA	40	1.2	2.8	5.1	13.7
LMR® 240	**.240**	**Black PE**	**90**	**1.3**	**3.0**	**5.2**	**12.7**
RG-8/X	.242	PVC	40	2.0	4.5	8.1	21.6
LMR® 200	**.195**	**Black PE**	**90**	**1.8**	**3.9**	**6.9**	**16.5**
LMR® 195	**.195**	**Black PE**	**90**	**2.0**	**4.4**	**7.7**	**18.6**
RG-58	.195	PVC-IIA	40	2.5	6.1	10.4	35.0
LMR® 100A	**.105**	**Black PVC**	**90**	**3.9**	**8.8**	**15.6**	**38.9**
RG-174	.110	PVC-IIA	40	5.5	13.0	25.0	75.0

LMR features: Watertight foam polyethylene dielectric • Non-kinking • EZ install connectors

***Use calculator at www.timesmicrowave.com for loss at any frequency**

TIMES MICROWAVE SYSTEMS
A Smiths Industries company

ISO 9001

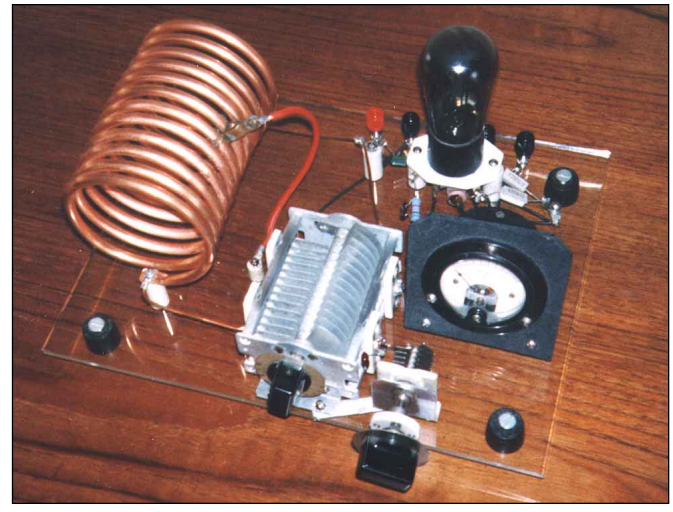

NEW!
Coming in April
$8
THE ARRL
REPEATER
DIRECTORY®
Save a place

A father-and-sons mini-DXpedition! Bill, KD6JUI, and his sons Ian (center) and Bruce (right) took a Ten-Tec Scout transceiver to a resort at the city of San Jose del Cabo in Baja California, Mexico. With just 20 W to an end-fed random-wire antenna, they worked stations throughout North America, Asia and Europe.

Here's the alternative to careful tower guying! Randy, WA2OMT, spotted this injured installation while vacationing on Prince Edward Island, Canada. No, this isn't an amateur tower, but it's a sight to give any ham food for thought.

The Lawrence County (Ohio) ARES/RACES promotes the public-service side of Amateur Radio with an annual event at a shopping complex in Burlington, Ohio. Under an open canopy they set up HF, VHF, UHF, packet and ATV stations—all powered by batteries or generators. Other local emergency and public service agencies operate exhibits as well. The event has become so popular that in 1999 the Lawrence County commissioners proclaimed September 25 as Lawrence County Health and Safety Awareness Day.

They're accustomed to high winds in northeastern Montana. K7SAM needed to work on his 50-foot fold-over tower, so he decided to tie it down securely. When the "breezes" can gust to 75 MPH, even a horizontal tower can take flight!



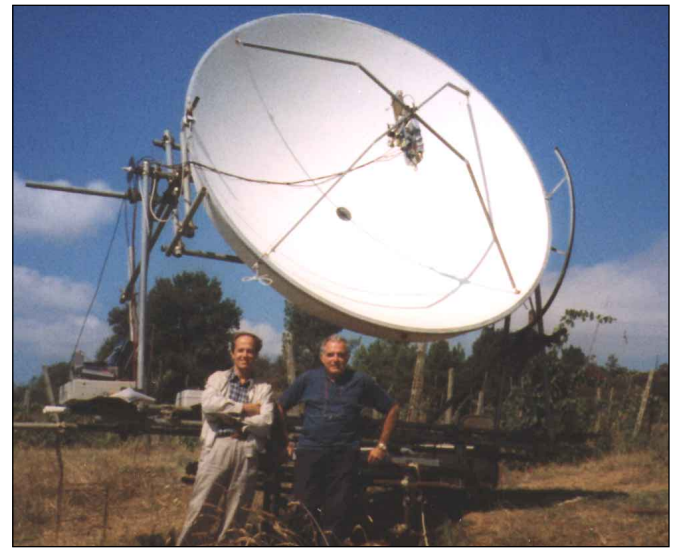
Early amateurs were fond of "open" circuit designs on wood bases. When Al, N2AO, revived this vintage transmitter he broke with tradition and opted for a Plexiglas base instead. The result is a neat, attractive layout. The tube is a 27 running at 5 W with 250 V on the plate, so Al plays it safe when operating this rig.

The clock is ticking! You have less than 10 months to work the 100 DXCC entities necessary to qualify for the beautiful DXCC 2000 Millennium Award. The award period ends at 2359 UTC on December 31, 2000. Application forms are available for a self-addressed, stamped envelope to: DXCC 2000 Millennium Applications, ARRL, 225 Main St, Newington, CT 06111, or you can download an application on the Web at: **http://www.arrl.org/awards/dxcc**. You'll find more information on page 47 of your December 1999 *QST*.

Thurman, N6QX, visited ARRL Headquarters last October and showed us his homebrew HF mobile antenna. When he arrived back home, he sent us this photo. The mast that supports Thurman's unique "handlebar" antenna can be raised and lowered merely by pressing a switch inside his motorhome.

Technical Excellence in San Diego. ARRL Southwestern Division director Fried Heyn, WA6WZO (left), presented the 1998 Doug DeMaw, W1FB, Technical Excellence Award to Doug Smith, KF6DX (right), at the 1999 Southwestern Division Convention. Doug won the award for his series of digital signal processing tutorials. Soon after the series was published in *QEX* (*QST's* sister publication for experimenters), Doug became the *QEX* editor!

Who says that young amateurs don't homebrew? Reed, KF4ZWJ, a high school senior, checks out a Norcal 20 QRP transceiver. Perched atop the rig is a Morse code decoder Reed designed for his senior research project. It uses a Basic Stamp2 microcontroller running software that Reed wrote himself.

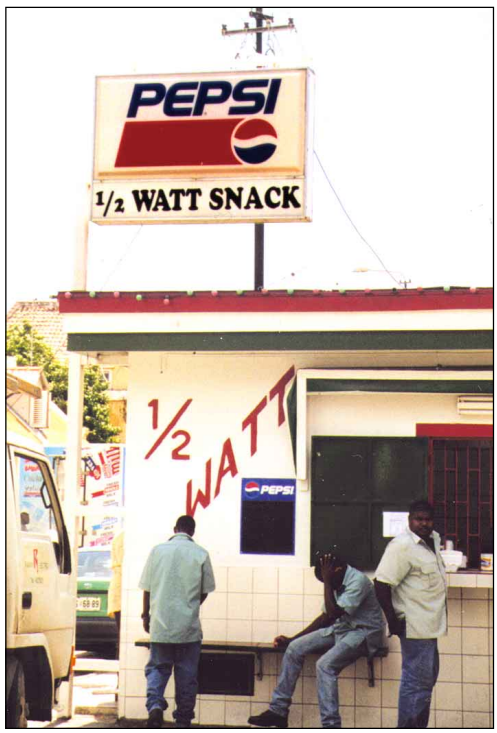


Moonbounce—Italian style! Alessandro, IK5WJD (left) and Pietro, I5PPE (right) built this 10-GHz moonbounce station using a 3-meter surplus dish. Installed at the focal point is a 10-GHz/2-meter transverter, a 10-GHz receive preamplifier and a Siemens traveling wave tube amplifier that generates an impressive 20 W output. Their aiming system is purely visual, with help from a video camera mounted on the edge of the dish.

Yes, that is a potato chip can on his antenna. Tom, N1XWA (left), takes the concept of center-loaded mobile whips to a new extreme. Bruce, N1LN (center) and Tom, WA1RHP (right) seem bemused at the sight of Tom's contraption.

SET is for everyone. Laura Thompson, KC8GRS (age 15), operated a packet station during last October's Simulated Emergency Test in Mansfield, Ohio as Pat, N8JOZ, observed in the background.

This tower is nothing to "grouse" about! Paul, KQ9KX, spotted this ruffled grouse taking a brief siesta in the base of his tower. In addition to being a ham, Paul is an avid hunter. Fortunately for the grouse, he decided to "shoot" it with his camera.



Only ½ watt? It must be the new low-carb diet. While in Curacao N6HR found this local eatery. He assumes that it must be a hangout for QRP enthusiasts who visit the island!

Curiosity and the cat. In this case it is a precocious kitten named Sharon who was caught in the act of exploring the station of Dick, KB7BAD. After sniffing around the Yaesu FT-890 transceiver, Sharon decided that she needed a closer look at the clock—no doubt checking to make sure that she doesn't miss her 20-meter sked.

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.)

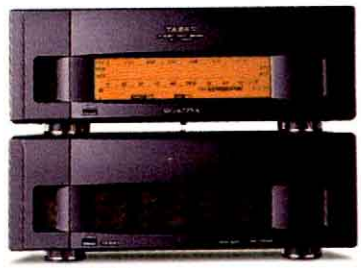
FT-920
The FT-920 HF/6M Transceiver is designed for today's active Ham. It features high-speed DSP in all modes, 127 memory channels, AFSK or FSK Digital operation, new-technology MOSFET PA finals, high-speed Automatic Antenna Tuner, and high-resolution LCD display.

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.**

FT-8100R
The versatile FT-8100R Dual Band Mobile offers rugged RF design, 50 Watt (VHF)/35 Watt (UHF) power output, 310 memory channels, Dual Receive (VV/UU/VU), Enhanced Smart Search,™ CTCSS Encode, and a TX Time-Out Timer. (ADMS-2E programming software available.)

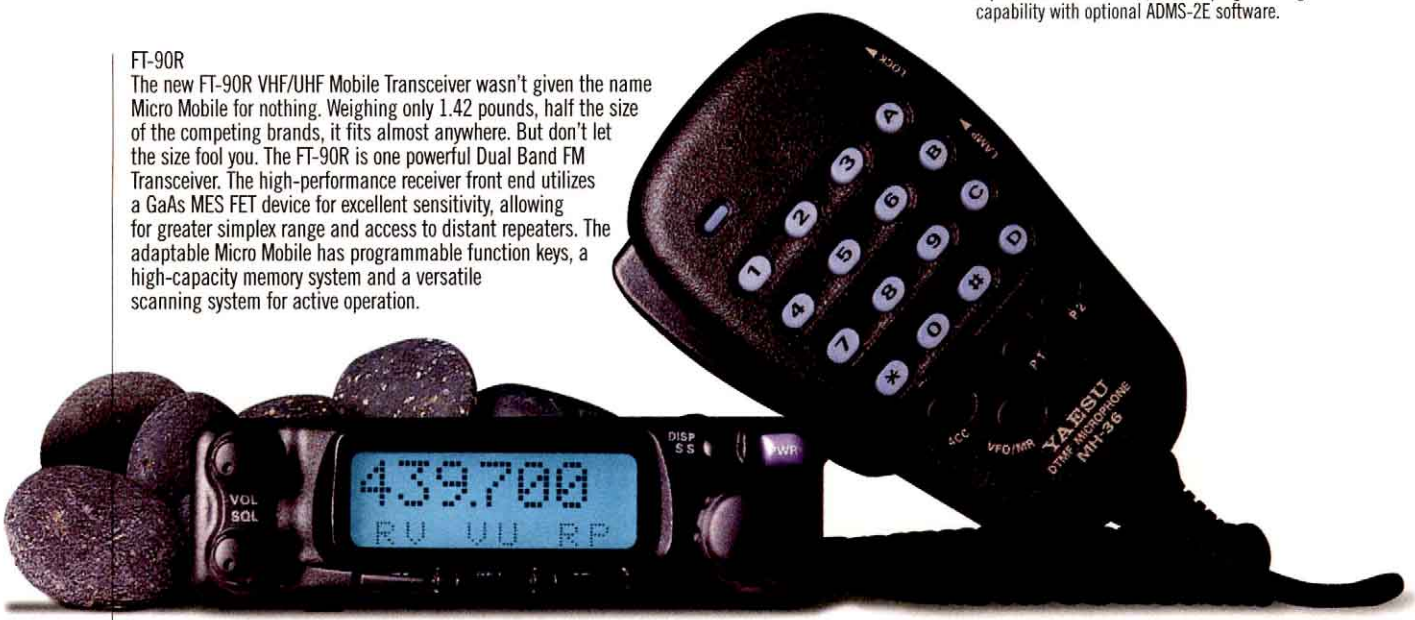
FT-100
This ultra-compact HF/VHF/UHF 100W Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.

FT-3000M
This 70W high-powered 2M FM Mobile provides extended UHF receiver coverage, AM Aircraft RX, and is MIL-STD approved. The FT-3000M features 81 memory channels, Smart Search,™ CTCSS/DCS, optional ADMS-2E programming software, and is 1200/9600 Baud Packet compatible.

FT-290RII
Ideal for base, vacation, or expedition use, this 25 Watt 144 MHz Multimode Transceiver is outstanding for emergency, travel, or weak-signal DX work. Optional battery pack allows over-the-shoulder portable use for search-and-rescue operation.

FT-2600M
This heavy-duty VHF FM Mobile is encased in a durable aluminum die-cast chassis/heatsink assembly, and manufactured to MIL-STD 810 requirements. Features include 60 Watt power output, 179 memory channels, direct keypad frequency entry from microphone, Alphanumeric memories, and PC programming capability with optional ADMS-2E software.

FT-90R
The new FT-90R VHF/UHF Mobile Transceiver wasn't given the name Micro Mobile for nothing. Weighing only 1.42 pounds, half the size of the competing brands, it fits almost anywhere. But don't let the size fool you. The FT-90R is one powerful Dual Band FM Transceiver. The high-performance receiver front end utilizes a GaAs MES FET device for excellent sensitivity, allowing for greater simplex range and access to distant repeaters. The adaptable Micro Mobile has programmable function keys, a high-capacity memory system and a versatile scanning system for active operation.



LITTLE BIG MOUTH.

Life is an adventure. So whether you're on expedition or vacation, you will probably encounter some rough going along the way. And when you do, you'll be glad that your mobile transceiver is a Yaesu. With units small enough to install almost anywhere and rugged enough to achieve military approval for shock and vibration, Yaesu is the obvious choice for dependability. Its exceptionally clear signal and wide dynamic range tame even the most crowded bands, and provide outstanding protection from intermodulation in urban areas. Learn more about Yaesu products on the web at www.yaesu.com

YAESU ...leading the way.

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.

RESTRUCTURING

♦ After hearing about the restructuring of the Amateur Radio Service, I was a little taken aback at the drastic changes that would be going into effect in April 2000. But now that I have been able to think about it a little longer, I have come to a decision and I would like to share it with others in the ham community.

The real concern about the continuation of our complex hobby should not be about whether a single operating mode is one of the elements we consider in testing prospective new licensees. Instead, we should be worrying about the lack of mentoring for new hams (many know this better as "Elmering"). If the goal is to bring new amateurs and upgrades into the traditional mainstream, good mentors will be critical.

Newcomers will need our guidance. We can show them, by our best examples, if nothing else, how to properly operate HF voice, CW, PSK31 and all the other modes. The same will be true for VHF. The idea is to showcase the richness of Amateur Radio. We can also introduce them to the art of kit building, show them how to use an oscilloscope, how to use an antenna analyzer or even how to solder (an art unto itself, when done properly!).

Code is not the all and everything some of us would like to believe, and reducing the testing speed will not cause the death of anything. Code was the beginning of ham radio and should be revered for that, but not idolized. I will continue to use it almost exclusively because I gravitated to it naturally, not because I had to learn it to get a license.

The long-term impact of restructuring is ultimately up to us. Changes in license examinations won't kill CW, ham radio or anything else, but an embittered, unfriendly attitude toward newcomers surely will.—*Patrick Wilson, K4OW, Quinton, Virginia*

♦ Of all my years in Amateur Radio, I have never witnessed such a pathetic degradation of what used to be a wonderful hobby; a hobby of which I used to be proud. Restructuring has dealt the final blow, destroying everything that was good about Amateur Radio. The first major blow was struck when the "Incentive Licensing" program was implemented in the late '60s. That was pathetic enough.

I used to feel good about welcoming new hams into the hobby. The reason I felt good was because I could relate to their pride of accomplishment. I knew that those new hams went through the same process I did; met the same requirements I did.

Well, I'm not going to welcome new hams who've obtained their Amateur Extras after 5-WPM CW exams when I had to demonstrate a 20-WPM skill level. How will these people feel when they find themselves among those of use who *earned* our Extra tickets?

I promise to come down hard on anyone holding a "5 WPM Extra." If I encounter any of these people in the Extra portions of the CW bands, I will tell them that if they can't keep up with me at 20 WPM, their Amateur Extra licenses are trash.—*Doug Loucks, W7YV, Eastlake, Colorado*

♦ When I first became involved in electronics, slide rules were the one absolutely necessary calculation tool owned by every engineer and technician. They were simple, uncomplicated, easy to use (after some period of rather tedious practice), and delightfully low tech. They were the calculation tool-of-choice for over three centuries.

Then, as the giant asteroid was to dinosaurs, overnight the $9.95 pocket calculator killed the slide rule. Despite its ubiquity and utter simplicity the mighty slide rule went essentially extinct in less than a decade!

Perhaps somewhere, in a backward company in a backward country without sand from which to make silicon chips, a group of stalwart engineers still treasure their Pickett or K+E slipsticks, and still require a practical examination, down to the third significant digit, of an engineer's proficiency, and whether they actually could explain the difference between the CIF and DIF scales.

Perhaps some amateur mathematicians still are proficient on slide rules (after all, they haven't been outlawed!). I bet they even hold speed and accuracy contests at a nostalgic "Slippers" convention each spring in Akron, Ohio. Led by the scratchy but firm voices of their oldest club members, Vince Bentupcursor and Larry Elscale, they close each convention by quoting the 1940s fight song of that bastion of wood-assisted math, Cal Tech:

"E-to-the-x du dx, E-to-the-x dx,
Cotan secant tangent sine,
three point one four one five nine.
Square root, cube root, QED
Slipstick, slide rule, Hooray! CT!"

The next *SLIPS* newsletter duly reports the resolution of the IEEE BoD to gain legislation to include slide-rule competency testing as a requisite to all engineering degrees, except those seeking 2-year Stickless Technician degrees.

Regular Technicians will require 5 CPM (Calculation Per Minute) exams, BSEE will require 13 CPM, and MSEE will require a 20 CPM exam.

On another front, when I first became involved in Amateur Radio, Morse code was the one absolutely necessary communications mode used by every ham. It was simple, uncomplicated, easy to use (after some period of rather tedious practice) and delightfully low tech. It was the amateur communications mode-of-choice for over three generations.

Then, as the giant asteroid was to dinosaurs, overnight…—*Hans Brakob, K0HB, Plymouth, Minnesota*

♦ Dissenting voices bemoan restructuring because making the requirements easier somehow diminishes their own accomplishments. It will also, they contend, open the floodgates to an invasion of riffraff.

I respect their opinions, but their assumptions are ill informed. I wonder how many have considered the fact that the new written tests might be considerably more difficult? Even though we had to pass a Morse code exam, our written tests were relatively easy. This may no longer be the case. The struggle and achievement will still be there.

We can choose to think big or small about the FCC's new restructuring order. We can grumble about the loss of a supposed Golden Age. We can wring our hands about the barbarians at the gates. We can even threaten to turn in our VE badges. That's the way to think small.

On the other hand we can think big. We can be glad that ham radio won't die when we go to the grave because restructuring will help encourage others to replenish our ranks. We can, in fact, be *optimistic* about our future and act accordingly!

I feel good about ham radio again. (And I still feel good that I had to work hard to get my Extra. I'll always have that sense of achievement.) The future is bright if only we can stop thinking small. We've needed a change for a long time. Incentive licensing wasn't working. It was choking ham radio. Think big and get over it! Enjoy the changes that are coming.—*Mark Edwards, W0QL, Foxfield, Colorado*

♦ After reading the Commission's *Report and Order*, I was disappointed to find that the requirements for the General and Ama-

teur Extra were reduced for no apparent reason. Those of us who studied hard to earn these licenses feel that this as a slap in the face.

The CW test really wasn't all that difficult, but it was a good yardstick of *motivation*. In fact, it was the only real test of motivation since the written exam could be mastered by anyone with a decent memory and/or a bit of tutoring. Now how will we test for motivation and discipline? With a mere 5 WPM exam?

I don't want HF to turn into 2 meters. I also don't want 2 meters to turn into CB. In the entire Report and Order I could find no valid reason why Amateur Radio licensing needed to be "dumbed down." I am afraid that the commission listened to those who would profit financially from the move—equipment manufacturers, radio schools, study material publishers, etc. A decade ago the "no-code" license was invented and the manufacturers did a booming business in VHF equipment. Although HF tickets have always been there for the earning, maybe the manufacturers felt that hams needed an easier, faster path to major HF purchases.—*Roy Davidson WP2F, Hemet, California*

REVIVING THE "SLASH" ZERO (0)

♦ Having been a resident of the tenth call district (0) for my entire 37 years as a licensed amateur radio operator, I am certain that I have been asked at least a gazillion times about the "goofy looking character" in my amateur call sign. With the inrush of computer interest in recent decades, more and more *non-hams* came to recognize the military or "slash" zero (0) as a way to distinguish the number "zero" from the letter "O". Early DOS computer screens and dot matrix printers helped make this zero distinction common knowledge in most every household and business. I no longer had to explain that my call sign was W "Zero" FM, not W "Oh" FM. It was nice to finally live in a call sign district designated by a universally recognizable *number*, not some strange character that required constant explaining. Then it all changed!

As computers advanced to include sophisticated word processors with dozens of fancy fonts, the military or "slash" zero suddenly began to vanish. The zeros became basically tall and skinny and the letter "O" was generally more rotund. Mail began to arrive on which my call sign appeared to contain the letter "O" rather than the number zero. I instantly thought about those who held calls like WO0O, or KO0O or N0OOO. How confusing! And what about those poor souls whose call signs actually *spell words* (and sometimes not very *nice* words) when the "slash" zero was replaced with the letter "O". You've seen them.

Some font styles depict very little difference between the letter "O" and number "zero". I receive QSL cards with QSO labels where I cannot make the distinction. Even some amateur radio publications (thankfully, *not QST*) no longer use the military zero when printing amateur's call signs in their own articles. That's almost *sacrilegious!* Was that article referring to K "Oh" zero E, or was it about K zero "Oh" E? Were some just too lazy to choose a font with the "slash" zero for amateur radio applications or did none exist?

I began to search for fonts that could provide military zeros. In response to my plea on a bulletin board, a nice guy sent me an email and attached a font file called "VAG Round" that featured the military zero. I was very grateful, but…*one lousy font?* That was it.

Then recently, Mark Buckner, a friend of mine who is the photographer for the St. Louis Blues hockey team, was kind enough to take some photos of my ham station for my new QSL cards. Mark's a true pro and works quite proficiently with digital imaging and desktop publishing. When the digitized proofs arrived for my new QSLs, Mark had already inserted my call sign *with the military "slash" zero* into the photo. Was I surprised! How did he do that? He's not a printer of QSL cards. And, how did he know? Mark explained that he had once held a ham license when he was younger, before f-stops proved more interesting to him than Morse code.

I was amazed at just how many font options Mark provided for my QSL card design. He said that I could have almost *any* font that I liked with a "slash" zero properly configured. Then Mark revealed his trick.

Using a shortcut in virtually any word processor or graphics package, you can "force" an authentic looking tenth call district zero (like this: 0) into almost any font by holding down the ALT key while typing 0216 on the *calculator-configured numeric keys* on the computer keyboard. The "NUMBER LOCK" feature must be ON. When you release the ALT key, a perfect 0 will appear. *(Note: This will not work with the number keys appearing across the top of the alpha characters. I also found that email would not recognize this "0" character in an address.)* This and other shortcuts are documented in the "special character" section of the Microsoft Word manual. Another approach is to click on SYMBOL under the INSERT menu in *Word*, but I find "ALT+0216" easiest for me. (Macs may have different commands for this.)

I immediately began adding "slash" zeros to all my amateur related documents and correspondences, including QSL and address labels, using this simple "ALT+0216" shortcut and they look great. It's right there. Try it! You'll make every ham in the tenth call district a very happy hammer!—*Terry Schieler, W0FM, St. Louis, Missouri*

hy-gain®

Eight band AV-640 vertical antenna covers 40, 30, 20, 17, 15, 12, 10 and 6 Meters

- **No radials**
- **No traps**
- **No ground**
- **No tuning**
- **Handles 1500 Watts**

hy-gain's new *PATRIOT* HF verticals are the best built, best performing and best priced multiband verticals available today. Make full use of your sunspot cycle with the *PATRIOT's low angle* signal.

The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters. Instead of typical lossy can traps, the AV-640 resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

No ground or radials needed

- Effective counterpoise replaces radials
- End fed with broadband matching unit

Automatic bandswitching

- Single coax cable feed
- Each band is individually tunable
- Wide VSWR bandwidth

Sleek and low-profile

- Low wind surface area
- Small area required for mounting
- Mounts easily on decks, roofs and patios

Built-to-last

- High wind survival
- Matching unit made from all *Teflon*® insulated wire

hy-gain® warranty

- One year limited warranty
- All replacement parts in stock

Contact us today!

No other amateur radio company provides the full service customer support that we do every day. Please contact us for more information on *hy-gain*® Patriot antennas. Not only do we manufacture the best designed and constructed antennas, *we also manufacture satisfied customers*.

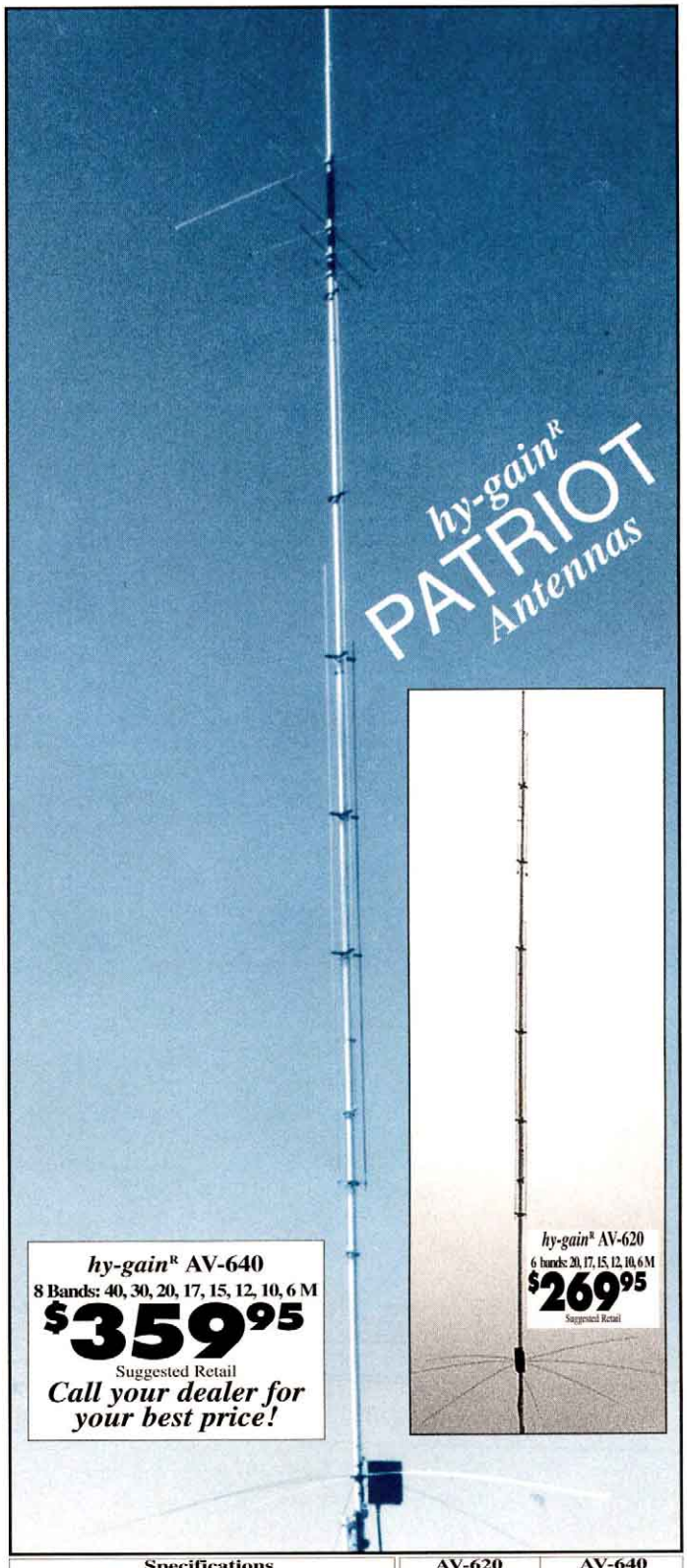
hy-gain

. . . the tradition continues

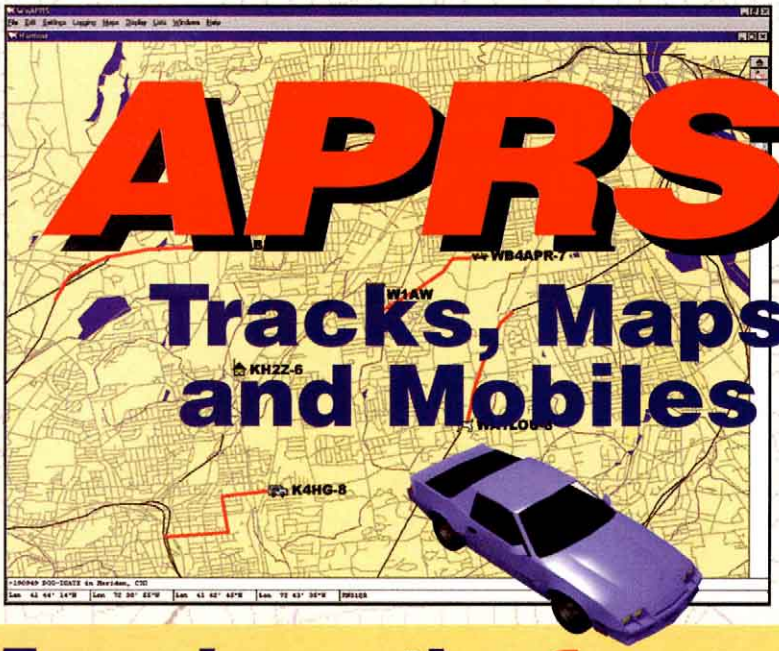
300 Industrial Park Road, Starkville, MS 39759

• *Free Catalog/Nearest Dealer:* 800-647-1800

• FAX: (601) 323-6551 • 8 a.m. - 4:30 p.m. CST, Mon - Fri



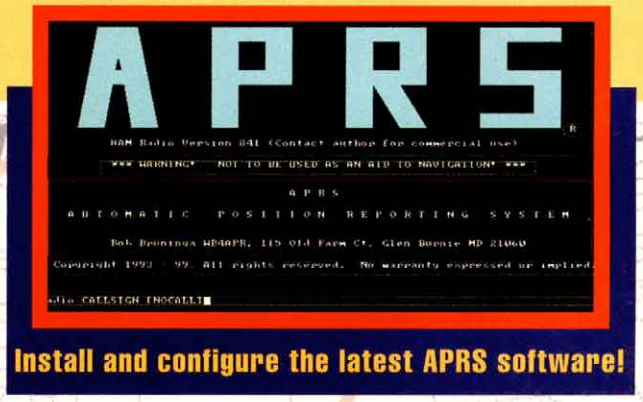
Specifications	AV-620	AV-640
Bands covered (meters)	6,10,12, 15,17,20	6,10,12,15, 17,20,30,40
2:1 VSWR Bandwidth (KHz)		
40M	N/A	150
30M	N/A	175
20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
Horizontal radiation angle (degrees)	360	360
Height (feet)	22.5	25.5
Weight (pounds)	10.5	17.5
Wind surface area (square feet)	2.4	2.5
Wind survival (mph)	80	80



A Guide to the Automatic Position Reporting System

By Stan Horzepa, WA1LOU
— author of the original *Getting on Track with APRS*

Experience the *fastest growing* Amateur Radio mode!



Install and configure the latest APRS software!

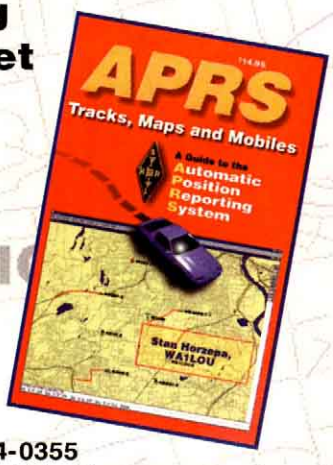
With the help of this hands-on guide, **you will learn how to use APRS to track anything that moves, including marathon runners, emergency vehicles and weather systems.**

Learn how to add objects to maps, such as hurricanes and emergency response vehicles.

This book also covers:

- **Hardware Installation**
- **Navigating Maps**
- **Tracking**
- **Sending and Receiving Messages and Bulletins**
- **Direction Finding**
- **Using the Internet for APRS**

and more!



Includes the most complete summary of commands for all APRS versions!

APRS SOFTWARE NOT INCLUDED

APRS Tracks, Maps and Mobiles
ARRL Order No. 7741 **Only $14.95***
*plus shipping $4 US (UPS)/$5.50 International (surface)

ARRL
225 Main St., Newington, CT 06111-1494 tel: 860-594-0355
fax: 860-594-0303 e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/

QT3/2000

By George Pataki, WB2AQC

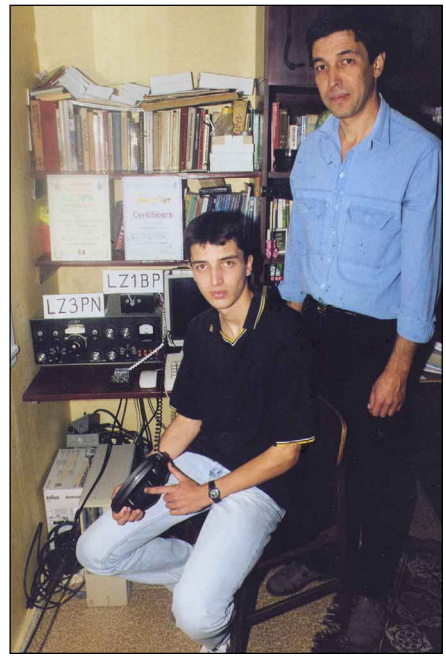
Bulgaria: Amateur Radio Friends and Fun

LZ hams abound in contests and on the air—but when it comes to really learning about hams from afar, there's no substitute for a face-to-face QSO. With that in mind, America's unofficial "Balkan Ambassador" visited hams and friends in Bulgaria for the first time in many years.

The idea of visiting Bulgarian hams dawned in the spring of 1999, when I was in Spain. I was sitting with some local hams at an outdoor restaurant in Valencia one evening when one of them asked me where I'd go next. I was tired and sleepy and, without too much thought, I said, "Bulgaria." All four EA5 hams jumped up and in a choir yelled, "Why Bulgaria?" That woke me up. I had to come up with a suitable answer.

"When I was there a long time ago I met some very nice amateurs. Not many people visit Bulgaria these days and it would be an interesting trip," I stalled.

Besides, I had a hidden agenda. Many years ago, while visiting Bulgaria for the first time, I met a young and pretty female ham who accompanied me to the beach. I liked her, but I was very shy. Finally, we left the beach because and I had to go to my hotel to change clothes for an evening event at a restaurant with local hams. When we got to the hotel I gathered all the courage I could muster and I asked her if she would go dancing with me later that evening. Without saying a word she moved her head slowly from left to right, back and forth, a couple of times. I took that as a "no." I found out later that the Bulgarians—probably the only people in the world—nod their heads up and down for "no" and left to right, back and forth, to say "yes." It was too late for me!



Peter, LZ3PN, and his father Todor, LZ1BP.

While preparing the trip, a friend advised me to contact Nick, LZ1JY, who knows everybody and is a good organizer. I sent him e-mail. He was very helpful in setting up meetings with local hams and groups in various cities. Nick also put me in touch with Yanko, LZ1BMV, from the LZ1KDP radio club.

Sofia

Nick, LZ1JY, was waiting for me at the Sofia airport. He's the manager of the electronics division of Samsung Corporation. He's also known at the airport, so he pushed my luggage cart through customs without any interference.

A relaxed Svetlin, LZ1SJ.

The mostly homebrewed station of Dimo, LZ1ON.

I took a room in a little hotel near the Technical University campus where I paid $20 per night. The hotel was really more of a student dormitory than a hotel. There was no radio, no TV and no air conditioning, and the telephone was "temporarily" out of order (as were most of the phones in the city).

My first visit was at LZ1KDP, the radio club of the Technical University of Sofia, located about five minutes from my hotel. The club is on the sixth floor, but it also has some rooms on the top (seventh) floor.

The chief of the club is Anna, LZ3GU, but she was out sick, so I met a very active and enthusiastic gang that included Yanko, LZ1BMV; Ventsi, LZ1HST; Ivan, LZ1PJ; Mila, LZ1ABB; and a few licensed operators without personal call signs. The club boasts 145 members comprising students and former students of the university.

One evening I met Jordan, LZ1UU, who spends the winter months working as a communications officer with the Bulgarian scientific expedition on Livingston Island in the South Shetland group. He has been there four times, operating as LZ0A. His LZ0A QSL card shows two penguins.

Nick, LZ1JY, took me to the Federation of Bulgarian Radio Amateurs, which is in the Postal Administration Building. There I met Federation Secretary Zdravka, LZ1ZQ; Kosta, LZ1FN, a telegraphy instructor; and Maria, who is in charge with the Bulgarian QSL bureau. Zdravka's son is George, LZ3GC.

The LZ QSL bureau works well despite financial difficulties, and the Federation has a well-equipped club station (LZ1BFR). You can send e-mail via **lz1ms@qsl.net**.

The last call sign directory published by the Federation was in 1997. The 1995 edition has an interesting list of well-known radio amateurs around the world, including kings, astronauts, scientists, movie stars, and more.

In 1998 the Federation published an interesting book about the history of Amateur Radio in Bulgaria, and in 1992-1993 it published a 50-page magazine titled *LZ 73*, which was eventually discontinued because of ailing finances.

At the Federation I met Dimiter, LZ1AF, who brought along a couple of pounds of his QSL cards to be sent through the bureau. Dimiter is the graphic designer who created the new look of ACOM 2000A automatic HF linear amplifier, made by the people who used to build the Alpha 91β. Dimiter's new QSL cards feature the amplifier prominently.

I visited Dimiter's station, which is equipped with industrial and homemade gear, including an IC-751A and a beta ETO 91 amplifier that's easily capable of running the legal power limit. He is very active and has worked 325 DXCC entities, all on CW. He has a 6-element log-periodic for 10 through 20 meters, an 8-band vertical for 10 to 80 meters and a sloper for 160 meters. Dimiter was first licensed in 1956. He is the DX editor of the English section of Radio Bulgaria and his programs are aired several times a week.

Every Thursday evening about 6 PM, many Sofia hams meet at a local restaurant to eat, drink and talk about everything—sometimes even Amateur Radio! I joined in to meet about 20 hams.

I visited Todor, LZ1WE, a radio engineer licensed in 1970 and an active operator with more than 300 DXCC entities worked. His wife Dani, LZ3EW, is a chemist. She works on 2-meter FM making mostly local contacts. The two use mostly homemade equipment and can run up to 350 W. Their 3-element Yagi for 10 through 20 meters is also homemade and installed on the top of their very tall building. Todor uses computer logging and both have QSL cards.

I also visited Sergei, LZ1SE, a bedridden ham who suffered a spinal injury in 1973. A college student at the time, he graduated as a radio communications engineer and is now is a computer programmer. Sergei has a Yaesu FT-757 and is running 100 W to a delta loop. He operates mostly SSB on 10 to 80 meters and has worked more than 200 DXCC entities.

With Ventsi, LZ1HST, I visited Yuri Tzenkov, who publishes with his brother Viktor, LZ3NN, a magazine devoted to radio electronics named *Elektron*. They also have a couple of stores that sell radio and electronic parts. Their e-mail address is **electron@bulnet.bg**.

Considering that Sofia is the capital and the country's biggest city, I met very few amateurs, partially because the telephone system was so sporadic.

As I do on every trip, I sent a quick e-mail to my loving wife Eva, WA2BAV. From Sofia the message was:

"I don't think I'll ever come back. I'm having a wonderful time with Sofia—and I don't mean the city."

Her answer was short and sweet:

"When you run out of money you'll be left only with Sofia—and I mean the city. Anyway, I moved your junk into the garage and rented your room. Have a wonderful time!"

Plovdiv

After two and half days in Sofia it was time to leave for Plovdiv. Nick, LZ1JY, said I should go by bus, but then he changed his mind, advising me to go by train because it would be safer and the train couldn't break down somewhere along the way. He drove me to the railway station. The ticket to Plovdid was 3.50 levas, about $2

When I got on the train I noticed a big puddle of water coming from the toilet. I crossed the puddle on the way to my

Ivan, LZ3BF, is active on both HF and VHF. Notice the computer monitor. PCs are as popular in Bulgarian ham shacks as they are in the States.

Nick, LZ1OE, has an impressive array of gear.

The always smiling Ivan, LZ3GM, at the LZ1KRB club station.

A well-known voice on the airwaves—Hristo, LZ1HM.

compartment. I idly thought that with all this water, at least we wouldn't have a fire. How wrong I was! Somewhere between Sofia and Plovdiv my train car caught fire at *both* ends. The train stopped in a small town. We all got off to look at the fire, but I saw only smoke and steam.

During the crisis the railway workers seemed to shout contradictory instructions. "Get off the train, " one said, while another yelled, "Get on the train." While half of the passengers were getting off, the other half were getting on, so the number of people in both locations stayed about the same.

I saw a passenger unselfishly sacrificing his bottle of mineral water trying to extinguish the fire. Finally a fire truck came by and sprayed some water on the undercarriage at both ends of the car, which seemed to take care of whatever mystery had caused the fires. We continued our journey wet, smoked and smiling from ear to ear.

I arrived to Plovdiv an hour late, but Yoan, LZ1YW, was waiting and recognized me because I was wearing a cap that displayed my name and call sign. Yoan is a retired electronics technician who was first licensed in 1965. He is a home-brewer and operates only on CW using an old Bulgarian military transmitter and receiver and lots of home-brew equipment for HF and VHF. His desk is always full of tools, parts, test instruments and equipment under construction. Using a 9-band Windom-type wire antenna, Yoan has worked more than 200 DXCC entities.

Next to see was Nick, LZ1NG, an electronics technician licensed in 1975; his wife Bistra, LZ1BV, an electrical worker licensed in 1980; his son Angel, LZ3AX, a 20-year-old computer school graduate; and son Stefan, LZ1EEE, a 15-year-old high school student who is studying computers. A real ham family, Bistra's father Stefan is LZ5GV, and her mother Maria is LZ1MID. Stefan and Maria met at the LZ1KSP radio club in 1950 and got married in 1959.

Nick is a "big gun" and an A1 operator with 326 DXCC entities worked and many prestigious awards. Bistra, with five fewer years on the air, has worked 260 DXCC entities. You can contact them at **lz1ng@plov.omega.bg**. I slept very comfortably at Nick's place.

Georgi, LZ1CW, a retired electrical technician licensed in 1950, met his wife Vera at the local radio club in 1953 and married her in 1955. It seems that in Bulgaria, radio clubs are more than places where enthusiasts can learn Morse code and operate a station! Georgi has a Kenwood TS-120S and a 2-element quad for 10 through 20 meters, a 2-element wire Yagi for 40 meters and an end-fed wire for 80 meters. Georgi has QSL cards and despite the fact he has a computer, keeps his log on paper. His e-mail address is **lz1cw@plov.omega.bg**.

The last ham I visited in Plovdiv was Rumen, LZ5OL, a photographer; his wife Tony, LZ1BOL, a museum curator; and her 22-year-old son Rosen, LZ1RAZ. They operate only VHF, talking mostly with local friends.

Stara Zagora

The next day I left Plovdiv for Stara Zagora. The two-hour train ride costs 2.70 levas, about $1.50. In Stara Zagora, Del, LZ1DEC; Ivo, LZ3RN; and Kosta, LZ1DJ, were waiting for me.

Kosta, LZ1DJ, a radio technician at a broadcast station, licensed in 1971, proudly displays his call sign on the back window of his car. Using 100 W from an IC-706 transceiver and a wire dipole for 10 through 40 meters, he has worked more than 200 DXCC entities, mostly on CW.

Ivo, LZ1RN, a teacher of Bulgarian literature first licensed in 1992, runs 100 W from an IC-728 to a dipole for 10, 15 and 40 meters. He operates CW, RTTY and SSB, and has worked more than 250 DXCC entities.

Gandy, LZ1GST, a mechanical engineer licensed in 1996, uses a small IC-706 transceiver, a homemade power supply and a multiband wire dipole for 10 through 40 meters. Gandy is a DXer, works on CW and SSB, and is a good QSLer.

Dimo, LZ1ON, a Lt. Colonel in the Bulgarian Army, licensed in 1996, is one of the hams I met while visiting Subby, LZ5SS. Dimo has a homemade 40-W transceiver, a computer, a delta loop antenna for 40 and 80 meters and a dipole for 15 and 20 meters. Dimo is a DXer and works CW and SSB. Dimo's wife Svetla, LZ1TB, is an elementary school teacher. His 20-year-old-son Daniel, LZ5OE, is in college studying economics. And his 14-year-old son Galian, LZ1GON, is in high school. Dimo's hospitality went beyond the fraternity of ham radio and reflects clearly on the changing times. In years past, an army officer could not have received a visiting American.

I also had an opportunity to drop in on Subby, LZ5SS, and Roussko, LZ1RT, two well-known hams in the community.

My last visit in Stara Zagora was with a father-and-son team: Zhivko, LZ1GDR, a civil engineer working for the army and his son Del, LZ1DEC, a high school student. Both received their Class C (VHF) licenses in 1997. They have a small 2-meter rig with a 4-element quad antenna. Both are computer literate and Del's English is very good. I slept at their house. The next morning, Roussko drove me to Kazanlak.

Kazanlak

In Kazanlak I met Nasko, LZ1YE, and his large radio amateur family. Nasko is an electronics technician who now owns a printing plant where he and his crew make flyers, brochures and many of the beautiful

photo QSL cards used by LZ hams. Nasko was licensed in 1971 and has a Class A license. He was very active, has many awards (including 5BDXCC and US Counties), is on the Honor Roll for Mixed and SSB, among other things. His wife Nassy, LZ3FF, licensed in 1990, teaches Bulgarian. Nasko's father Peter, LZ3YE, licensed in 1993, is a cabinetmaker and electrician. Nasko's daughter Petya, LZ3YW, licensed in 1990, graduated from a radio communications high school. Nasko's other daughter Anny, LZ3YP, lives and works in France. Both daughters were national champions in high-speed telegraphy. Nasko's brother Koly, LZ1DB, an electronics technician, owns a ham radio store. Six members of a family—all hams! Their station is squeezed into a small storage space near the kitchen. They have several antennas, the most impressive of which is a quad installed high on the roof of the building. Nasko has a beautiful QSL card printed by his own company (Tempo). His e-mail address is **tempoqsl@sz.inetg.bg**.

Next to visit was Don, LZ1OJ, a mechanic first licensed in 1989. Don uses a transceiver; a 250-W power amplifier and a power supply—all homemade. He works mostly CW, has worked more than 265 DXCC entities and uses a very nice photo QSL card printed by his friend Nasko, LZ1YE.

With Nasko, LZ1YE; Don, LZ1OJ; Milen, LZ5DB; and Aleko, LZ3ZZ; I went to the LZ1KOZ club station near Lake Koprinka, about five miles from Kazanlak. During contests this station signs LZ5W. I operated for a while on 40-meter SSB, making about a dozen QSOs with Hungarian and Romanian hams, some of whom I knew from previous visits. The station has a Yaesu FT-890 and a huge homemade power amplifier. The ops said it puts out 1 kW, but I believe they were being modest.

This station also sports four 80-foot towers. One has a 4-element Yagi for 40 meters on a 64-foot boom. One supports a 6-element Yagi for 20 meters on a 73-foot boom. One twirls a 6-element Yagi for 15 meters on a 48-foot boom. And the last tower lofts a 6-element Yagi for 10 meters on a 38-foot boom.

No wonder the LZ1KOZ club station has won so many national and international contests! The ops have a large number of awards to prove it.

We had lunch in a nearby restaurant where Aleko, LZ3ZZ, works as a waiter. Then we went to see Todor, LZ1BP, and his son Peter, LZ3PN, both national champions in high-speed telegraphy. Todor, a metallurgical engineer licensed in 1993, has a Class B license. Peter, a student at the Technical University of Sofia, licensed in 1996, has a Class C license. Both work only CW using a homemade 100-W transceiver, a Windom antenna for 40 meters and a ground-plane for 15 meters.

Stoian, LZ3QX (standing) along with Stefan, LZ3OE (left) and Todor, LZ5QZ (right) at the LZ1KSN club station.

The last person I visited in Kazanlak was Marin, LZ1RW, a mechanical engineer who works in power plant automation and runs a print shop with Liubomir, LZ2EV, where they make beautiful QSL cards for Bulgarian and foreign hams. Ironically, his cards are quite simple. His quad has also gone with the wind—a fate experienced by most quads sooner or later. Marin works CW and SSB. His e-mail address is **lz1rw@kz.orbitel.bg**.

Milen, LZ5DB, hosted me for the night. Early the next morning I took a train to Sliven.

Sliven

I left Kazanlak for Sliven by train early in the morning. I was so tired from the previous day that I confused my toothpaste with my shaving cream. They look so much alike! Let me tell you, you *can* shave with toothpaste, but brushing your teeth with shaving cream will wake you in a *hurry*.

The two-hour train ride cost only 2.10 levas—less than a subway ticket in New York City. The train was running like an old jogger. It ran for a while, than it slowed and rested. It stopped, often waiting for other trains traveling on the same tracks from the opposite direction. I'm glad that it did!

At the Sliven railway station, four hams were waiting for me: George, LZ1WM; Stoian, LZ1VN; Ivan, LZ1GWM; and Dimiter, who gave his call sign as LZ1KDZ (a club call). Ivan, LZ1GWM, said he'd come along as a translator. The hams discussed among themselves about where to go and what to do. When it was official, Ivan said we were on our way to see George's station.

George, LZ1WM, a retired electronics technician licensed in 1956, shares a nice station with his wife Vesa, LZ1SG, a retired insurance clerk licensed in 1964. The two use a tablefull of homemade equipment and some older manufactured gear. George was an active DXer and contester and has a wall full of awards, pendants and medals to show for it. He's worked more than 300 DXCC entities.

Hristo, LZ1HM, a mechanic who retired from a textile factory has a very nice station and lots of equipment—all homemade. His antenna is a W3DZZ for 10 through 80 meters. He operates CW, RTTY, SSB and 2-meter FM. His 22-year-old granddaughter Magdalena, LZ1MHM, licensed in 1998, has a Class C ticket.

Ivan, LZ1GM, has a small station in a living room corner. Licensed in 1967, he is test instrument specialist who uses a homemade 50-W transceiver and a 300-W linear amplifier. His 4-element Yagi for 10, 15 and 20 meters is fixed on Germany because he talks mostly with a friend living there.

Another Ivan I ran into in Sliven was LZ3BF. What a remarkably generous and hospitable fellow!

My last ham friend in Sliven was Svetlin, LZ1SJ. He also has a nice "all homemade" station—transceiver, linear amplifier, electronic keyer, power supply and voltage regulator. Svetlin works CW, SSB and keyboard CW. He is a DXer with 215 DXCC entities. On 6 meters he has worked 61 countries.

Burgas

In Sliven I took the 5:25 AM train and

arrived in Burgas, on the Black Sea, at 8 AM. The ticket cost 2.30 levas, about a dollar and a quarter. At the railway station, three hams were waiting for me: Stefan, LZ3OE, an electronics technician working for the army; Stoian, LZ3QX, a radio communications sergeant; and Todor, LZ5QZ, a high school student.

I went to the Hotel Bulgaria—a nice place in the center of the town and a five-minute walk to the railway station. A double room set me back 56 levas, tax included, which comes to about $30. (Breakfast was included in the price, but because I would be leaving early the next morning before the restaurant opened, I got a bag with two sandwiches and an apple.)

First, we all went to the radio club, LZ1KSN, sponsored by a large chemical plant, located at the Cultural Center. I took some photos there and went to see a station that belongs to Stefan, LZ1RN, an electrical engineer licensed in 1981. Stefan has an IC-735 and a 1-kW amplifier feeding a 2-element quad for 10, 15 and 20 meters (installed on a homemade tower). Stefan is a DXer with 301 DXCC entities worked, has several awards, does computer logging and has QSL cards.

My next hosts were Deko, LZ1QV, and his wife Ginka, LZ1GW. For 25 years Deko was a radio officer on cargo ships. He's now a purser on an oil tanker. Ginka is studying economics at the local university. The two use a computer, a Kenwood R-100 communications receiver, a Yaesu FT-990 and an all-band delta loop antenna.

We took a trip to the village of Dolno Ezerovo, four miles outside Burgas, to see Nick, LZ1ZM. Nick uses a Kenwood TS-820 and several antennas on HF and VHF. Nick operates CW, Pactor, RTTY and packet. His e-mail address is **lz1zm@mobikom.com**.

Last on my list in Burgas was Todor, LZ5QZ, a high school student licensed in 1995. He is the son of Kolyo, LZ1QZ. They share a Yaesu FT-707S and a homemade antenna tuner. Their antenna is an 80-meter delta loop. They have another house about 45 miles west of Burgas, Todor's grandparents' house, where they have a second station. Todor and Kolyo are avid contesters.

After I finished chatting with father and son I went to McDonald's to eat. Where else would a homesick American go? Later I went to the hotel to sleep, asking for a 4:45 AM wake-up call because my train was leaving for VelikoTarnovo at 5:20 AM.

Burgas, after Varna, is the country's second-largest port city—lots of ships, lots of sailors and at least one McDonald's fast food joint.

Veliko Tarnovo

Getting here required a longer train ride because I had to cross the Balkan Mountains from southern to northern Bulgaria. The first-class ticket for the five-hour ride was 8.95 levas, less than $5. I had to change trains at Dabovo where, according to the schedule, I had three minutes between trains. My train was late—as was the train I had to catch! I stepped aboard the connecting train right on time.

The train traveled through many tunnels in complete darkness—some short, some long. I finally arrived in Veliko Tarnovo, where Kiril, LZ2JA, an electronics engineer and the director of Chamber of Commerce and Industry, was waiting for me.

We first went to the village of Kutsina, about 12 miles north of Veliko Tarnovo, to see George, LZ2VT. George has a Kenwood TS-830S with a separate VFO-230, a second homemade transceiver and three linear amplifiers, all homemade (350, 800 and 1000 W). George has a nice color photo QSL card and his e-mail address is **vtcci@vali.bg**.

Next we visited the village of Polikraiste to see Rumen, LZ2DD, a barman, first licensed in 1988, with a Class A license. Rumen has a homemade 50-W transceiver and a 4-element quad for 10 through 20 meters on top of an 80-foot tower.

Kiril, LZ2JA, took me to the Military Academy to see the LZ2KMS club station and some of its operators. Years ago it would have been unthinkable for an American to even go near a Bulgarian military installation and take photographs of smiling high-ranking officers!

The club station has a TS-830S, a TS-780 and a couple of huge, old military radios. I met the father-and-son team of Khristo, LZ4XG, an army colonel, and his son Kaloyan, LZ2GKX, a sergeant; colonel Ilia, LZ4JO; colonel Ivan, LZ4IX; and Wasil, a cadet at the Academy. All three colonels are professors at the Military Academy. Because LZ2KMS is a contest station, the ops there have worked more than 200 DXCC entities on CW, RTTY and SSB. The ops use a computer for logging and for high-speed telegraphy practice. As we were leaving the Academy we met Mike, LZ2NW, a sergeant and the president of another radio club, LZ2KBA (LZ6T during contests).

In the evening, Kiril, LZ2JA; Kiril, LZ2ZK (there is no shortage of Kirils in Bulgaria); the three ham radio colonels and their families; and I met in a little restaurant where we had a long and pleasant conversation.

I had finished my job. Now it was time to head for the hotel to catch some shuteye.

In the morning, I got up in a hurry. Kiril, LZ2JA, was waiting for me in front of the hotel to take me to the railway station. I left the hotel without taking my passport, which, according to past and present rules, I had to leave there until I departed. At the railway station, 16 minutes before my train was scheduled to leave, I remembered my passport. Kiril jumped in his car and went to get it. The train arrived and everybody stood up. I stayed near it, waiting. I suddenly saw Kiril running toward the train with my passport in hand. I threw my bags on the train and got onto the steps. The moment Kiril handed me my passport the train left for Russe.

Russe

At the railway station, Mike, LZ2ZD, was waiting for me. Mike is a broadcast engineer working at the local television station. The building, shaped like a tall needle, is very contemporary, as is the equipment it houses. Mike, licensed in 1984, graduated from the Technical University of Sofia and is still a proud member of his "alma mater" radio club, LZ1KDP. He uses a "Volna"-type transceiver made in the Ukraine with a homemade 400-W amplifier. Mike's e-mail address is **lz2zd@yahoo.com**.

Mike took me to see the last station I'd visit in Bulgaria—the Technical University Student's Radio Club, LZ1KIM. When we arrived, Rumen, LZ2AF, was already there. This club used to be very active and was favored by a great many operators. Although years of financial shortfalls have taken their toll, LZ1KIM still has a Kenwood TS-830, a 1-kW amplifier and several wire antennas.

Home Via Home

During my trip to Russe I slept in a guestroom in the television building, an arrangement made by Mike, LZ2ZD. In the morning, Mike took me to the railway station where I boarded the train that took me across the Danube river, all the way to Bucharest, Romania. There I changed trains and after another nine hours I arrived in my hometown of Timisoara, where I rested a few days before I took a plane back to New York City.

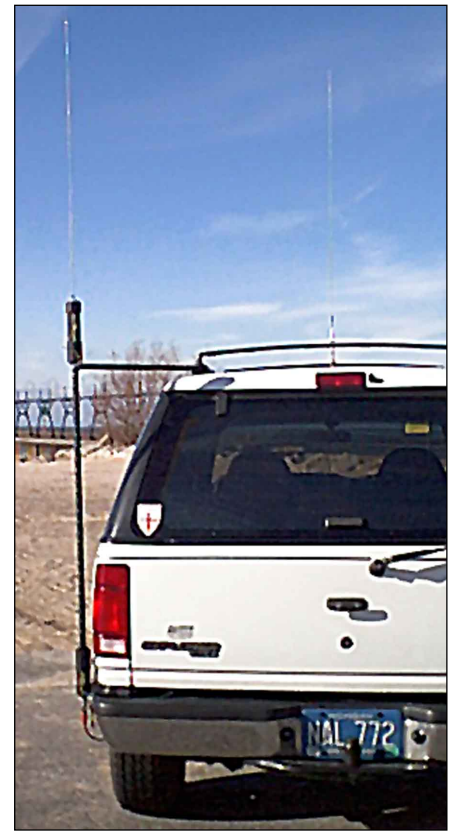
I'd had a wonderful time visiting the Bulgarian amateurs. They're good hams and good hosts—and friendly to a fault. But if you visit them, don't forget to nod your head up and down to indicate "no!"

You can contact the author at 84-47 Kendrick Place, Jamaica Estates, NY 11432; **wb2aqc@aol.com**.

By Frank W. King, KM4IE

A $20 HF Mobile Antenna

A few hours of fun with PVC and wire and you've got yourself a respectable road radiator!



Ready for the road! A length of 1/2-inch-diameter PVC pipe fastened to the vehicle's roof rack and antenna acts as a stabilizer.

While returning home from a brief business trip one evening, I was listening to the chatter on a 2-meter repeater. As one ham extolled the virtues of a new generation of diminutive HF transceivers, several others lamented the expense of good antennas for the HF bands and 2 meters. I operate HF and VHF mobile every day. On VHF, I use a roof-rack-mounted 5/8-λ commercial mobile antenna that retails for $14.95. On the HF bands, a bumper-mounted "homebrew" antenna—that costs about the same as the VHF antenna—added the bonus of a fun day at the workbench!

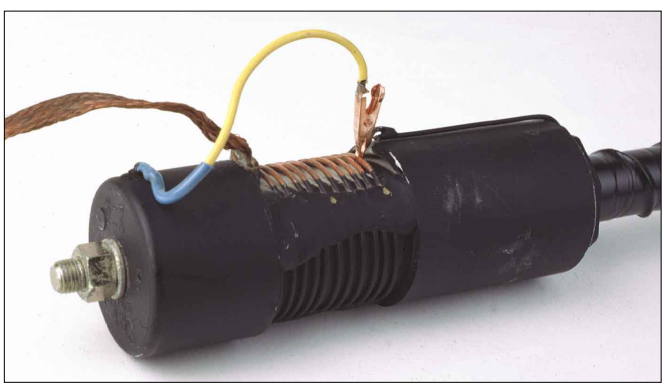
My HF antenna is a "bug-catcher" style vertical that has netted me CW and phone contacts worldwide using my ICOM IC-706MkII. The antenna consists of little more than some PVC pipe topped by a RadioShack replacement whip antenna and a couple of coils made from a small roll of #14 house wire. The beauty of this antenna lies not only in its under-$20 price tag, but also in its simplicity and ease of tuning. The antenna can be built for a wide range of frequencies; finding a good match and low SWR is no more complicated than moving two taps, one on the loading coil and one on the matching coil.

My current version of this antenna operates on 20 through 6 meters with an SWR of 1.5:1 or less in any segment of each band. The antenna is quite broadband even in a one-tap setup. One real joy of building this antenna is that because it's fully adjustable, construction dimensions are completely noncritical! How much easier could an antenna be?

Construction

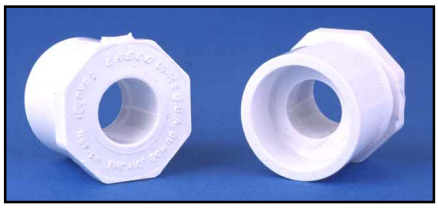
A trip to your local hardware store or do-it-yourself outlet and RadioShack should equip you with the majority, if not all, of the parts required; see the **Materials List**. You'll need three pieces of schedule 40 PVC pipe. One piece is a three-foot-long section of 1/2-inch pipe that forms the antenna shaft (center). For the loading and matching-section coil forms, I use 1 1/4-inch-diameter pipe so the antenna can be mounted reasonably close to the vehicle. The loading coil at the top of the antenna is a piece of 1 1/4-inch pipe roughly 6 inches long. The third piece of PVC is a 4-inch length of 1 1/4-inch pipe used for the matching-coil form at the bottom of the antenna.

Refer to the accompanying photographs during the following discussion. Use a belt sander or a file to make a flat about 5/8 inch wide along the length of each of the two 1 1/4-inch coil forms. The flats provide room beneath the coil windings for attaching clip-lead taps. Each coil form has a PVC end



Close-up view of the matching coil. To the left is the 3/8-24 mounting bolt. Attached to the bottom turn of the coil is a length of shield braid used as a ground strap. A small area of the PVC pipe OD is ground flat to provide room between the coil turns and the pipe form for an alligator-clip tap to firmly grasp a wire turn without interference.

The loading coil resembles the matching coil except it has a greater number of turns. A RadioShack whip is attached to the top PVC cap. The wire lead connecting the bottom of the whip to the top of the loading coil passes through a hole in the top of the pipe cap.



Two of these reducers (Genova and DO-IT #30245) are needed to make the transition from 1¼-inch pipe to ½-inch pipe.

cap on one end and a 2½-inch-long dual female coupling fitted with a standard PVC 1¼-inch to ½-inch reducer (Genova and DO-IT #30245) on the other end. The reducers and couplers mate each end of the main shaft to the coil forms. You can assemble for fit, but don't glue the pieces together yet.

Center-drill both end caps. Drill the top cap on the loading coil to accept a RadioShack replacement whip assembly (RS 21-952). In the matching-coil's bottom cap, drill a hole to accept a ⅜-24 bolt for the mounting stud. Also, drill a small hole through the side of each top and bottom cap, near the top, to pass a length of #14 wire.

To the bottom of the whip and mounting bolt, attach 12-inch-long pigtails of #14 bare wire, passing the wires through their cap holes to the outside. These wires, respectively, connect the bottom of the whip to the top of the loading coil, and the mounting stud (RF feed) to a clip lead for the matching coil. Fasten the whip and the ⅜-24 bolt to their respective PVC caps, securing them tightly. Place a drop or two of thread-locking compound on the threads of the whip base in the upper cap and on the threads of the ⅜-24 bolt in the bottom cap. If either of those mounting nuts come loose once you have glued the whole thing together and wound the coils, you may—shall I say—utter a few words of disappointment! Once the connections are tight, align the flat sides of the two coil forms at the opposite ends of the main shaft and glue the entire shaft assembly. At this point, your creation starts to look like a real antenna!

Now, wind the coils. Strip a 25-foot roll of #14/2 (with ground) house wire. Wrap the wires on their respective forms, holding the turns temporarily in place with electrician's tape. The matching coil on my 20- through 6-meter antenna consists of 11 turns spaced ⅛-inch apart (a length of about 1⅞ inches). The loading coil has 25 turns spaced ⅛-inch apart for a length of approximately 3⅞ inches. Wind the third wire on the antenna shaft, spacing the turns about 1 inch to 1¼ inches apart. Don't wind the turns of the helix any closer than an inch apart, otherwise tuning the antenna on 10 and 12 meters will be a real challenge.

When the coils are wound to your liking, mix a couple of inches of epoxy putty and cut it into six strips. (Duro Epoxy Putty Sealant works well. I use the 30-minute

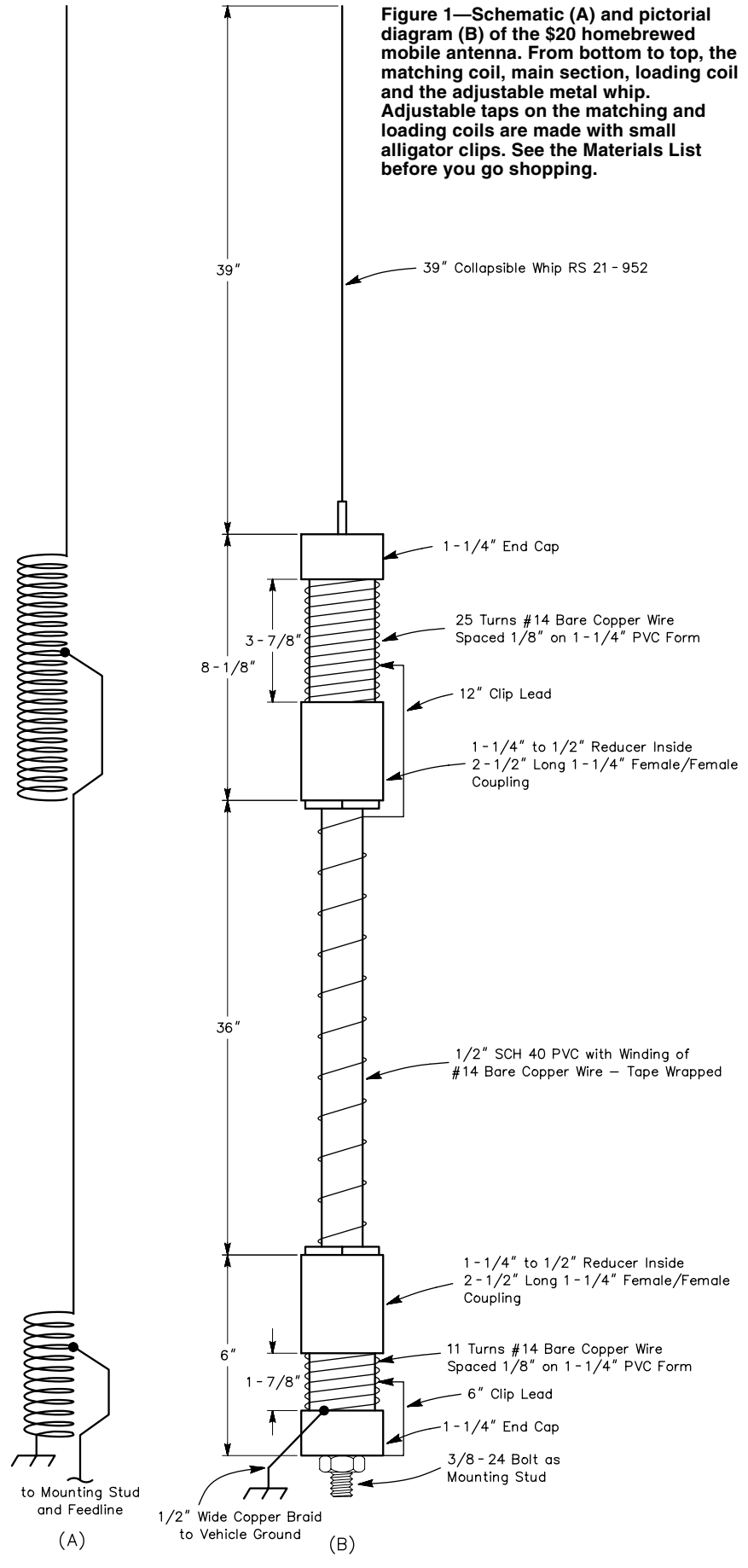


Figure 1—Schematic (A) and pictorial diagram (B) of the $20 homebrewed mobile antenna. From bottom to top, the matching coil, main section, loading coil and the adjustable metal whip. Adjustable taps on the matching and loading coils are made with small alligator clips. See the Materials List before you go shopping.

The main shaft of the antenna is wound with a turns spacing of no less than one inch.

Table 1
Coil-Tap Positions and Whip Extension for the Mobile Antenna

Band (Meters)	*Matching-Coil Tap (Turns)*	*Loading-Coil Tap (Turns)*	*Whip Position*
20	6	8	Fully extended
17	9	14	Fully extended
15	8	20	Fully extended
12	10	23	Retracted 1 ft
10	10	24	Retracted 2 ft
6	10	12	Retracted 1 ft

variety and find that I have enough putty in one package for two antennas.) Roll each piece of putty into a bead long enough to extend the length of the matching and loading coils. Place three beads of epoxy on each coil, spacing them equally around the forms (but not over the flat areas). Lay each bead on its respective coil and press the bead until it flattens and contacts the coil form. When cured, the epoxy putty holds the coil turns securely in place.

Clip leads and cosmetics are next. Wrap the three-foot shaft and its winding with electrical tape. Spray the coils flat black taking care to mask the coil-tap areas above the flats. Solder a 6-inch-long clip lead to the 3/8-24 mounting-stud pigtail and a 12-inch clip lead to the top of the helically wound shaft cutting off any excess wire. Connect the bottom turn of the matching coil to a length of 1/2-inch-wide copper braid to serve as a ground connection. Solder the top of the loading coil to the whip's pigtail. Insert the whip and you're ready to install the antenna, tune it and get on the air!

Installation and Operation

I use a standard bumper mount with an extra ground lug placed a few inches away to which the matching coil's braid is attached. Install the antenna and guy it—I use a length of 1/2-inch PVC pipe attached to the vehicle's roof rack as a guy.

Tuning

It helps to mark the tap points of the loading and matching coils for later reference. I use a gold-paint pen and place the marks on one of the flat beads of epoxy putty that runs the length of each coil. On my current antenna, I have dots placed every five turns and keep a small chart at the operating position. The reference points make band changes quick and consistent every time. The numbers in the coil-tap chart of Table 1 refer to the coil-tap points as counted *from the bottom* of each coil.

This antenna tunes 20, 15 and 17 meters easily with the whip fully extended. I find that I have to drop the whip into the shaft about one foot to tune 12 meters, and about two feet to tune 10 meters. Get out a note pad and a pencil to make a tap-point chart for the various bands. Connect an SWR meter in the feed line between your transceiver and the antenna. (If available, you can use your rig's built-in SWR meter; my IC-706 is so equipped.)

Key your rig and adjust the power output of your radio for just a few watts. The SWR is most affected by the movement of the loading coil tap (the upper coil) and fine-tuned by the placement of the matching-coil (lower coil) tap. Table 1 provides some starting points for finding the lowest SWR on each band. Each installation is different, so don't expect the number of turns given in Table 1 to match your installation exactly. Key the rig, check the SWR, move each tap up or down one turn and repeat the process until you've obtained the lowest SWR on each band.

On 20 through 10 meters, the antenna is 1/4-λ long. On 6 meters, the antenna is much too long to tune as a 1/4-λ radiator, but not too long to tune up nicely as a 1/2-λ radiator. With the whip fully extended, it's only a matter of some experimentation to find a "sweet spot" for 6 meters. (I wouldn't be surprised to discover a multiple of 2 meters hiding in there somewhere, although I haven't had the inclination to look for it).

The whip can collapse completely into the antenna shaft. This is great, especially if you keep your vehicle in a garage as I do. No matter how far into the shaft I retract the whip, at 100 W output, the dielectric and clearances are such that I have experienced no problems with whip-to-coil arcing.

Summary

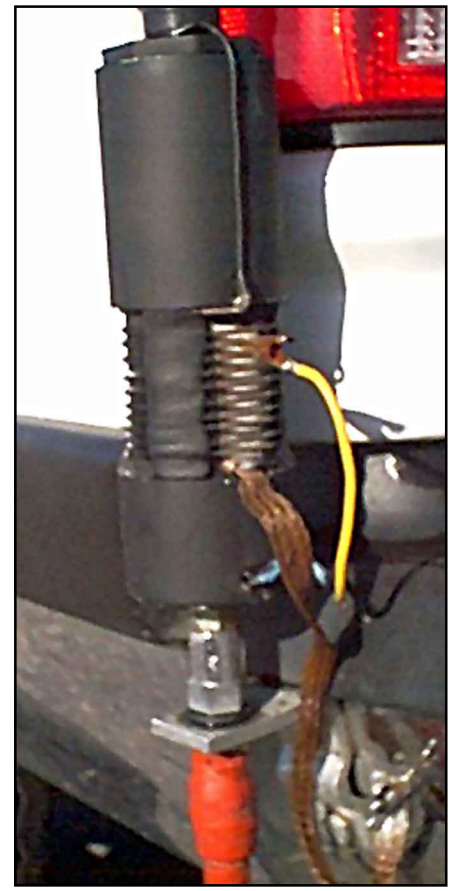
Now go have some fun with your "$20 Martian Death Ray" (as my brother John, AB4GK, calls it). Just wait 'til the guys who ordered their expensive new HF mobile antennas hear from *you* tonight![1]

And look for me on 17 meters. I'd love to be the first person to compliment you on your new antenna!

Frank W. King, KM4IE, was first licensed in North Carolina. He is an Episcopal priest and holds an Extra class license. He and his wife Jocelyn, KD4IMC, make their home on the Shores of Lake Michigan. You can contact Frank at 68121 Riverview Dr, South Haven, MI 49090-0149; **frfrank@i2k.com**.

Photos by the author and Joe Bottiglieri, AA1GW.

[1]Fixed-station operators who have limited room for an antenna should give this antenna a tryl.—*Ed.*



A close-up of the antenna base.

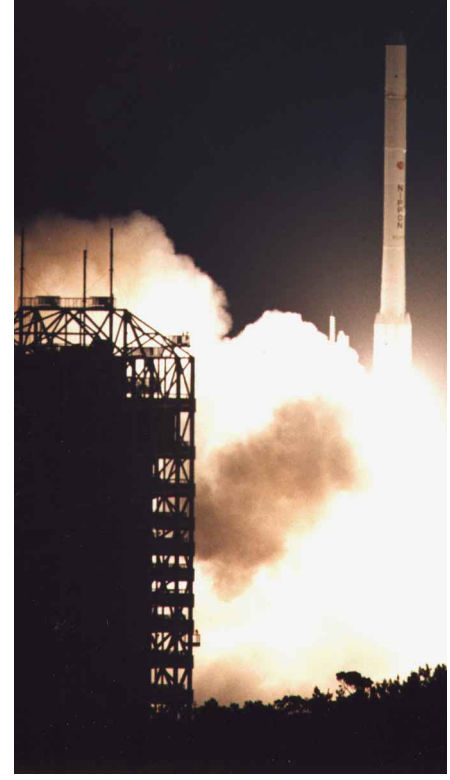
Materials List

Length of 1/2-inch-wide copper braid
3/8-24 mounting stud
25-ft #14/2 w/ground house wire
Two 1 1/4-inch PVC pipe caps
Two 1 1/4-inch to 1/2-inch PVC reducers (Genova and DO-IT #30245)
36-inch length of 1/2-inch PVC pipe
PVC cement
Epoxy putty sealant
RadioShack collapsible whip (RS 21-952)
Two alligator clips
Plastic electrical tape

By Steve Ford, WB8IMY

An Amateur Satellite Primer

Tired of the same old QSOs? Break out of orbit and set your course for the "final frontier."



Satellite-active hams compose a relatively small segment of our hobby, primarily because of an unfortunate fiction that has been circulating for many years—the myth that operating through amateur satellites is overly difficult and expensive.

Like any other facet of Amateur Radio, satellite hamming is as expensive as you allow it to become. If you want to equip your home with a satellite communication station that would make a NASA engineer blush, it will be expensive. If you want to simply communicate with a few low-Earth-orbiting birds using less-than-state-of-the-art gear, a satellite station is no more expensive than a typical HF or VHF setup. In many cases you can communicate with satellites using your present station equipment—no additional purchases are necessary.

Does satellite hamming impose a steep learning curve? Not really. You have to do a bit of work and invest some brain power to be successful, but the same can be said of DXing, contesting, traffic handling, digital operating or any other specialized endeavor. You are, after all, communicating with a *spacecraft!*

The rewards for your efforts are substantial, making satellite operating one of the most exciting pursuits in Amateur Radio. There is nothing like the thrill of hearing someone responding to your call from a thousand miles away and knowing that he heard you through a satellite. (The same goes for the spooky, spellbinding effect of hearing your own voice echoing through a spacecraft as it streaks through the blackness of space.) Satellite hamming will pump the life back into your radio experience and give you new goals to conquer.

No doubt this is beginning to sound like an impassioned Captain Kirk delivery. ("Answers! I need *answers*, Mr Spock!") Let's cut to the chase.

Satellites: Orbiting Relay Stations

Most amateurs are familiar with repeater stations that retransmit signals to provide wider coverage. Repeaters achieve this by listening for signals on one frequency and immediately retransmitting whatever they hear on another frequency. Thanks to repeaters, small, low-power radios can communicate over thousands of square kilometers.

This is essentially the function of an amateur satellite as well. Of course, while a repeater antenna may be as much as a few thousand meters above the surrounding terrain, the satellite is hundreds or thousands of kilometers above the surface of the Earth. The area of the Earth that the satellite's signals can reach is therefore much larger than the coverage area of even the best Earth-bound repeaters. It is this characteristic of satellites that makes them attractive for communication. Most amateur satellites act either as analog repeaters, retransmitting CW and voice signals exactly as they are received, or as packet store-and-forward systems that receive whole messages from ground stations for later relay.

Linear Transponders and the Problem of Power

Most analog satellites are equipped with *linear transponders*. These are devices that retransmit signals within a band of frequencies, usually 50 to 100 kHz wide, known as the *passband*. Since the linear transponder retransmits the entire band, a number of signals may be retransmitted simultaneously. For example, if three SSB signals (each separated by 20 kHz) were transmitted to the satellite, the satellite

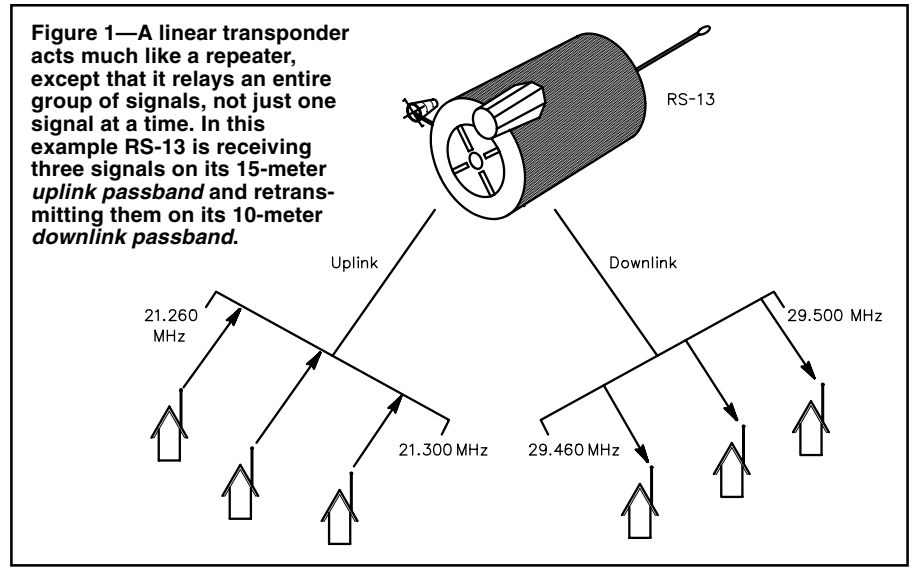


Figure 1—A linear transponder acts much like a repeater, except that it relays an entire group of signals, not just one signal at a time. In this example RS-13 is receiving three signals on its 15-meter *uplink passband* and retransmitting them on its 10-meter *downlink passband*.

would retransmit all three signals—still separated by 20 kHz each (see Figure 1). Just like a terrestrial repeater, the retransmissions take place on frequencies that are different from the ones on which the signals were originally received.

Some linear transponders invert the uplink signals. In other words, if you transmit to the satellite at the *bottom* of the uplink passband, your signal will appear at the *top* of the downlink passband. In addition, if you transmit in upper sideband (USB), your downlink signal will be in lower sideband (LSB). Transceivers designed for satellite use usually include features that cope with this confusing flip-flop.

Linear transponders can repeat any type of signal, but those used by amateur satellites are primarily designed for SSB and CW. The reason for the SSB/CW preference has a lot to do with the hassle of generating power in space. Amateur satellites are powered by batteries, which are recharged by solar cells. "Space rated" solar arrays and batteries are expensive. They are also heavy and tend to take up a substantial amount of space. Thanks to meager funding, hams don't have the luxury of launching satellites with large power systems such as those used by commercial birds. We have to do the best we can within a much more limited "power budget."

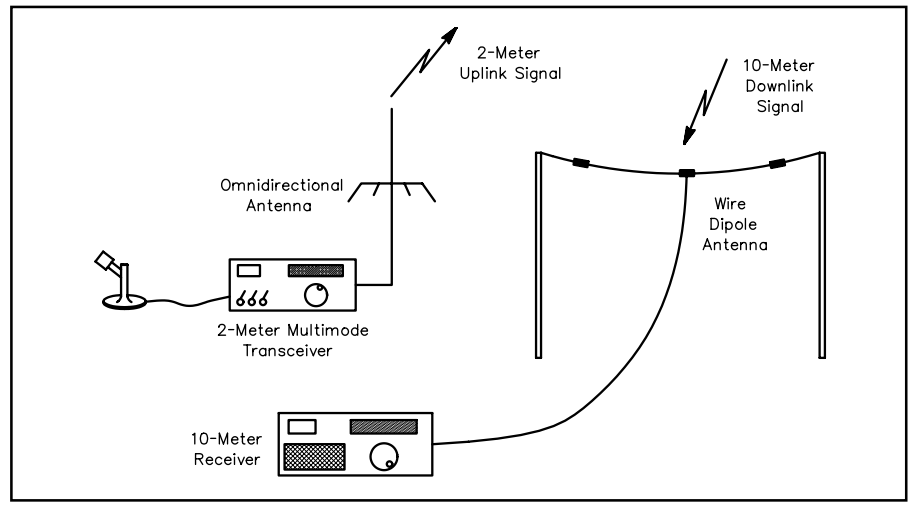
So what does this have to do with SSB or any other mode?

Think *duty cycle*—the amount of time that a transmitter operates at full output. With SSB and CW the duty cycle is quite low. A linear satellite transponder can retransmit many SSB and CW signals while still operating within the power generating limitations of an amateur satellite. It hardly breaks a sweat.

Now consider FM. An FM transmitter operates at a 100% duty cycle, which means it is generating its full output with every transmission. Imagine how much power a linear transponder would need to retransmit, say, a dozen FM signals—all demanding 100% output!

Having said all that, there *are* a few FM repeater satellites. However, these are very low-power satellites (typically less than 1 W output) and they do not use linear transponders. They retransmit only one signal at a time.

A portable antenna array for working OSCAR 10. The array consists of a 2-meter Yagi, a 70-cm Yagi, and an azimuth/elevation rotator.



To work RS13 or RS15 by uplinking on 2 meters you'll need a 2-meter multimode transceiver, a 10-meter receiver and antennas for 2 and 10 meters.

Finding a Satellite

Before you can communicate through a satellite, you have to know when it is available. This isn't quite as straightforward as it seems.

Amateur satellites do not travel in geostationary orbits like many commercial and military spacecraft. Satellites in geostationary orbits cruise above the Earth's equator at an altitude of about 35,000 kilometers. From this vantage point the satellites can "see" almost half of our planet. Their speed in orbit matches the rotational speed of the Earth itself, so the satellites appear to be "parked" at fixed positions in the sky. They are available to send and receive signals 24 hours a day over an enormous area.

Of course, amateur satellites *could* be placed in geostationary orbits. The problem isn't one of physics; it's money and politics. Placing a satellite in geostationary orbit and keeping it on station costs a great deal of money—more than any one amateur satellite organization can afford. An amateur satellite group could ask similar groups in other areas of the world to contribute money to a geostationary satellite project, but why should they? Would you contribute large sums of money to a satellite that may never "see" your part of the world? Unless you are blessed with phenomenal generosity, it would seem unlikely!

Instead, all amateur satellites are either low-Earth orbiters (LEOs), or they travel in very high, elongated orbits. Either way, they are not in fixed positions in the sky. Their positions relative to your station change constantly as the satellites zip around the Earth. This means that you need to predict when satellites will appear in your area, and what paths they'll take as they move across your local sky.

You'll be pleased to know that there is software available that handles this prediction task very nicely. A bare-bones

program will provide a schedule for the satellite you choose. A very simple schedule might look something like this:

Date	Time	Azimuth	Elevation
10 OCT 01	1200	149°	4°
10 OCT 01	1201	147°	8°
10 OCT 01	1202	144°	13°
10 OCT 01	1203	139°	20°

The date column is obvious: 10 October 2001. The time is usually expressed in UTC. This particular satellite will appear above your horizon beginning at 1200 UTC. The bird will "rise" at an azimuth of 149°, or approximately southeast of your station. The elevation refers to the satellite's position above your horizon in degrees—the higher the better. A zero-degree elevation is right on the horizon; 90° is directly overhead.

By looking at this schedule you can see that the satellite will appear in your southeastern sky at 1200 UTC and will rise quickly to an elevation of 20° by 1203. The satellite's path will curve further to the east as it rises. Notice how the azimuth shifts from 149° at 1200 UTC to 139° at 1203.

The more sophisticated the software, the more information it usually provides in the schedule table. The software may also display the satellite's position graphically as a moving object superimposed on a map of the world. Some of the displays used by satellite prediction software are visually stunning!

Satellite prediction software is widely available on the Web. Some of the simpler programs are freeware. My recommendation is to browse the AMSAT-NA site at **http://www.amsat.org**. They have the largest collection of satellite software for just about any computer you can imagine. Most AMSAT software isn't free, but the cost is reasonable and the funds support amateur satellite programs.

Whichever software you choose, there are two key pieces of information you must provide before you can use the programs:

(1) **Your position**. The software must have your latitude and longitude before it can crank out predictions for your station. The good news is that your position information doesn't need to be extremely accurate. Just find out the latitude and longitude of your city or town (the public library would have this data, as would any nearby airport) and plug it into the program.

(2) **Orbital elements**. This is the information that describes the orbits of the satellites. You can find orbital elements (often referred to as *Keplerian elements*) at the AMSAT Web site, and through many other sources on the Internet. You need to update the elements every few months. Many satellite programs will automatically read in the elements if they are provided as ASCII text files. The less sophisticated programs will require you to enter them by hand. I highly recommend the automatic-update software. It's too easy to make a mistake with manual entries.

Getting Started with the FM Birds

Do you like elevated FM repeaters with wide coverage areas? Then check out the AMRAD-OSCAR 27, UoSAT-OSCAR 14 and SunSat-OSCAR 35 FM repeater satellites. From their low-Earth orbits these satellites can hear stations within a radius of 2000 miles in all directions.

You can operate the FM satellites with a basic dual-band VHF/UHF FM transceiver. Assuming that the transceiver is reasonably sensitive, you can use an omnidirectional antenna such as a dual-band ground plane or something similar. Some amateurs have even managed to work the FM birds with H-Ts, but they often couple their radios to multi-element directional antennas. Of course, this means that they must aim their antennas at the satellites as they cross overhead.

Start by booting your satellite tracking software. Check for a pass with a peak elevation of 30° or higher. As with all satellites, the higher the elevation, the better. If you plan to operate outdoors or away from home, either print the schedule to a printer or jot down the times on a piece of scrap paper that you can keep with you.

When the satellite comes into range, you'll be receiving its signal about 5 kHz higher than the published downlink frequency (see Table 1) thanks to *Doppler shifting* (see the sidebar, "Down with Doppler"). So, begin listening on the higher frequency. If you suddenly hear the noise

Table 1
Active Amateur Satellites: Frequencies and Modes

Satellite	*Uplink (MHz)*	*Downlink (MHz)*
SSB/CW		
AMSAT-OSCAR 10	435.030—435.180	145.825—145.975
Fuji-OSCAR 20	145.900—146.000	435.800—435.900
		435.795 (CW beacon)
Fuji-OSCAR 29	145.900—146.000	435.800—435.900
(available biweekly)		435.795 (CW beacon)
RS-13	21.260—21.300	29.460—29.500
	145.960—146.000	
		29.458 (CW beacon)
RS-15	145.858—145.898	29.354—29.394
Packet—1200 bit/s		
(FM FSK uplink, PSK downlink except as noted)		
AMSAT-OSCAR 16	145.90, .92, .94, .96	437.0513
Packet—9600 bit/s		
(FM FSK uplink and downlink.)		
UoSAT-OSCAR 22	145.900, .975	435.120
KITSAT-OSCAR 25	145.98	436.50
Fuji-OSCAR 29	145.85, .87, .89, .91	435.910
TMSAT-OSCAR 31	145.925	436.925
UoSAT-OSCAR 36	145.960	437.025, 437.400
FM Voice Repeaters		
UoSAT-OSCAR 14	145.975	435.070
AMRAD-OSCAR 27	145.850	436.795
(daylight passes *only*)		
SUNSAT-OSCAR 35	436.290	145.825
(limited operation)		

Down with Doppler

The relative motion between you and the satellite causes *Doppler shifting* of signals. As the satellite moves toward you, the frequency of the downlink signals will increase as the velocity of the satellite adds to the velocity of the transmitted signal. As the satellite passes overhead and starts to move away from you, the frequency will drop, much the same way as the tone of a car horn or a train whistle drops as the vehicle moves past the observer.

The Doppler effect is different for stations located at different distances from the satellite because the relative velocity of the satellite with respect to the observer is dependent on the observer's distance from the satellite. The result is that signals passing through the satellite transponder shift slowly around the published downlink frequency. Your job is to tune your uplink transmitter—*not your receiver*—to compensate for Doppler shifting and keep your frequency relatively stable on the downlink. That's why it is helpful to hear your own signal coming through the satellite. If you and the station you're talking to both compensate correctly, your conversation will stay at one frequency on the downlink throughout the pass. If you don't compensate, your signals will drift through the downlink passband as you attempt to "follow" each other. This is highly annoying to others using the satellite because your drifting signals may drift into their conversations.

level dropping, chances are you are picking up the satellite's signal. At about the midpoint of the pass you'll need to shift your receiver down to the published frequency, and as the satellite is heading away you may wind up stepping down another 5 kHz. Some operators program these frequency steps into memory channels so that they can compensate for Doppler shift at the push of a button.

Once again, these FM satellites behave just like terrestrial FM repeaters. Only one person at a time can talk. If two or more people transmit simultaneously, the result is garbled audio or a squealing sound on the output. The trick is to take turns and keep the conversations short. Even the best passes will only give you about 15 minutes to use the satellite. If you strike up a conversation, don't forget that there are others waiting to use the bird.

The FM repeater satellites are a good way to get started. My recommendation would be to try OSCAR 14 or OSCAR 27 first. SunSat-OSCAR 35 operates on a somewhat variable schedule and may be difficult to catch. See the SunSat Web page at **http://sunsat.ee.sun.ac.za/** for the latest schedules.

Once you get your feet wet, you'll probably wish you could access a satellite that wasn't so crowded, where you could chat for as long as the bird was in range. Time to move up!

Moving Up to the Fujis and Radio Sputniks

The RS—*Radio Sputnik*—satellites were built and launched by the former Soviet Union. There have been a number of RS satellites in orbit. At the time of this writing, only RS-13 and RS-15 are operating.

RS-13 is by far the more popular of the two active Radio Sputniks. It is actually a transponder module riding piggyback, so to speak, on much larger navigational bird. RS-13 carries a *Mode K* transponder, which means that it receives signals on the 15-meter band and retransmits on the 10-meter band. RS-13 also operates in *Mode A*, which means that it receives on 2 meters and retransmits on 10 meters.

When using RS-13 you don't need to know precisely where the satellite is positioned in the sky. After all, you aren't likely to be using narrow beamwidth antennas unless you're trying to uplink on 2 meters using a Yagi. Mainly, you want to know when the satellite will be in view. Of course, 15 and 10-meter signals are subject to ionospheric bending, so it pays to listen for the satellite before and after the predicted visibility period.

Once you've determined when the satellite is due to rise above the horizon at your location, listen for the satellite's CW telemetry beacon. This signal is transmitted constantly by the satellite and carries information about the state of the satellite's systems, such as its battery voltage, solar-panel currents, temperatures and so on. You should hear it just as the satellite rises above the horizon. As soon as you can hear the beacon, start tuning across the downlink passband.

On an active day you should pick up several signals (you can hear recordings of actual RS-13 signals in the Amateur Radio section of my personal Web site at **http://home.att.net/~wb8imy/home.htm**). They will sound like normal amateur SSB and CW conversations. Nothing unusual about them at all—except that the signals will be slowly drifting downward in frequency. That's the effect of Doppler shift. It's not too serious on the 10-meter downlink, but it can be a challenge when the downlink is at 70 cm because the degree of shift is proportional to the transmitted frequency—the higher the frequency, the greater the shift.

Now tune your transmitter's frequency to the satellite's uplink passband (on either 15 or 2 meters). RS-13 does not use inverting transponders. If you transmit at the low end of the uplink passband, you can expect to hear your signal at the low end of the downlink passband. Discounting the effects of Doppler, the relationship between your uplink and downlink frequency is fairly direct. For example, if you transmit at 21.265 MHz you can expect your signal to be retransmitted by the satellite at 29.465 MHz. Generally speaking, CW operators occupy the lower half of the transponder passband while SSB enthusiasts use the upper half.

Assuming that you cannot hear your own signal from the satellite on a separate receiver, the best thing to do is make your best guess as to where your signal will appear on the downlink and set your receive frequency accordingly. Send several brief CQs ("CQ RS-13, CQ RS-13…"), tuning "generously" around your guesstimated receive frequency after each one. The station that is answering your call will also be making his or her best guess about where you are listening.

RS-15 operates in the same fashion, but listens only on 2 meters and retransmits on 10 meters. Unfortunately, RS-15 has been suffering from a damaged power system. As a result, its signal is often very weak.

Fuji OSCARs 20 and 29 are also linear transponder birds that function much like RS-13 and RS-15. The main difference is that they listen on 2 meters and retransmit on 70 cm. (They also use inverting transponders.) Not that many amateurs own receivers that can listen for 70-cm CW and SSB, so these satellites are not very active. During weekend passes, however, you should be able to hear several conversations taking place.

Station Requirements for the RS and Fuji Satellites

To work RS-13 you'll need, at minimum, a multiband HF SSB or CW transceiver. You *do not* need an amplifier; 100 W is more than enough power for the uplink. In fact, even 100 W may be too much in many instances. The rule of thumb is that your signal on the downlink should never be stronger than the satellite's own telemetry beacon.

A 15-meter wire dipole is adequate for sending and receiving with RS-13. (Yes, you'll be listening on 10 meters, but the 15-meter dipole should function adequately as a 10-meter receiving antenna.)

The ideal situation is to have *separate* 15- and 10-meter radios and antennas so that you can listen on 10 meters while you are transmitting on 15 meters. The ability to hear yourself simultaneously on the downlink is a tremendous asset for working any satellite. It allows you to operate full duplex as you listen to the Doppler shifting of your own signal, giving you the opportunity to immediately tweak your transmit frequency to compensate (rather than fishing for contacts using the haphazard half-duplex procedure I described earlier).

To work RS-13 and RS-15 in Mode A, you'll need a 2-meter multimode transceiver that can operate in CW or SSB. Remember that in Mode A RS-13 and RS-15 are listening for signals on 2 meters and retransmitting on 10 meters. This means that you'll still need a 10-meter SSB receiver. Choose your radios carefully. A number of modern HF transceivers also include 2 meters and even 70 cm. The problem, however, is that some of these radios do not allow *crossband splits* between VHF and HF. That is, they won't allow you to transmit on 2 meters and receive on 10 meters. At the very least they won't allow you to this simultaneously.

Omnidirectional antennas for 2 meters are sufficient for transmitting to RS-13 and RS-15. A beam on 2 meters would be even better, but then you incur the cost of an antenna rotator that can move the antenna up and down as well as side to side—the so-called *azimuth/elevation rotator*.

For the Fuji OSCARs the ability to transmit and receive simultaneously is a must, in my opinion. The Doppler effect is pronounced on the 70-cm downlink. You need to listen to your own signal continuously, making small adjustments to your 2-meter uplink so that your voice or CW note does not slide rapidly downward in frequency. To achieve this you will need separate 2-meter and 70-cm transceivers (such as a couple of used rigs), or a dual-band transceiver that is specifically designed for satellite use. Kenwood, ICOM

and Yaesu have such radios in their product lines. These wondrous rigs make satellite operating a breeze, although their price tags may give you a bit of sticker shock (about $1600). They feature full crossband duplex, meaning that you can transmit on 2 meters at the same time you are listening on 70-cm. They even have the ability to work with inverting transponders automatically. That is, as you move your receive frequency down, the transmit VFO will automatically move up (and vice versa)!

Although beam antennas and azimuth/elevation rotators are not strictly necessary to work the Fujis (I've done it myself with omnidirectional antennas on both bands), they vastly improve the quality of your signal. If you decide to go the omnidirectional route, you'll need to add a 70-cm receive preamp at the antenna to boost the downlink signal.

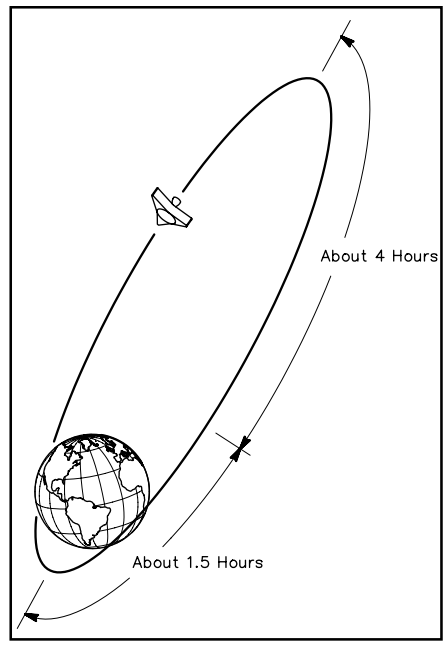
Taking the High Road with OSCAR 10

The limitations of LEO satellites, especially their brief periods of availability, are overcome by a class of satellites called "Phase 3." The name comes from the various phases in the development of amateur satellites. The earliest ones, during Phase 1, contained beacon and telemetry transmitters, but not transponders. These early satellites were all in circular, low-Earth orbits—as were the Phase 2 satellites, which carried communication transponders.

Phase 3 satellites are not in low-Earth orbits. Rather, their orbits describe an ellipse. These satellites swing within a few hundred kilometers of the Earth's surface at one end of the ellipse (the *perigee*) and streaks out to 30,000 km or so at the other end (the *apogee*). The physics of an orbiting body dictates that the satellite spends much more of its time near apogee than perigee. Therefore, the Phase 3 satellites spend most of their time at very high altitudes. From a typical point in the Northern Hemisphere, a particular Phase 3 satellite is available for more than 10 hours per day. This is a remarkable improvement over the LEO satellites! And because the Phase 3 satellite is so much higher, it is visible from a greater fraction of the Earth's surface, too. The result is a vast improvement in the communications capability of the satellite.

There is a downside, however. The greater distance to the Phase 3 satellite means that more transmitted power is needed to access it, and a weaker signal is received from the satellite at the ground station. (This problem is alleviated somewhat by the use of gain antennas on the satellite.) The signal levels are such that you usually need ground-station antennas that exhibit significant gain (10 dBi or more).

At the time of this writing, the only Phase 3 satellite in orbit is OSCAR 10. It is only intermittently available; its computer suffered accumulated radiation damage that rendered the satellite uncontrollable. OSCAR 10 occasionally operates when it gets sufficient sunlight.



OSCAR 10 travels in a high, elliptical orbit. Phase 3D will achieve a similar orbit.

When OSCAR 10 is working, however, it is a hot DX satellite! At apogee OSCAR 10 can see half of the globe. This means that you can enjoy transatlantic and transpacific conversations for hours at a time.

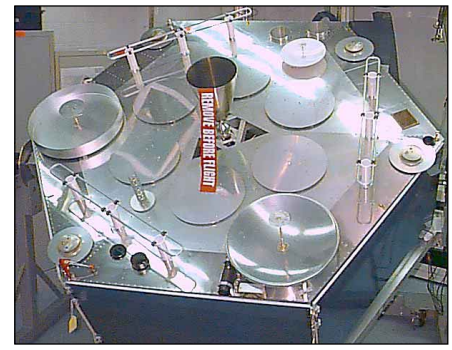
Such astonishing capability comes at a price in terms of station hardware. Not only will you need Yagi antennas and an az/el rotator, you will also need a VHF/UHF dual-band "satellite ready" SSB transceiver, a 150-W amplifier and a receive preamplifier. If you buy brand-new equipment, the cost of a station for OSCAR 10 could approach $3000. Some careful shopping at fleamarkets and on the Web can bring the cost down to about $1500.

Phase 3D—The SuperSat

Late last year the amateur satellite community received the happy news that Phase 3D, the largest, most expensive Amateur Radio satellite ever created, finally had a launch commitment. If everything goes as planned, Phase 3D will be launched in the very near future.

Like OSCAR 10, Phase 3D is designed to travel in a high, elongated orbit that will provide spectacular DX coverage. Phase 3D will be a huge (by amateur satellite standards) communication platform offering transponders—both analog and digital—from HF to microwave!

The RF output of its 2-meter transmitter alone will be about 200 W. Compare that to the 50-W output of OSCAR 10 on 2 meters. This isn't the whole story, though. OSCAR 10's 2-meter antenna offers an effective radiated power (ERP) of 180 W. The superior 2-meter antennas aboard Phase 3D are capable of yielding an ERP of up to *2500 W!*



The Phase 3D satellite, buttoned up and ready to go.

What does this mean to you? It means that you won't need the large multielement beam antennas you're accustomed to seeing on most OSCAR 10 stations. Depending on the sensitivity of your receiver you may not even need a mast-mounted receive preamp.

Phase 3D will pack a substantial punch on all of its transponders making large, expensive stations for high-orbiting amateur satellites things of the past. This will be especially true if you take advantage of Phase 3D's microwave capability.

Like most satellite operators I'm eagerly awaiting news about the launch of Phase 3D. When that powerful spacecraft reaches orbit, a new era of satellite hamming will begin.

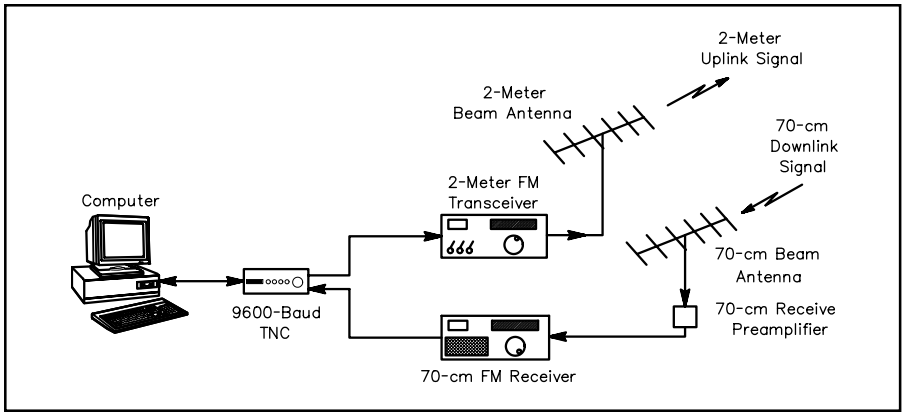
The PACSATs

If you enjoy packet operating, you'll love the PACSATs! Several satellites comprise the currently active PACSAT armada: AMSAT-OSCAR 16, UoSat-OSCAR 22, KITSAT-OSCAR 25, Fuji-OSCAR 29, TMSAT-OSCAR 31 and UoSAT-OSCAR 36.

Most PACSATs work like temporary mail boxes in space. You upload a message or a file to a PACSAT and it is stored for a time (days or weeks) until someone else—possibly on the other side of the world—downloads it. Many PACSATs are also equipped with on-board digital cameras. They snap fascinating images of the Earth, which are stored as files that you can download and view. Read "Step Up to the 38,400 Bps Digital Satellites" by Stacey Mills, W4SM, elsewhere in this issue.

Which PACSAT is Best?

You can divide the PACSATs into two types: The 1200- and 9600-baud satellites. OSCAR 16 is presently the only 1200-baud PACSAT available for message storing and forwarding (OSCAR 19 may be coming back on line shortly). You transmit packets



This is a diagram of a typical 9600-baud packet satellite station. Both the 2-meter and 70-cm radios must be capable of handling 9600-baud data signals.

to AO-16 on 2-meter FM and receive on its phase-shift keying (PSK) signal on 435-MHz SSB. OSCARs 22, 25, 29, 31 and 36 are the 9600-baud PACSATs. You send packets to them on 2-meter FM and receive on 435-MHz FM.

So which PACSATs are best for beginners? There's no easy answer for that question. You can use any 2-meter FM transceiver to send data to a 1200-baud PACSAT, but getting your hands on a 435-MHz SSB receive could put a substantial dent in your bank account (although you could receive the signal on an HF rig by using a receive converter). In addition, you need a special PSK terminal node controller (TNC). These little boxes are not common and could set you back about $250.

So the 9600-baud PACSATs are best for the newbie, right? Not so fast. It's true that you don't need a special packet TNC. Any of the affordable 9600-baud TNCs will do the job. The catch is that not all FM transceivers are usable for 9600-baud packet. You need rigs (or a single dual-band radio) capable of handling 9600-baud signals. And not all 440-MHz FM transceivers can receive down to the 435-MHz neighborhood of the PACSATs. As always, shop carefully.

Broadcasting Data

Despite the huge amounts of data that can be captured during a pass, there is considerable competition among ground stations about exactly *which* data the satellite should receive or send! There are typically two or three dozen stations within a satellite's roving footprint, all making their various requests. If you think this sounds like a recipe for chaos, you're right.

The PACSATs produce order out of anarchy by creating two *queues* (waiting lines)—one for uploading and another for downloading. The upload queue can accommodate two stations and the download queue can take as many as 20. Once the satellite admits a ground station into the queue for downloading, the station moves forward in the line until it reaches the front, whereupon the satellite services the request for several seconds.

For example, let's say that OSCAR 16 just accepted me, WB8IMY, into the download queue. I want to grab a particular file from the bird, but I have to wait my turn. OSCAR 16 lets me know where I stand by sending an "announcement" that I see on my monitor. It might look like this:

WB8ISZ AA3YL KD3GLS WB8IMY

WB8ISZ is at the head of the line. The satellite will send him a chunk of data, then move him to the rear.

AA3YL KD3GLS WB8IMY WB8ISZ

Now there are only two stations ahead of me. When I reach the beginning of the line, I'll get my share of "attention" from the satellite.

You may not be able to download an entire file in one shot. If the satellite disappears over the horizon before you receive the complete file, there's no need to worry. Your PACSAT software "remembers" which parts of the file you still need from the bird. When it appears again, your software can request that these "holes" be filled.

And while all of this is going on, *you're receiving data that other stations have requested!* That's right. Not only do you get the file you wanted, you also receive a large portion of the data that other hams have requested. You may receive a number of messages and files without transmitting a single watt of RF. All you have to do is listen. That's why they call it "broadcast" protocol. (The one exception to the broadcast method is Fuji-OSCAR 29. It operates more like a traditional packet BBS.)

Station Software

You must run specialized software on your station PC if you're going to enjoy any success with the broadcast-protocol

Bruce Paige, KK5DO, and his daughter Mahana, W5BTS, are both active satellite operators. Bruce is responsible for the Houston AMSAT Net, which you can hear on the Web in RealAudio at http://www.amsatnet.com/.

PACSATs. If your computer uses DOS only, you need a software package known as *PB/PG*. *PB* is the software you'll use most of the time to grab data from the satellite. *PG* is only used when you need to upload.

If you're running Microsoft *Windows* on your PC, you'll want to use *WISP*. *WISP* is a *Windows* version of *PB/PG* that includes such features as satellite tracking, antenna rotator control and more. Both software packages are available from AMSAT. And while you're contacting AMSAT, pick up a copy of the *Digital Satellite Guide*. It gets deep into the details of PACSAT operation far beyond the scope of what we can discuss here.

Just the Beginning

This article barely nicks the surface of satellite operating. There is much more to learn and enjoy. I suggest that you spend some time at the AMSAT Web site at http://www.amsat.org. You'll pick up a wealth of information there. Speaking of "picking up," grab a copy of the *ARRL Satellite Handbook* (see your favorite dealer, or buy it on the Web at http://www.arrl.org/catalog/). Between these two resources you'll be able to tap just about all the amateur satellite knowledge you're likely to need.

In the meantime . . . see you in orbit!

QST

By Stacey E. Mills, W4SM

Step Up to the 38,400 Bps Digital Satellites

Imagine downloading high-resolution views of the Earth from orbit at 38,400 bps. Is it Internet technology? No, it's amateur satellites!

The first digital store-and-forward satellites developed by hams in the late 1980s were a revolution in communication that has spawned a considerable commercial counterpart. The downlinks on the first generation Pacsats (AO-16, LO-19), launched just over 10 years ago, were phase shift keyed (PSK) at 1200 bits per second (bps). Bits per second are roughly, but not exactly, equivalent to "baud". The first Pacsats were quite a revolution in their day, but incredibly slow by today's standards. PSK was chosen for the downlink because it has several major advantages primarily relating to its low duty cycle as an SSB mode, narrow bandwidth, and high data transmission efficiency. That is, reception is possible at a relatively low signal-to-noise ratio. These were important features for early "proof of concept" satellites with limited power budgets. However, PSK suffers from the need for very precise tuning of the downlink frequency. Allowable deviations from the center frequency are generally measured in Hertz. Successful tuning usually requires closed-loop feedback from the modem to the transceiver to activate "mike click" up/down tuning and keep the signal locked during the considerable Doppler shift that occurs with a low earth orbit (LEO) satellite transmitting on 435 MHz. Nonetheless, the Pacsats performed admirably. AO-16, in particular has had a long and active career, only recently suffering its first software crash in many years.

The Pacsats were followed by the UoSat generation of digital satellites (UO-22, KO-23, KO-25) using frequency shift keying (FSK). FSK is an FM mode requiring more output power from the satellite, but it enables high data transmission rates, at a correspondingly wider bandwidth, and is much more forgiving with regard to tuning, an important factor given the Doppler shift of satellite signals. The allowable tuning error is large enough with FSK that closed loop feedback is not necessary and calculated Doppler offsets based on a fresh set of the satellite's Keplerian elements will suffice. With the use of FSK on satellites came the blinding speed of 9600 bps downlinks. Coupled with the development of the *WISP*[1] software package by Chris Jackson, G7UPN, and a variety of compatible rotator and radio control interfaces such as the Kansas City Tracker/Tuner card, TrakBox, SatTrak, and others, fully automated digital stations became commonplace. The digital satellite revolution was in high gear.

[1]Notes appear on page 45.

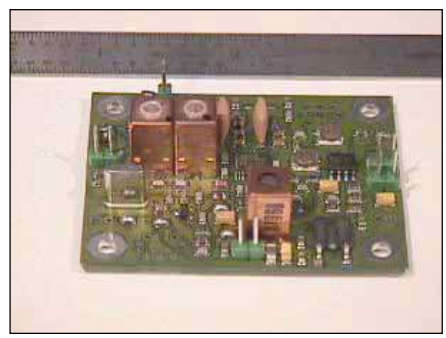


Figure 1—The Symek IFD board.

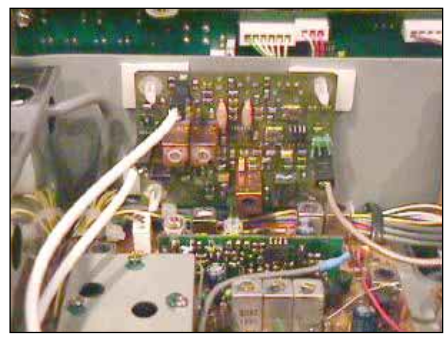


Figure 2—My IFD board installed in a Yaesu FT-736.

Although several of the 9600 bps satellites have had cameras on board, the newest member of this group, TmSat-OSCAR 31, makes widespread use of its high resolution color cameras and takes a large number of high-quality images. Downloading these images can be time consuming at 9600 bps, although the recent use of compression algorithms on board the satellite has greatly alleviated this problem. By their nature, however, hams like to "push the envelope" and the latest in the series of amateur digital satellites is UoSat-OSCAR 36. This satellite, like all of the UoSats, was built at Surrey Satellite Technologies Limited (SSTL) in Surrey, England (**http://www.ee.surrey.ac.uk/SSC/**). What makes UO-36 different is that it has several high-speed downlinks, including one at 38400 bps. A 38400 bps downlink may eventually also be active on TO-31. This article summarizes the software and equipment necessary to receive these new high-speed downlinks. With a little effort, the results are quite dramatic. We're talking about data transfer rates that rival or even surpass what you may be enjoying with your home Internet connection. Despite the fact that these low-orbit satellites are only in range for about 15 minutes, 1.5 megabyte downloads are typical on each satellite pass.

In order to receive at 38400 bps, and uplink at 9600 bps, we need to consider requirements for the radio, modem, and software, as well as some general operating comments.

The Radio

In the days of 1200 bps satellites, data came and went straight through the audio jack and microphone input of a conventional transceiver. No modifications were required. The bandwidth needed for the signal was similar to that of a voice transmission, so

the shaping and selectivity filters normally used in voice transmissions were perfectly acceptable for 1200 bps data. For FSK, a good rule of thumb, given the modulation levels used, is that required receiver bandwidth is 1.5 times the data rate in bps. Thus, 9600 bps FSK requires approximately 14.4 kHz of bandwidth. A signal of this bandwidth is usually within the width of the IF passband, but will not pass unaltered through FM audio signal processing and speech shaping circuits, so these must be bypassed to receive and transmit the full signal. Some newer rigs now come from the factory with the appropriate data connectors for 9600 bps, but many older rigs (and some newer ones) require modifications. It is usually necessary to insert the FSK transmit signal directly into the FM transmitter's varactor diode and tap the FSK receive signal directly from the FM discriminator. The required modifications for a wide variety of radios are well documented and available on the AMSAT Web site at **ftp://ftp.amsat.org/amsat/mods/**. A large number of hams have successfully made these modifications.

If you are contemplating these 9600 bps modifications on a Yaesu FT-736R, be aware that the passband of the Yaesu FT-736 is slightly narrow for optimum 9600 bps FSK reception. This may be improved by replacing a filter in the transceiver with one having a wider bandwidth. Other rigs, such as the ICOM IC-475 have also been shown to benefit from changing their 15 kHz filters to 20 kHz filters. Information regarding this is also available on the AMSAT web site. Alternately, Symek (see below) has developed a simple demodulator on 455 kHz that they call a *ZFD board*. This sells for $35 (US) and enables reception of FSK signals up to 19200 bps with excellent linearity. Because of the wider bandwidth of the ZFD compared with the standard FT736 demodulator, there is no need for absolutely precise tuning of the receiver.

When UO-36 is in 38400 bps downlink mode, the uplink bps rate is still 9600, so the modifications made for transmitting will work fine. In fact, the varactor diode signal insertion used for 9600 bps transmission is generally good up to 19200 bps.

For 38400 bps reception, the bandwidth required (approximately 57.6 kHz) far exceeds that normally present in the final stages of a conventional receiver. Amateur receivers are designed to be selective (narrow bandwidth) and the passband of the IF filters is considerably below this level. In order to get the signal bandwidth needed from a conventional amateur transceiver like the Yaesu FT-736R, Kenwood TS-790, ICOM-970, or ICOM IC-821, the receive signal must be intercepted at the first IF level, from the output of the first mixer, before any IF filtering has occurred. Until recently, this wasn't an easy feat to accomplish.

Figure 3—The Symek TNC31S.

A new product from Symek (**http://www.symek.com/sat/main.htm**) in Germany provides precisely what you need.[2] Ulf Kumm and his co-workers have developed what they call an *IF demodulator* or *IFD board*. This is actually a small amplifier, receiver and signal demodulator—all in one. The intercepted first IF signal is amplified, converted to a second IF at 10.7 MHz, filtered and demodulated. The boards are specifically tuned for the first IF frequency of any of the commonly used 144/435 MHz dual band transceivers, some 435 MHz monoband rigs, and general coverage receivers as well. Power supply to the board is 8 to 20 V dc at approximately 35 mA. There are jumpers that allow you to select from a 5-V regulated power source, or to have the supply voltage present as dc bias on the IF input cable. In addition to providing data output, the IFD boards contain a few other niceties, which you may or may not need. Output of the filtered 10.7 MHz IF is readily available for use by other demodulators, such as a high speed PSK demodulator. There is an RSSI (S-meter) output that produces a dc voltage from 0 to 4 V, corresponding to signal levels from –110 dBm to –40 dBm. The discriminator output may be tapped if AFC is required.

When ordering an IFD board, in addition to indicating which type of radio (or first IF) you will be using, you must also decide about the passband filters on the board. There are three choices: 80 kHz (good to 38400 bps), 120 kHz (good to 76800 bps), and 300 kHz (good to 153600 bps). The 120 kHz filter is standard and if not otherwise specified your IFD will come with this. I also chose the 120 kHz filter to allow for future use at 76800 bps. I avoided the 300 kHz filters, because for the narrower 38400 bps signal, this would allow more adjacent noise into the passband, creating a lower signal to noise ratio.

If you don't see your rig listed on the Symek Web site, don't worry. If you can determine the first IF of your receiver, they'll make a custom board. The boards measure 2.16 ×1.73 × 0.7 inches (55 × 44 × 18 mm) and easily fits inside most rigs (see Figure 1). Cost for standard boards is currently about $125.00, plus shipping. Orders can be made over the Internet or by e-mail using a credit card. My IFD board arrived in about a week. For less common IFs, there may be a delay for fabricating the matching crystals of 4 weeks.

Symek provides detailed instructions (in English!) for the installation of these boards. These are partly available on their Web site, so you can see what's involved, before deciding about a purchase. If you were comfortable making 9600 bps transmit modifications, this is just as easy. In a Yaesu FT-736R the installation is especially easy, involving only the cutting and splicing of a single cable. The supply voltage is present on the IF cable, so no additional power connections are needed. The unit easily mounts on the back right-hand side of the top front bulkhead (Figure 2). I brought the connections for both 38400/9600 and 9600/9600 uplink/downlink to two separate $^1/_8$-inch stereo jacks on the rear of the rig, just to the right of the 110-V power connector. Removing this plate and finding this small area for mounting the jacks was far more time consuming than installing the board, which only required an hour. If you want a faster approach, you can simply bring the cables out the back of the rig.

In my Kenwood TS-790 the installation is slightly more detailed, requiring a modification to one of the 435 MHz PC boards (cutting a land on the board) and installation of two small toroidal transformers, but following the instructions makes this easy if you're comfortable with working on small components. Symek recommends partially retuning the IF on some rigs after installation. Don't panic, the instructions are given for this as well, when needed. I was easily able to make this modification to a TS-790, including tweaking the tuning, in about 2 hours.

Importantly, once installed, the IFD board has no effect on normal function of the rig, either for normal audio usage or for 9600 bps operation. In fact, because the IFD is in series with the first IF and includes an amplification stage, you may actually notice a slight (1-2 dB) increase in receiver gain after the modification. This depends somewhat on the rig used. It should be noted that the IFD board is not meant to function at the narrow bandwidth of 9600 bps. Use the 9600 bps receive modification (discriminator pickup or ZFD board) for this bps rate.

If you don't want to modify your receiver for 38400 bps, Symek *offers a complete 70cm FM data transceiver*, the TRX4S, which is capable of transmitting and receiving data in narrow band mode up to

19200 bps and up to 153k bps in wide mode. This 20-W transceiver is fully programmable via RS232. It can be used for high speed terrestrial (receive and transmit) communications, as well as for 38400 bps satellite receiver operation just as it comes out of the box. To uplink on 2 meters (limited to 19200 bps) for satellite operation requires another radio, of course. Not surprisingly, compared with the low cost IFD add-on, this complete transceiver is more expensive (about $940). However, if you're also thinking about terrestrial communications at these high data rates, this is a choice to consider.

The Modem

Once you've modified your receiver and transmitter, you'll need a modem capable of handling 38400 bps FSK. At the moment the choices are somewhat limited. The standard G3RUH modem can be modified to run at 38400 bps. The modifications have been described by the modem's designer, James Miller, and are available on the Web at **http://www.amsat.org/amsat/articles/g3ruh/109a.txt**. The PacComm Spirit-2 (satellite version) is said to be capable of 4800 to 57600 bps right out of the box (**http://www.paccomm.com/**). I have not had experience with this unit, but I believe it is based on the G3RUH design, so it should be capable of handling this speed. The TAPR DSP group has been experimenting with the DSP56002EVM board at a variety of bps rates (**http://www.tapr.org/tapr/html/kitsf.html**). The processor in this unit is said to be "just barely" capable of handling a 38400 bps signal. Unfortunately, I have not had time to pursue this approach. The Motorola DSP56002EVM boards are no longer available, being replaced by several higher speed models. The latter are fully capable of handing 38400 bps and, hopefully, TAPR will develop appropriate interfaces and DSP software in the future.

Symek, the same company that produces the IFD boards I've already described, also makes two high-speed modems capable of 38400 bps, and beyond (>1Mbps). The TNC3S is a two port version, which may be set up to run 9600/9600 for the older satellites on one port, and 38400/9600 on the other port for UO-36 and TO-31. Software modifications to *WISP* to allow switching ports between satellites is currently in development and should be completed by the time this article appears. The TNC31S is a single port version of the TNC3S.

Currently, I am using the TNC31S (Figure 3). The unit can be set up to boot in "KISS" mode and to have 38400 bps receive and 9600 bps transmit functions. Having the modem boot in KISS mode makes it very easy to use. Just tell *WISP* that you're

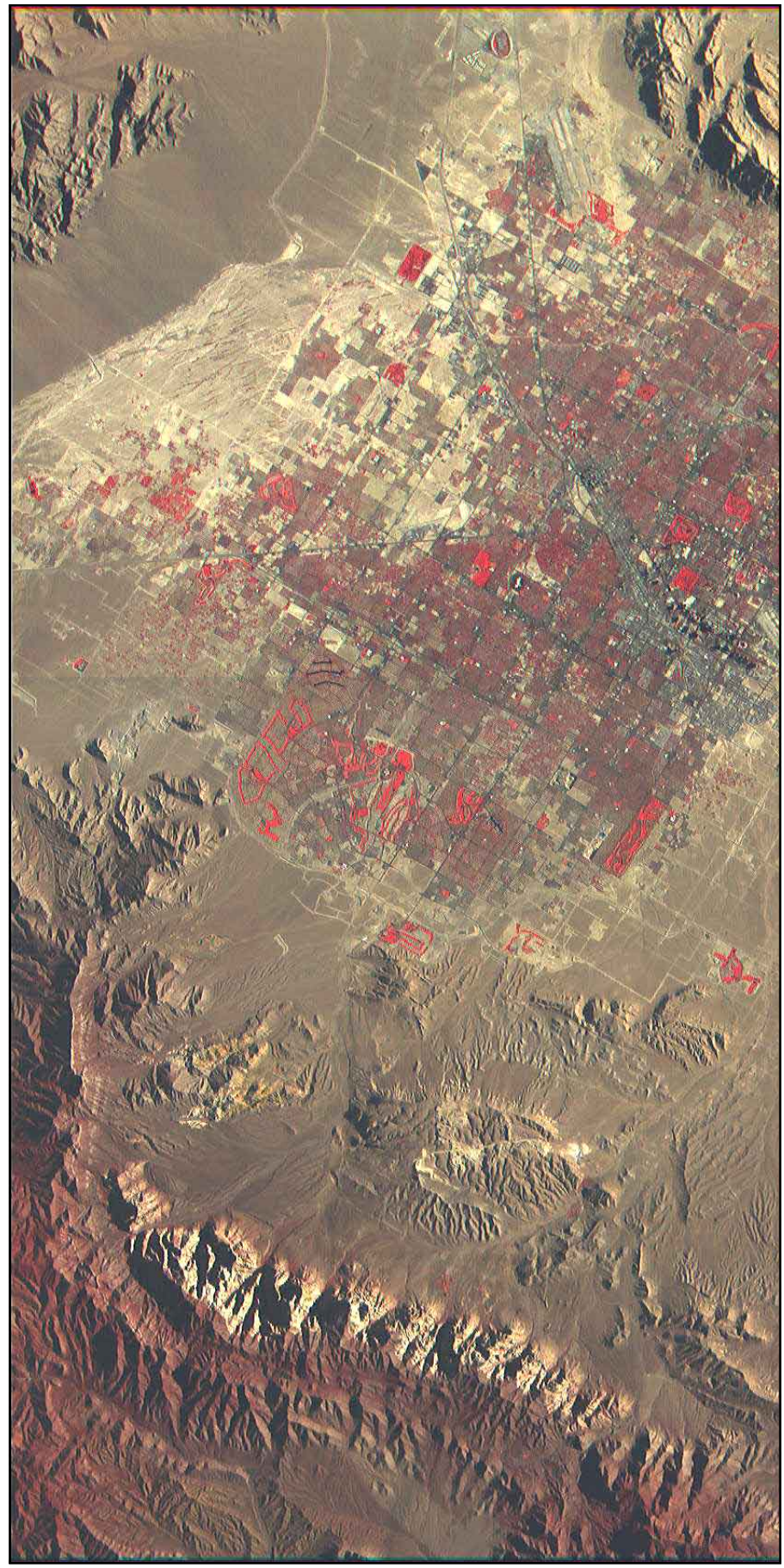


Figure 4—OSCAR 36 captured this image of a well-known city in the western US. Do you need a hint? Think "Caesar's Palace."

running a TNC-2; the TNC designation doesn't matter because *WISP* doesn't need special codes to place the modem in and out of KISS. The data link to my PC is at 57600 bps. It is important to have the transfer rate higher than the receive bps rate to prevent buffer overflows.

Software

This is the easy part. The same *WISP* software package available from AMSAT that functions on the 1200 bps and 9600 bps satellites will work fine at 38400 bps. Remember to set your modem and *WISP* for a modem-to-computer data transfer rate higher than 38400 bps. I use 57600 bps. If the transfer rate from the modem to the computer is set at 38400, the modem can never "catch up" from data flow interruptions and the modem buffer will eventually overflow.

If you're going to enjoy the beautiful, high-resolution color photos available on UO-36 (and seen on the cover of this issue), you'll need the software package *CCD Display2000*, developed by Colin Hurst, VK5HI. This is also available from AMSAT. UO-36 and TO-31 have a variety of image formats, including wide and narrow angle, B&W, full color and spectral images. Many of the images are in compressed format, and also come with a smaller, "thumbnail" version that can be downloaded first and examined before downloading the higher resolution version. Color images require the assembly of multiple single-color images obtained through filters in the satellite's camera. Thumbnails as well as full size files are needed to reassemble the final image. A full description of the image file subtypes is beyond the scope of this article, but *CCDDisplay2000* includes a detailed Help file. The software handles decompression and assembly of the multiple image files into a final color image.

Operation

Downlink at 38400 bps has to be seen to be fully appreciated! Currently, TO-31 is not operating in 38400 bps mode, so I will confine my comments to UO-36. This new satellite functions just like the other digital birds, and uses the standard Microsat File Transfer Protocol. Thus, image files (and other file types) can be specified for automatic downloading in the *WISP* MSPE equations. Details of this procedure can be found in the *WISP* setup and are familiar to users. *WISP* will then take care of requesting the files and requesting fills of file "holes" until the entire file has been downloaded. The downlink signal on UO-36 is at either 437.400 MHz or 437.025 MHz. Uplink is at 145.960 or 145.500 MHz.

Although the downlink signal is strong, I recommend that you use directional antennas and an azimuth/elevation rotator for maximum efficiency. This doesn't mean that you can't use an omnidirectional antenna such as a ground plane or "eggbeater," but you definitely will not enjoy 1.5 megabyte downloads. Rather than grabbing an image in one pass, you may need several to complete the file. (*WISP* takes care of all of this automatically.)

If you are using directional antennas, you should know that the downlink signal is right-hand circularly polarized. As those familiar with AO-13 will remember, when the off-pointing angle of the satellite antenna is high, the apparent polarization at the listener's location can switch to left-hand. If you use circularly polarized antennas the ability to switch polarization is very helpful as occasionally the signal virtually disappears if the wrong polarization direction is selected. The alternative is to use linearly polarized antennas and give up a fixed 3-dB signal loss. Because of the high-speed data rate, you can lose a lot of data during the time it takes your antennas to reposition after hitting an azimuth "stop." For this reason, elevation "flip" mode is a big advantage if you can use it.

One of the benefits of the broadband signal at 38400 bps is that Doppler tuning for receive is very noncritical. In fact, you can tune to the nominal downlink frequency and do reasonably well for an entire pass. Since I use *WISP* with a Kansas City Tracker/Tuner card, I get the calculated Doppler offset correction automatically fed to my transceiver, but there is plenty of room for error with these bandwidths.

The Symek IFD board does an outstanding job of amplifying and demodulating the wideband 38400 bps downlink. Coupled with the Symek TNC31S that I use, download efficiencies of 95% to 100% are typical. It is not uncommon to download over 1.6 megabytes on good passes. Because of the high-speed link, it is easily possible to obtain a full set of satellite images on a single pass. Try that at 9600 bps! Often, "fill" block requests are handled so rapidly that you miss them in the queue.

To whet your appetite for what's available, I've included a spectacular image from UO-36. Figure 4 is an unnamed town in the western US. See if you can figure out where.

Conclusion

With relatively simple modifications, including a Symek IFD board, a standard dual band 144/435 MHz FM transceiver can be converted to handle a 38400 bps (and higher) downlink and transmit uplink data up to 19200 bps. The benefits are considerable with a four-fold increase in downlink speed as compared to the current 9600 bps UoSats. It seems likely that this will be a popular speed for future satellites and may be active on Phase 3-D. Why not jump in now and give it a try? After watching 38400 bps downloads, the *WISP* byte counter on a 9600 bps pass appears to be moving in slow motion.

The modifications described can certainly be used for terrestrial packet as well. I'm convinced that the key to resurrecting packet in the United States, aside from the excellent functionality of APRS, lies in increasing the bps rate. In much of Europe, 9600 bps FSK is commonplace on terrestrial 435 MHz and several high speed (38400 bps and higher) packet stations have been established on 435 MHz and 1.2 GHz. The US has really lagged behind in developing terrestrial packet at rates above 1200 bps. "Internet speeds", perhaps with the newer TCP/IP style protocols, would sure "spice up" terrestrial packet as well!

Acknowledgements

Several individuals have been extremely helpful in the construction of this article and the groundwork leading up to it. TO-31 and UO-36 are under the able control of Chris Jackson, G7UPN, at SSTL, who is also the author of the *WISP* software suite for automated satellite operation. In addition to managing their day to day functions, Chris programs the image requests into these satellites. Roy Welch, W0SL, is the stateside *WISP* "guru", a colleague in the checkout of UO-36 on 38400 bps, and provided helpful comments on this article. Colin Hurst, VK5HI, another colleague in early UO-36 adventures, is also the author of software needed to process the satellite image files. James Miller, G3RUH, former "master" of AO-13 and expert in all things digital supplied the modifications for the G3RUH modem necessary for 38400 bps.

Finally, it should be noted that the author is not affiliated with any company mentioned in this article, and has received no compensation from them with regard to the items mentioned.

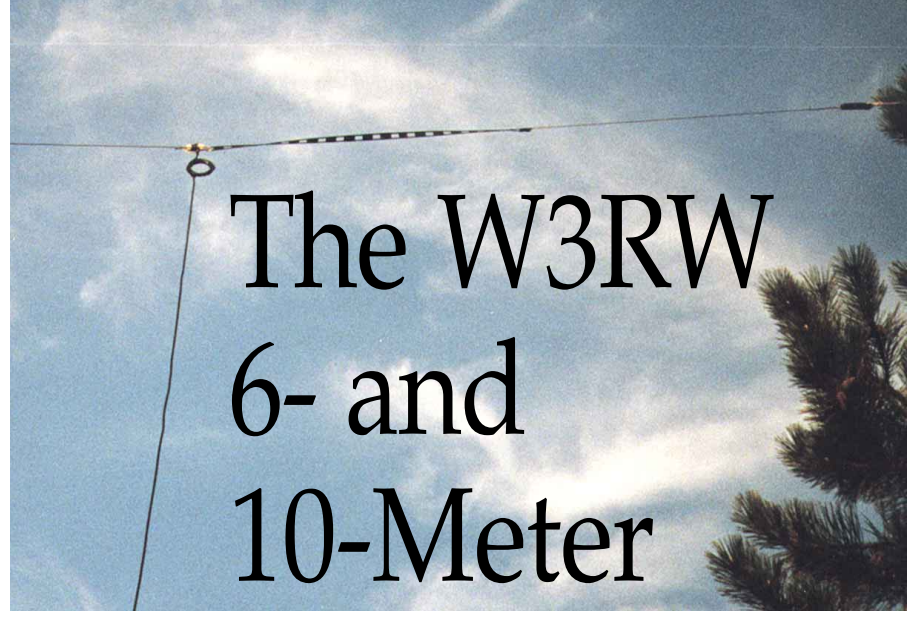
You can contact the author at 3917 Grenville Dr, Charlottesville, VA 22903-9723; **w4sm@cstone.net**.

Notes

[1]To learn more about *WISP*, and about using the digital satellites in general, I strongly recommend that you pick up a copy of the *AMSAT-NA Digital Satellite Guide*. It is available from AMSAT, 850 Sligo Ave, Suite 600, Silver Spring, MD 20910-4703; fax 301-608-3410; tel 301-589-6062. $12 in the US; $13 in Canada and Mexico; $15 elsewhere.

[2]Symek Datensysteme und Elektronik GmbH, Johannes-Kraemer-Str 34, D-70597 Stuttgart, Germany; tel 49 711 7678 923; fax +49 711 7678 924; **ulf@symek.com**. QST

By Bob Witmer, W3RW



The W3RW 6- and 10-Meter Long Wire

Looking for better-than-dipole performance on 6 and 10 meters without investing in a beam and rotator? Here it is! This novel antenna includes a matching section to deliver a near-50-Ω match on both bands.

I received many inquiries about the antennas described in my article, "Wire Gain Antennas for 6 Meters."[1] My favorite wire antenna—in terms of overall ruggedness, simplicity and pattern coverage—is a 4-λ long wire. In the spring of 1999, with the sunspot cycle improving, I decided I needed an antenna that would also provide some gain over a dipole on 10 meters. With this goal in mind, I investigated how to make a long-wire antenna that works well on 6 *and* 10 meters. Here's what I found.

Why Use a Long-Wire Antenna?

Wire antennas are among the easiest to install and use (and arguably lowest in cost), but most hams don't think of using long-wire antennas on VHF. Long-wire antennas *can* be used on VHF—particularly on 6 meters—as easily as on the HF bands. The following paragraphs describe typical long-wire gain and pattern characteristics; feedpoint characteristics are discussed later.

Gain

Antennas more than a couple of wavelengths long at the operating frequency exhibit gain over a dipole. The maximum lobe of an antenna 4λ long has an estimated *gain over a dipole* of approximately 3 dB (3 dBd); see Figure 1. The estimated gain for other multiple-wavelength wire antennas varies. A 3-λ antenna should have a gain of slightly more than 2 dBd; a 5-λ antenna exhibits a gain of about 4 dBd.

Patterns

With the gain increase comes a change in the antenna's radiation pattern. Along the axis of the wire, there is a narrowing and increase in the amplitude of the gain lobes compared to those of a typical dipole antenna's broadside pattern. Also, there's an increase in the number of lobes (and nulls) that provides somewhat omnidirectional coverage. Figure 2 shows some theoretical pattern comparisons.

Dual-Band Long-Wire Design Constraints

By changing which trees I used to support my wire antenna, I had room (just over 105 feet) to put up an antenna longer than the original 77-foot, 4-λ antenna. After playing with the antenna-length formulas, I found that a 3-λ, 10-meter long wire or a 5-λ, 6-meter long wire would fit. Both antennas provide the gain I was looking for—but I didn't have the room to put up *both*!

Eureka! The Dual-Band Long-Wire Antenna

Like the 4-λ, 6-meter long-wire antenna, I wanted a configuration with its feedpoint at a current loop (1/4 λ from one end of the antenna) to present a low-impedance to the feed line. This approach essentially separates the antenna into a "long" section and a 1/4-λ section. After examining the individual 3- and 5-λ antenna dimensions using 28.35 MHz and 50.15 MHz as frequencies of operation, it became clear that these antennas have one thing in common: The long sections are almost equal in length. With that in mind, I came up with a dual-band long-wire antenna design (see Figure 3) that uses ladder line as part of the 1/4-λ sections for each band and shares a common long section.

Dual-Band Matching Issues

Figure 1 shows the variation of radiation resistance, as measured at a current loop, with wire antenna length. Using this as a guide, the dual-band long-wire antenna has a theoretical feedpoint impedance of about 125 Ω on 10 meters (3λ) and 140 Ω

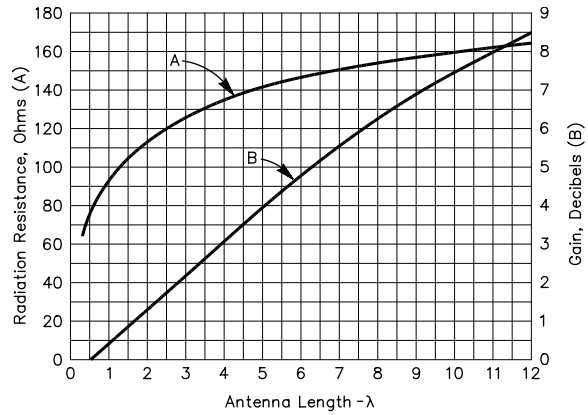


Figure 1—The variation in radiation resistance and power in the major lobe of harmonic (long-wire) antennas. Curve A shows the change in radiation resistance with antenna length, as measured at a current loop, while curve B shows the power gain in the lobes of maximum radiation for long-wire antennas as a ratio to the maximum of a 1/2-λ antenna.

[1]Notes appear on page 48.

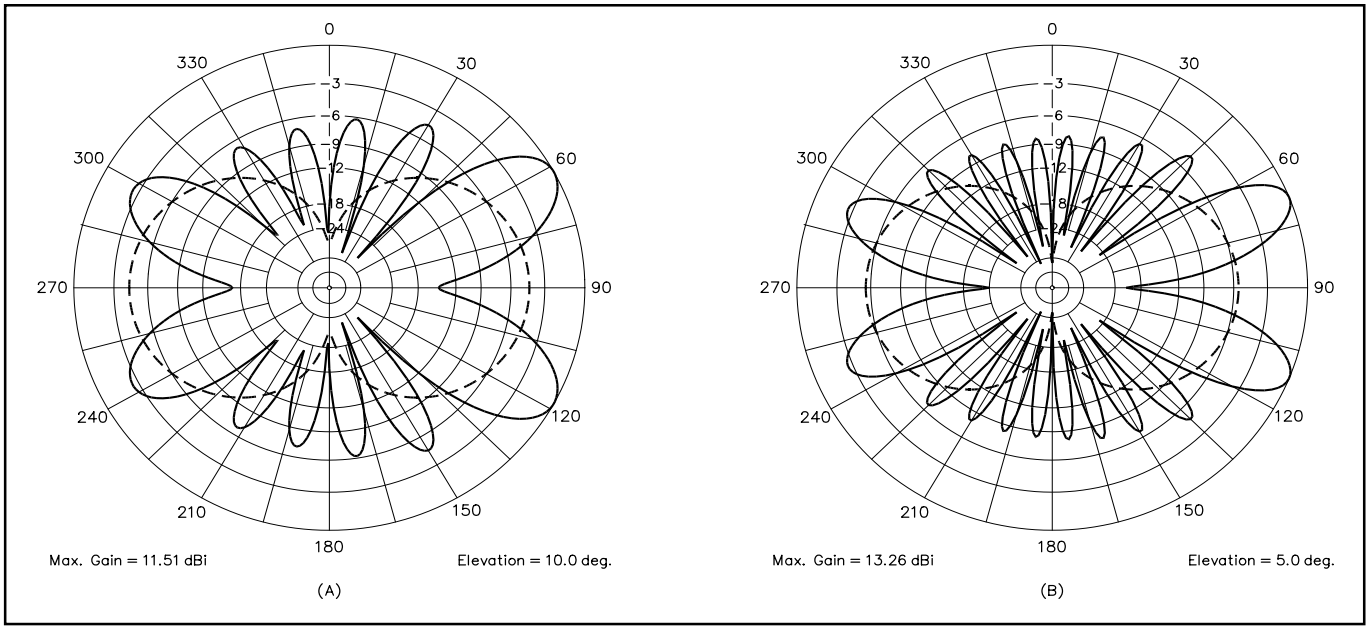


Figure 2—Predicted horizontal radiation patterns of a long-wire antenna as a function of length. At A, pattern of a 50-foot-high 3-λ long-wire antenna (solid lines) compared to that of a dipole (dashed lines). At B, pattern of a 50-foot-high 5-λ long-wire antenna (solid lines) compared to that of a dipole (dashed lines). *Tnx Dean Straw, N6BV*

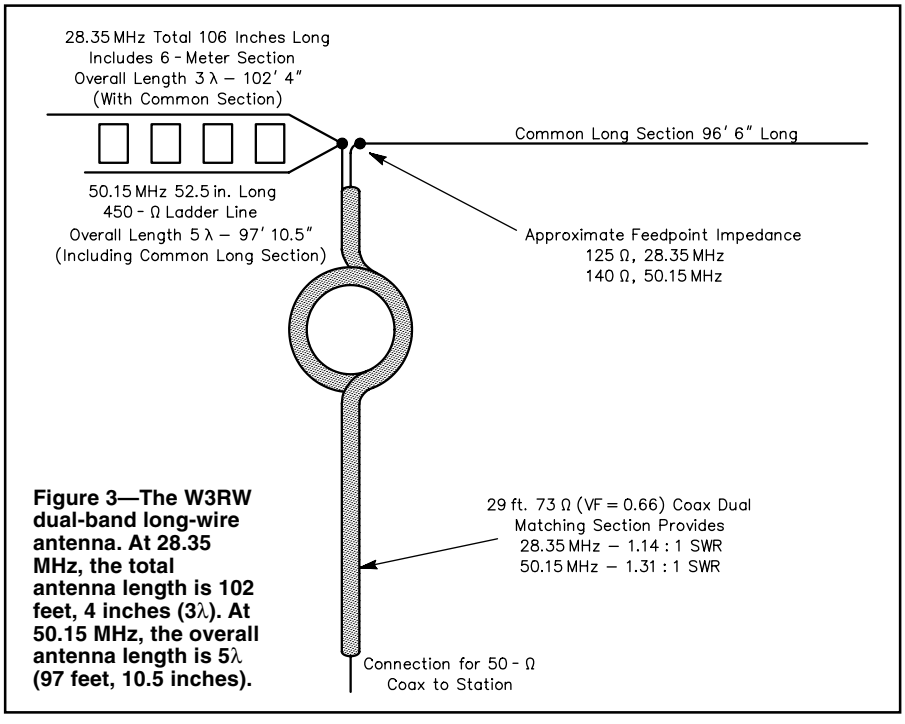


Figure 3—The W3RW dual-band long-wire antenna. At 28.35 MHz, the total antenna length is 102 feet, 4 inches (3λ). At 50.15 MHz, the overall antenna length is 5λ (97 feet, 10.5 inches).

on 6 meters (5λ). Either feedpoint impedance lends itself to using a $^1/_4$-λ 75-Ω coax matching section to match a 50-Ω coax feed line, but the typical $^1/_4$-λ coax matching section on 10 meters doesn't work on 6 meters and vice-versa. A wideband 4:1 balun could be used for matching, but the resulting impedance transfer would probably not be as close to 50 Ω as the $^1/_4$-λ matching technique provides. Also, most 4:1 baluns are relatively heavy, adding to antenna sag. Wideband 4:1 baluns are also expensive compared to the cost of 20 to 30 feet of coax. So, I decided to evaluate other approaches.

Eureka Again! The Dual-Band Coax Matching Section

I thought of the dual-band matching solution when I decided to experiment by adding a number of $^1/_2$-λ coax sections after the 6- and 10-meter $^1/_4$-λ sections. Comparisons showed that there is a combination of $^1/_4$-λ and $^1/_2$-λ transmission-line sections that results in total coax lengths for *each* band that are almost the same. (See Figure 4 and the sidebar "Characteristics of Half-Wavelength Transmission Lines.")

The total lengths of the two coax sections are close enough that the combination match works for the frequency pair of 28.35 and 50.15 MHz, although frequencies of 50 and 29.9 MHz provide an optimum calculated dual match. With the combination of the dual-band matching section and the dual-band long wire, an overall good match to 50-Ω line is obtained over the low-frequency ends of 6 and 10 meters.

On-The-Air Performance: Does it Work?

The system appears to work well—just like individual 6- and 10-meter long wires! With the long-wire antenna's maximum-strength lobes favoring the North/South directions, I use a two-element 6-meter quad in the attic to provide extra gain to the West. Although there are directions in which the quad *is* significantly better than the dual-band long wire, I've found that the long wire can hear everything the quad can hear—*including some signals the quad doesn't.*

My first QSO with the antenna came just after I finished making some adjustments. With my IC-706 connected directly to the end of the coax matching section, I answered a station in upstate New York calling CQ on 50.125 MHz. He came right back to me and we exchanged good signal reports (he was off the slightly weaker major lobe's end of the antenna.) After that, I switched to 10 meters and proceeded to work quite a few South and Central American stations in the main line of the antenna's stronger gain lobes. With the help of a small antenna tuner, I stretched the antenna's 10-meter bandwidth to cover the repeater segment and proceeded

Characteristics of Half-Wavelength Transmission Lines

A key factor in the dual-band matching solution is the 1/2-λ characteristic of transmission lines. Any impedance presented at one end of a 1/2-λ of coax—with coax of *any impedance* (that's the important part)—that same impedance is seen at the opposite end of the cable. For example, if you connect a 1/2-λ (or any multiple of 1/2-λ) of 75-Ω coax to a 50-Ω load, a 50-Ω impedance is seen at the other end—*even though the characteristic impedance of the coax in between is 75* Ω. (All wavelength references are to *electrical* lengths of coax; this takes into account the velocity factor of the cable.)

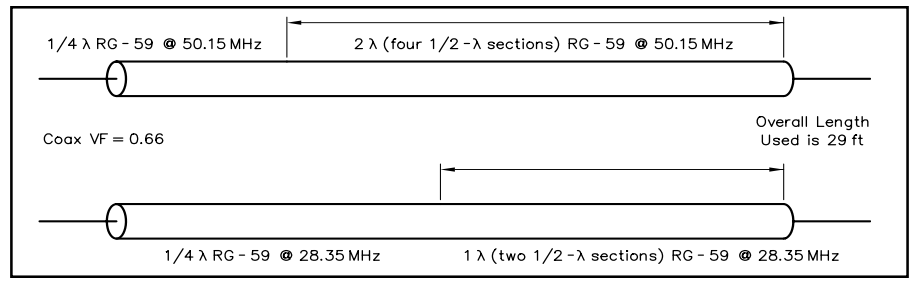


Figure 4—The W3RW dual-band matching section. Lengths shown here are for coax with a velocity factor of 0.66. The upper cable leg consists of a 50.15-MHz 1/4-λ section of RG-59 coax in series with a 50.15-MHz 2-λ (four 1/2λ-lines in series) section of RG-59 coax. The lower leg is a 28.35-MHz 1/4-λ of RG-59 coax in series with a 28.35-MHz 1-λ section (two 1/2λ-lines in series) of RG-59.

to work several additional stations.

As I write this, the September VHF contest and Hurricane Floyd's visit occurred about two months ago. I didn't actively participate in the contest, but I did use it to further check the antenna's 6-meter performance. With a transmitter RF output of 100 W, I found I could work everything I heard, including several sporadic-E contacts late one Sunday, but I did have to use a 400-W amplifier to make an Auroral contact. Ten-meter performance has been great! I've had no trouble working most DX I can hear from all over, including 7X, 9K, JA, ZS, ZL—and even a DS—with just 100 W output.

Construction Tips

Figure 3 shows the antenna details (not to scale). Cut the wire sections of the antenna a little long and wrap the far ends of the extra wire lengths back onto the main wire. This way, if you need to lengthen the antenna, you just unwrap the extra wire; you don't have to worry about adding more wire. If the antenna is too long, simply wrap more wire back onto the main run to reduce the antenna's overall length.

I started out with a little more than 5 feet of 450-Ω #14 stranded copper-clad ladder line for the 1/4-λ antenna section, allowing for connection to the center insulator and the 10-meter wire extension. As shown in Figure 3, one conductor of the 450-Ω line (the upper one) is used on 10 meters. The shorter conductor (lower one) is used on 6 meters. Make the cut for the 6-meter section so that it is *inside* one of the solid-dielectric sections of the line. Cutting the ladder line this way helps maintain the overall physical strength of the 6-meter section. (By the way, the dual-band long wire survived Hurricane Floyd's visit!)

Weatherproof the antenna by sealing the coax-to-wire connections, the connection between the matching-section coax and the 50-Ω feed line, and the connections at the ends of the matching section. Use a low-loss 50-Ω cable between the matching section and your shack.

To properly cut the matching line, you *must know* the velocity factor of the 75-Ω coax! The matching section I use is made of 0.66 velocity factor RG-59 coax, but cables with other velocity factors can be used as well. (When selecting the matching-section coax, remember that the center conductor in *foam-dielectric* coax has a tendency to migrate, potentially resulting in a short to the shield if the coax provides some structural support or is coiled.) I took the precaution of verifying the coax velocity factor by cutting an approximate 1/4-λ section and checking its length and frequency characteristics using a dip meter. Larger-diameter 75-Ω coax (such as RG-11) can be used if you want lower loss, but the cable is heavier than RG-59, and will likely increase the antenna sag. Interestingly, the data tables for coaxial cable show that the loss of many RG-59 coax types is similar to, or slightly *lower* than, RG-8X coax types at 50 MHz.

Adjustment

To tune the antenna, first adjust the lengths of the 1/4-λ sections, then adjust the long-wire sections to minimize the SWR on both bands. Then check the 1/4-λ-section lengths again. It takes no more than a couple of iterations to achieve the lowest SWR on both bands. The exact length of the dual-band coax matching section doesn't appear to be critical. I cut the matching section a little longer than 29 feet (using 0.66 velocity-factor coax) to provide the extra length needed for the connections to the wire and ladder-line sections and for the end coax connector. The resulting match was close enough to not require adjustment.

Coaxial Choke Balun

To isolate the feed line from the radiating currents of the antenna, I use a choke balun consisting of four feet of the matching-section coax wrapped in four turns just below the antenna feedpoint. This approach may not be as effective as using a traditional balun, but it seems to work; and considering the unbalanced antenna configuration, it may work almost as well. I have had no complaints about RF in the shack or house on either band. I derived this approach from the information in Table 19.4 on page 19.16 of *The 2000 ARRL Handbook for Radio Amateurs*.[2]

Summary

The W3RW 6- and 10-meter long-wire antenna is a resonant multiwavelength antenna that provides gain over a dipole on 6 and 10 meters and integrates a unique coax-cable matching section to provide a close match to 50 Ω on both bands. This is a predominantly horizontally polarized antenna optimized for the SSB portions of the 6- and 10-meter bands. Considering its simplicity and low cost, you ought to give it a try!

Notes

[1]J. Robert Witmer, W3RW, "Wire Gain Antennas for 6 Meters," *QST*, Feb 1997, pp 66-67.

[2]ARRL publications are available from your local dealer, or directly from ARRL. See the ARRL Bookcase elsewhere in this issue, or check out the ARRL web site at: **http://www.arrl.org/catalog/**.

[3]Please contact me for price and availability of a partial kit consisting of the dual-band matching-section coax, the 1/4-λ open-wire section and additional assembly information. Bob Witmer, W3RW, 146 Forest Trail Dr, Lansdale, PA 19446-6415; **w3rw@arrl.net**.

References

The ARRL Antenna Book (Newington: ARRL, 15th ed., 1988)

Edward M. Noll, W3FQJ, "A Multiband Long-wire Antenna," *ham radio*, Nov 1969, pp 28-31

ARRL's Wire Antenna Classics, (Newington: ARRL, 1999)

John D. Heys, G3BDQ, ed., "Practical Wire Antennas," (Potters Bar, England: RSGB, 1989)

Bob Witmer, W3RW, was first licensed in 1962 as K3VAX; he got his Extra class license in 1967. His Amateur Radio interests include equipment and antennas, 6- and 10-meter operating and HF DXing. Bob is a program manager for BAE Systems of Lansdale, Pennsylvania, with responsibility for a variety of electronic warfare programs. Bob has written several articles for QST. You can contact Bob at 146 Forest Trail Dr, Lansdale, PA 19446-6415; **w3rw@arrl.net**.

By Jay Kolinsky, NE2Q

NE2Q's Antenna Fell From the Sky!

Lofting large wire antennas with balloons and kites is an acknowledged part of Amateur Radio folklore. But the cost, danger, hassle and typically "irreproducible results" have kept these techniques from the mainstream—until now! If you've always dreamt of stratospheric antenna heights, NE2Q and AA1MY can show you the way.

Since becoming a ham in 1958 I've operated on most bands, but I've never really had a decent antenna for 160 meters. I tried tying the balanced feeders from my 80-meter dipole together at the tuner, but my signal on 160 wasn't moving S-meters very far. I needed a real antenna.

I recently became a member of GNARC, the Greater Norwalk Amateur Radio Club, a very friendly bunch with quite a few active experimenters. In late November 1999, the club sponsored a "Fun Fly" at Sherwood Island State Park, on the shores of Long Island Sound in Westport, Connecticut.

KE1GB and others flew model rockets. K1OF flew a kite supporting a tiny fast-scan TV camera and transmitter, which gave ATVers within 20 miles a good color picture of our operations on the ground. N1OLO set up a station to plug Amateur Radio. The station used a kite-supported end-fed wire. It worked quite well despite the rather weak wind conditions.

The day was unseasonably warm, and wind conditions had deteriorated by about 2 PM. We had trouble keeping the kites aloft. About this time a stranger came on the scene. He was carrying two long white objects under his arms. Nobody knew who this fellow was. He proceeded to unroll these articles, which he identified as homemade kites. They looked pretty large—about 15 feet from the top to bottom of the double tails and 10 feet wide.

I asked him if he expected to fly those things with the present wind conditions (a "non-breeze" of less than two miles per hour). He answered, "This is the way I like it!" He was "crazy" or he really knew his kites. He had a helper walk the kite about 200 feet downwind while he held the kite string. He yelled, "Let go," and the big kite soared almost straight up. I'd never seen anything like it.

After attaching the TV camera and transmitter from K1OF's kite, the stranger launched his second kite. I couldn't feel even a hint of a breeze on my face but the kite climbed straight up. What a wonderful kite! I thought about how unfortunate it was that this fellow wasn't a ham. His kite would be great for lifting a vertical antenna for the upcoming 160-meter contest.

The author (left) and Seab, AA1MY, with their kite creation.

I approached him again and introduced myself. "It's too bad you aren't a ham radio operator. I think your kite could lift a large antenna," I said. He replied, "My name is Seabury, call me Seab, and I'm AA1MY. I've been wanting to lift a 160-meter vertical dipole since I started flying these large kites."

By now, many of us were curious about Seab's kites. He identified them as Scott Sled kites. They're made for heavy lifting in light winds, and they fly at very high angles—70 to 80° is not uncommon.

His kites were made of white Dupont *Tyvek*, three skinny sticks and fiberglass-reinforced adhesive tape. Tyvek is used to make vapor barriers (in new house construction) and high-strength mailing envelopes. It's very strong and lightweight. Seab offered to give us the diagrams to make kites of our own. He had a bunch of copies with him. I guess he attracts lots of inquisitive people whenever he flies his designs.

Over the next few weeks, Seab and I made plans to work the 160 contest. We were trying to get permission to use the state park, but we were turned down because the park superintendent claimed there would be no employees on duty at night in December. The park closes at sundown. We tried another park near the water, but we could only stay there until midnight. So we gave up on the parks until next year when we'd have more time to set something up.

Because the parks were out of the question, I asked Seab about flying the kite from my QTH. I live on top of a 770-foot hill in northeast Westchester county, about 45 miles northeast of Manhattan. I have a clearing around my house that's about 200 by 175 feet. Where the clearing ends, 50-foot trees start. I'm surrounded by trees in all directions but one—southeast. My property drops off abruptly in that direction.

The wind would have to blow just right to get the kite out over the valley while avoiding the bordering forest. It would be like threading a needle blindfolded. And

Roll Your Own

The kite described in this article is a proven "Scott Sled" design, which, after considerable searching and experimentation, seems to be the most economical and easy to build lifter adequate to my needs. This one is scaled to 9 feet tall by 10 feet wide, which is just right to be cut from a standard 9-foot roll of house wrap. Tyvek, or a clone, is available from most building supply stores. Tyvek is good because it's strong and white, which lets fliers decorate the kites with club names, call letters, etc. Fluorescent spray paint and brushed acrylics work well.

Struts can be made from any strong, lightweight material, but I prefer economical, ribbed screen door molding, also available at most building supply stores. Struts are fastened with contact cement to the back of the kite to maintain its shape in flight. The kite's perimeter and vent edges are securely rimmed with 1/2-inch fiberglass-reinforced tape to prevent tearing under stress.

Bridle tie loops (see Figure A) are fashioned from 20-inch strips of one-inch fiberglass-reinforced tape. Start on one side of the kite and end on the other, making the loops about four inches in diameter. Place an eight-inch piece "face-to-face" on the inside of the first strip to provide a smooth, non-stick surface inside the loops. Remaining strips are "fanned" on the kite surface (to distribute load) and overlap at the loops. Fold the loop material in from both edges to provide a dense, smooth tie for the bridle lines.

The bridle itself is at least three times as long as the kite is wide, in this case about 36 feet long. Short bridles cause instability. Make sure there is no "twist" to the bridle and that the connection point to the fly-line is precisely centered. Use a heavy-duty swivel at the tie point to prevent twist and raveling during launch and retrieval.

Flying line for this kite should be at least 150-pound-test in 4-10 MPH wind and 250-pound-test or more in 8-18 MPH wind. I buy the big rolls of no. 36 "seine line" or "carpenters twine" at Home Depot. The line *must* be kept on a winder that's up to the task of belaying and winding heavy line safely. I recommend an "H-type" winder of 5/8-inch exterior-grade plywood, smoothed and painted, equipped with a belaying knob (see Figure 1). Believe me, there is no way in the world you'll stop a drum-type winder safely if the handle gets away from you under 50 to 100 pounds of load. Don't even think about using a fishing reel.

Never handle the line under load or loop it around your hands. *Always* use good leather gloves to prevent very nasty cuts—right to the bone. Do not fly in wind above 20 MPH!

Flying the Kite

To launch your kite, reel out at least 150 feet of line and have a second person hold the kite by the bridle ears with her/his *back to wind.* This can be difficult in a good breeze, so keep the kite rolled up until everything is ready for launch. Large kites are very efficient, so no running is required. When ready with all lines, the "pilot" signals the second person to open the kite and let it go. Have the line passed over the winder knob to center the load. If wind is above 10 MPH, let the line out very carefully or you may lose control and possibly get hurt trying to wrestle it back.

Fly the kite above 300 feet to avoid most of the ground turbulence caused by buildings, trees, etc. Another advantage is that there is usually a flyable wind at altitude even when it's not apparent at ground level. Higher is always better. With an altitude limit of 500 feet, an antenna hung from the fly-line at the 100-foot mark leaves 400 feet of "free line" for the kite to play with, thus reducing instability. Of course, more free line is better.

This is important: If you must belay the line for control and securing, do so only on a smooth metal pipe such as a bumper or a

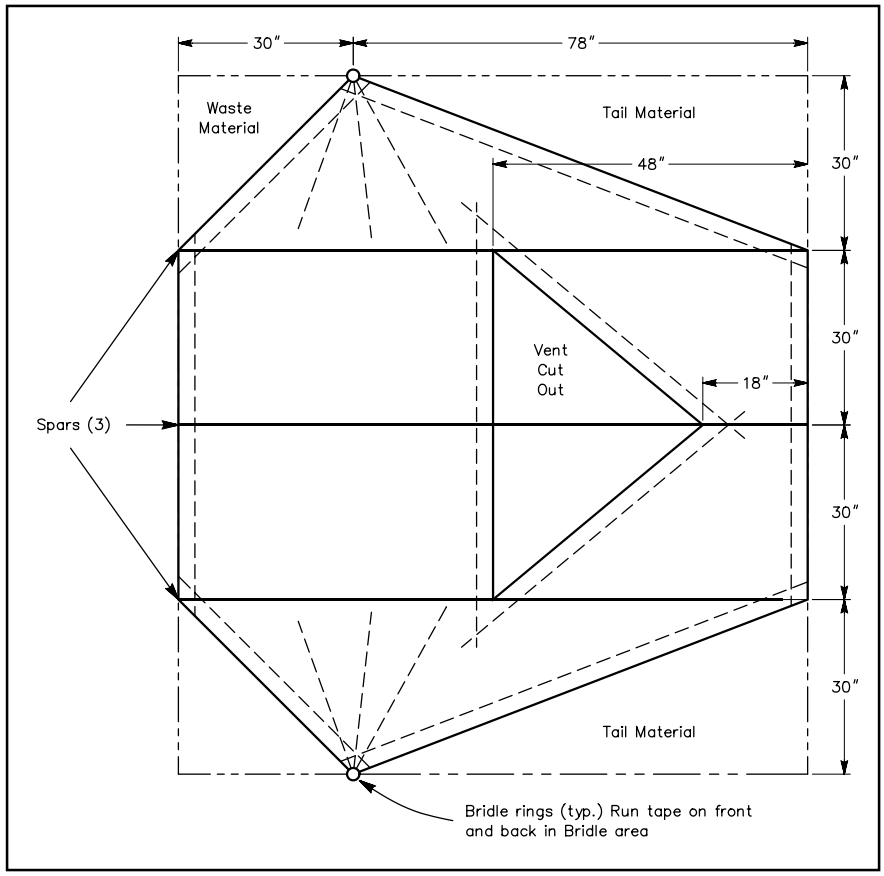


Figure A—This is the cutting pattern for a kite using a 9 × 10-foot section of Tyvek house wrap. The dotted lines indicate the placement of 1-inch Fiberglass reinforced tape on the back. The spars (I use screen door molding) are contact cemented to the back. Notice that the two sections labeled "Tail Material" are to be used to make the tail for the kite. The tail material is contact cemented to the back edge with the open V. Bridle rings can be made of 1-inch thick reinforced tape. The bridle must be at least 36 feet long for this kite.

we'd have to be cautious. A kite 500 feet above my lawn would be nearly 1400 feet above sea level. Seab suggested that we attach a battery powered strobe light to the kite for added safety.

Up, Up and Away!

The dipole was to be fed via several hundred feet of balanced line. Seab would drive down the next day. The FAA was notified and we were ready to go.

Naturally, at 10 AM Saturday, the electricity went out at my home. Someone had knocked down a nearby power pole. Would we get the power back in time? Seab called me at 2 PM. He was leaving his home in Beacon, New York for the 90-minute drive to my QTH. I told him about the downed mains. We arranged to use 2 meters for the talk-in and hoped the power would come back on before dark.

Seab arrived about 3:30 PM. We had about one hour of daylight left. Fortunately, ac power was restored about 30 minutes before Seab's arrival. Seab pulled out his kite and all the wire and string. We had virtually *no wind* at ground level. My wind-speed indicator showed only one to two miles per hour, but the direction of the slight breeze was perfect. Once again I had the feeling that there wasn't enough wind to get the kite airborne. I shouldn't have worried.

Seab positioned me and the kite right at the edge of the overlook. He moved upwind about 175 feet. The kite string was precariously close—about 15 feet—to a stand of 50-foot trees. Seab yelled, "Let 'er go!" I did, and the big kite shot straight up, just like the first time I saw it fly. It was amazing.

The kite immediately rose to about 250 feet. Seab then attached one end of the dipole to the kite string. We let the kite rise until the dipole's center insulator was about four feet off the ground. Seab then attached the 450-ohm ladder line to the kite string and to the antenna. He left about 100 feet of feed line between the center insulator and the kite string.

After the antenna stuff was rigged the kite rocketed to its full altitude of about 600 feet (tethered by 700 feet of 150-pound-test string). The 160-meter dipole was hanging perfectly vertical while the feed line came away horizontally for 100 feet before dropping down at about a 45° angle right to my shack. The top end of the dipole was at least 1000 feet above sea level!

"No Contest!"

I excitedly connected the balanced line to the tuner. The antenna tuned perfectly and the contest was in full swing. Many of the signals were 40 over 9 and higher. It was 2155 UTC when we made our first call (with 100 W) to W1TO. He shot right back with "599." We quickly worked nine stations in seven states including IL, WI and IA. I wanted to try things out at the 1-W level just for fun. WQ2G went in to the log first. We made eight more calls to eight stations, and they all came back on the first call despite the fact that other stations were calling. One was in North Carolina and one was in Indiana. We knew we had an "Antenna."

Now it was time for a 30-dB boost above QRP power. I fired up my home-brewed 8877 amp, and at 1.5 kW, we were "in business." We couldn't find a clear spot, so we just jumped in around 1846 kHz. After only a few minutes of calling CQ and working stations at a rapid rate, the frequency became quiet. Everyone who had been calling CQ had moved away from us. We were all alone, and we each had big smiles on our faces. We didn't really take this first contest too seriously. Our main purpose was to see if we could indeed raise a full-size vertical dipole for 160 meters with a kite. We did that and we were happy.

My wife Ulla, N2IOJ, called us to dinner. We stopped operating for an hour and enjoyed a sumptuous meal. "Good thing we couldn't get permission to operate in the park," I remarked. After dinner we checked the kite, which was still flying majestically. It was a beautiful and unusually warm night. The sky was crystal clear and the big kite was surrounded by a sea of twinkling stars. We continued operating and quickly filled another five log pages.

At 0140Z we checked the kite with a high-power 12-V searchlight. We noticed that the kite string/feed line attachment had failed. The entire weight of more than 200 feet of feed line was being supported by the kite. We thought something else might have broken, but nothing was visible. The kite, no longer flying vertically, was leaning at about 60° and had dropped slightly in altitude. The wind was still showing about two to three miles an hour on my indicator.

The author holds the kite, ready for launch. You can just see the tail material on the ground below the vent opening.

park bench. The metal won't chafe the line and acts as a heat sink. Allowing the line to slip over wood, etc, will cause rapid melt-down and loss of the kite and antenna. Think about it.

Never attach wire directly to a kite. Make sure that the line from the antenna attachment point is *smaller* than the line back to the control point on the ground. That assures that any line breakage will occur *above* the wire, eliminating the very serious hazard of your kite dragging wire over power lines, etc. Again, think about it.

Adjust the anchor point to position the antenna feeder in a location that's convenient to your operating position. The feed line should be anchored separately at the operating position to prevent your rig from being yanked into the wild blue yonder. Juggling anchor and operating points can determine the directional orientation of arrays, slopers, **V**s, etc. This requires constant attention, so a second (gloved) helper is highly recommended.

If the feed line is fragile, an additional, insulated messenger line must be added to avoid breakage from strain and flexing. Light monofilament line is great for this. Static discharge can be a problem, although I haven't suffered any ill effects—yet. That might be because of the low-resistance path to ground in my tuner.

Finally, when it's time to land your monster, have your helper "walk the line down" rather than trying to reel it in. The gloved "helper" walks away from the "pilot," pulling the line down for the desired distance, then secures the line temporarily while the pilot walks forward winding up the slack.

Other possibilities

There are lots of possibilities to explore with a lifter of this capacity. We've hoisted ATV rigs, 8-mm video cameras, large banners, beacons and, of course, the 250-foot 160-meter vertical dipole in this article. I've hoisted several QRP "antlers" on camping trips with great success. Two kites will support a horizontal array such as a half square, though it's quite a challenge to keep things under control. Additional "guys" (monofilament) must be attached to the antenna attachment point to maintain the required configuration. Allow for lots of (nearly constant) tinkering time!

For intrepid experimenters willing to invest about $25 and three hours of construction time, the return in fun and excitement is enormous. Let's hear about your adventures!—*AA1MY*

Seab, AA1MY (left), and the author with the "H-Winder" and a half-size version of the kite.

After all the 599s, which is the standard signal report for contests nowadays, we decided to get some honest comments. At 0216Z, the kite was still up (but not as high as it had been). We went up to about 1910 kHz and found "Coke," W4DHA, talking with NB4P and K4JZY. "Coke" said our signal was so strong we were probably running illegal power. This report came before we told Coke about our antenna. After we described our operations we had a nice chat. We signed off, went outside and searched for the kite. It was down!

What Goes Up...

We grabbed a pair of flashlights and followed the kite string, which was leading us to the northeast and was over the trees. We walked into the forest while shining our flashlights skyward to keep track of the string. It was now close to midnight. We found the kite floating in a tree about 30 feet high and about 700 feet northeast of my house. It was on my neighbor's property. We tried retrieving the kite using a 30-foot telescoping pole. Unfortunately, the pole was a little too jiggly, which caused us to laugh. The more we laughed, the more it jiggled. We gave up until the following morning.

Sunday morning came, and at 9 AM I was out on my neighbor's property with some additional hardware. I fashioned a hook from #10 aluminum wire and affixed that to the tip of my 30-foot pole with a hose clamp. It worked. I was able to snag the kite and pull it down. The string seemed stuck on the trees somewhere, so I cut the cord and left it in the tree. Seab's homemade kite was safe. The only casualty was a cracked stiffener, which would be easy to replace.

As I walked back to the house I started thinking about the antenna that was now draped over a thick forest of trees. I'd often wondered how I might string just such an antenna. Well, I'm happy to report that the treetop dipole is working *very* well. It works great on all bands up through 10 meters. It also shows good directivity from 40 meters on up. Who knows how long it will stay hanging up in the trees? I'll enjoy it as long as it lasts.

It truly is "The Antenna that Fell From the Sky!"

Be Careful and be Legal

If you'd like to try your hand at making AA1MY's heavy lifter kite, you can follow the plan described in the sidebar "Roll Your Own." Be cautious when flying it. This is *not a child's toy*. Avoid power lines and do not use a wire (instead of string) to hold the kite. A runaway kite of this size with a few hundred feet of dangling wire could be quite hazardous.

In addition, make sure you observe FAA regulations concerning moored kites. Our kite weighed less than 5 pounds, which exempts it from many FAA regulations. Even so, it is a potential hazard to pilots so you should contact your nearest FAA Flight Service Station 72 hours in advance and ask them to issue a NOTAM (Notice to Airmen) for the duration of your flight. You can locate and contact your nearest Flight Service Station by calling 800-992-7433.

If you attempt to fly a kite that is *heavier* than 5 pounds, other rules apply. Specifically:

- You cannot fly your kite less than 500 feet from the base of any cloud, or more than 500 feet above the surface of the Earth.
- You cannot fly your kite when visibility conditions are less than 3 miles.
- You cannot fly your kite within 5 miles of any airport
- If your kite will be flying higher than 150 feet, you must notify the nearest FAA Air Traffic Control facility 24 hours beforehand.
- Any kite flown at night must carry a light, preferably a bright strobe.

Our next project is a half-wave bottom-fed vertical for 160. This will eliminate the weight of the feed line needed for a center-fed dipole. How about a half-wave vertical director aimed at Europe in front of the driven element?

You can contact the author at PO Box 300, Pound Ridge, NY 10576; **jkolin@cloud9.net**.

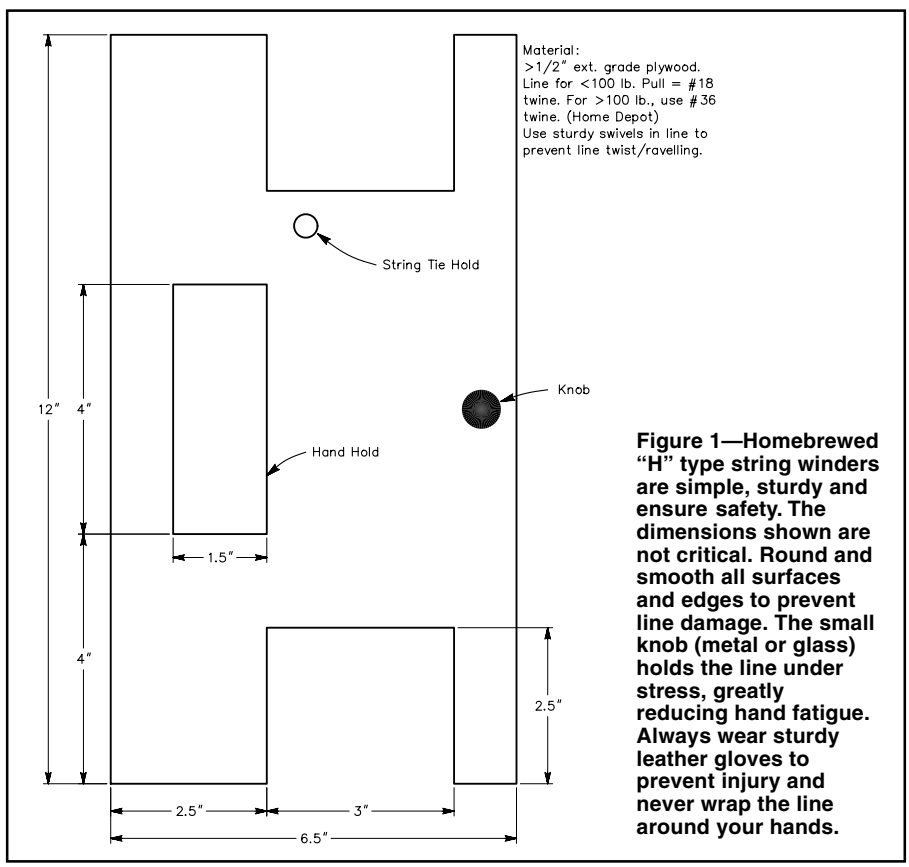


Figure 1—Homebrewed "H" type string winders are simple, sturdy and ensure safety. The dimensions shown are not critical. Round and smooth all surfaces and edges to prevent line damage. The small knob (metal or glass) holds the line under stress, greatly reducing hand fatigue. Always wear sturdy leather gloves to prevent injury and never wrap the line around your hands.

How Hamvention Happens

By Rick Lindquist, N1RL

Like a garage band that finally breaks into the top of the charts, Hamvention started small and grew into an Amateur Radio institution. Staying Number 1 involves lots of hard work, volunteers, and money.

Viewed from the outside, the Dayton Hamvention is the world's biggest and best hamfest—the place where amateurs from around the world gather each May to gawk at—and perhaps purchase—the latest gear, socialize with their cohorts, and haggle for bargains. Looking from the inside out, however, Hamvention is, at its core, a complex business that ultimately aims to delight upwards of 30,000 vendors, exhibitors, and visitors and make them want to return the following spring.

Making it happen each year means months of planning, countless hours of work, sizable sums of money, and a delicate network of personal relationships and rapport with key individuals and entities

The Hamvention crowd lines up outside Hara Arena prior to opening. Last year, more than 28,100 turned out for Hamvention.

The main arena Indoor Exhibits at Hamvention.

that's taken years to build. It also means attention to minute details, like arranging programs and forums, and for more down-to-earth concerns like contracting for three dozen porta-johns and 150 trash containers (with liners), and disposing of 45 tons of trash after everyone has gone home.

The result each May is greater than the sum of its parts. With the conjunction of the ARRL National Convention and Hamvention 2000, Hamvention officials say interest has been "early and intense."

Shuttle bus service costs Hamvention around $70,000 each year.

A Quick Hamvention History

What became the Dayton Hamvention started out in the early 1950s with $100 from DARA and an inspiration to develop a quality Amateur Radio convention. A fellow named John Willig, W8ACE, is credited with first proposing the idea to DARA around 1950. It was turned down. The new DARA president, Frank Schwab, W8YCP (later W8OK) was more receptive to Willig's idea. The DARA Board allocated $100 and the first organizational meeting was held in early 1952. The rest, as they say, is history.

Well, not quite. Willig was tapped as the first general chairman of the Southwestern Ohio Ham-vention, as the show was dubbed. It became Dayton Hamvention the following year, and the name now is a registered trademark.

The $100 in seed money did not go very far. A small TV was raffled off to help raise money. The FCC agreed to give license exams, and the late Phil Rand, W1DBM, a pioneer in TVI elimination was on the program. Boat anchor fans will appreciate the fact that the first prize was a Collins 75A2 receiver, purchased locally.

The first "Ham-vention" ended up being held in March instead of April (as it was for many years) because the Biltmore Hotel in downtown Dayton already was booked for April. 1999 Hamvention Forums Chairman Ron Morefield, W8ILC, was there for "Ham-vention's" debut. "They geared up for 300 people. But 650 people showed up, and they didn't know what to do," he said. There were seven exhibitors and six forums at the first show.

By 1955, the Hamvention Committee had instituted its awards program with the Hamvention "Amateur of the Year." In 1964 the Hamvention moved to Hara Arena, its present location. In 1973, Hamvention expanded into a two-day event, and Sunday was added to make it a three-day event the following year. Next year's show is the 50th Hamvention.

DARA: The Volunteer Side of Hamvention

The Dayton Amateur Radio Association—DARA—owns Hamvention. DARA chooses the show's general chairman, who then assumes the Herculean—and totally volunteer—task of orchestrating Hamvention. The Hamvention 2000 Chairman is Jim Graver, KB8PSO, who spent three years as assistant general chairman under the tutelage of former Chairman Dick Miller, N8CBU, before being given the reins in his own right. Hamvention has had 26 general chairmen over the years, some serving for more than one event. On the Hamvention Committee since 1992, Graver started out staffing the prize booth and worked his way up.

COURTESY OF KB8PSO


Hamvention 2000 General Chairman Jim Graver, KB8PSO

Graver views his chairmanship as an enormous responsibility. "The position has a lot of both politics and pressures," he concedes. The General Chairman is under the gun to not only generate the revenue DARA needs to operate as a club and to cover the costs of its scholarship and its educational and public service work, but also "to make sure the attendees are happy, the exhibitors are happy, take a look at what didn't work last year and continue to improve the show each year," he says. "And, of course, along with changes always come some instability that you need to manage as well."

Graver says he has "a great team" behind him that includes 550 or so DARA volunteers on 28 core committees—each with its own chairperson and assistant. Committees meet regularly to discuss their respective areas of responsibility. A monthly joint gathering lets committees compare notes as preparations ramp up for Hamvention.

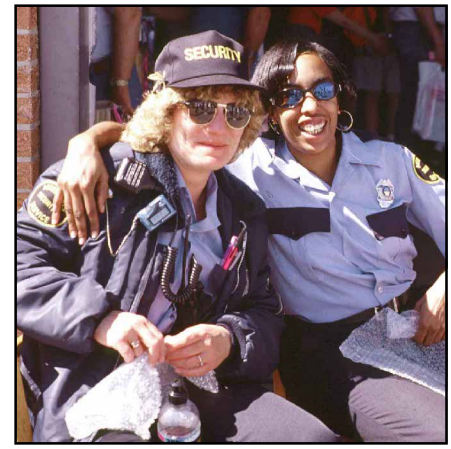
DARA volunteers are most visible during the three-day Hamvention. They work in traffic control, assist vendors and visitors, provide security, handle tickets and programs, and generally keep an eye on things—among many other tasks.

One crucial role for Hamvention volunteers, Graver says, is to see to it that the show "continues to flow," as he put it. "Are the attendees enjoying themselves? Are they smiling?" Smiles are extremely important, he says.

During the show, DARA volunteers attend to "a humongous number of details," Graver


The Hamvention horde arrives on opening day!

EMS staffers prepare for a weekend of Hamvention duty.



Hamvention security personnel ham it up.

says, and they try to handle incidents as they arise. This means "being everywhere, being in communication, and accessible to folks to answer questions, to get to a spot when someone needs help—there are questions coming up all the time."

Those intimately involved with Hamvention consider maintaining a sense of continuity from one Hamvention to the next as critical to the show's staying power. Drawing on the experience and expertise of past general chairmen is a real asset, says Graver, who consults a core group of past general chairmen for guidance.

Planning for the following Hamvention begins before the current show even takes place. Graver's already working on the 2001 show—the 50th Hamvention. "This is a 365-day function that we volunteer for, so we're all the time working on the show and what we want in it and looking at not only this year but next year," he explains. "We have to be constantly looking forward."

Monday-morning quarterbacking is part of the process. "Every year, after the show, we review what happened, what could we have done differently, what changes impacted a situation, how we can look into the future to try and prevent things," Graver says.

It's a lot to keep on top of. Graver's predecessor, Miller, says he purposely tried to *not* know about certain details of the show so he could keep focused on the bigger picture.

The Wizard Behind the Screen

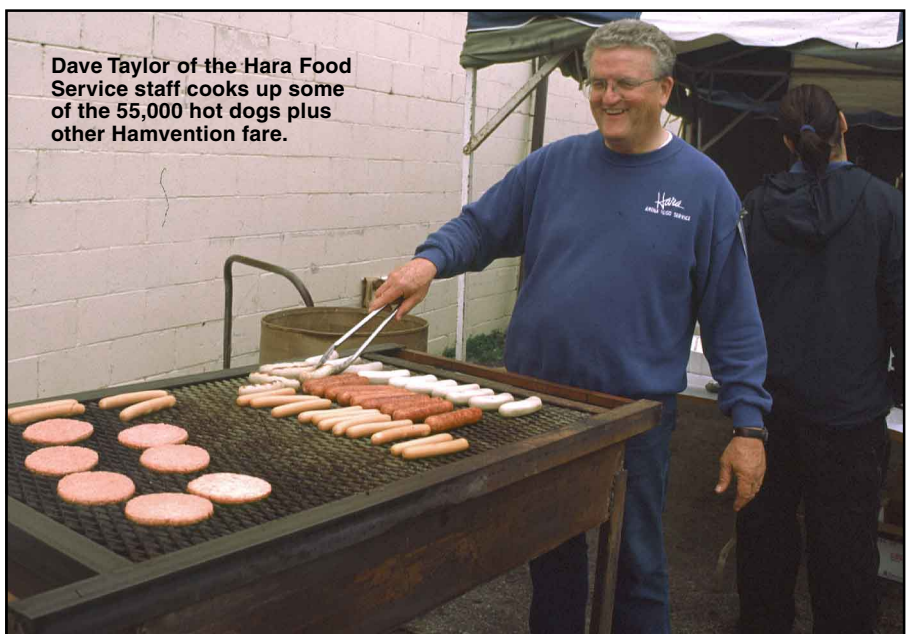
While DARA volunteers freely donate much of the human effort that makes Hamvention happen, Hamvention has grown too large to rely strictly on "free help." For many years now, one professional in particular has attended to the very crucial nuts and bolts that make the show happen each spring and keep the amateur community coming back year after year.

This wizard's name is Garry Matthews, KB8GOL. "I'm very attached to Hamvention," says Matthews, who has been working behind the scenes producing Hamvention for more than three decades, starting out as a contractor with Hara Arena and later being hired by Hamvention to produce the show. While he devotes most of his working days throughout the year to Hamvention, he gives untold *gratis* hours as well, Hamvention officials say. Matthews' company, Event Production Services, is his bread and butter and does shows all over the country, but Hamvention is the largest endeavor.

All of those familiar with Hamvention from behind the scenes view Matthews' role as vital to ensuring a smoothly running Hamvention. Over the years, he's been the glue that makes it all hold together. "He's the core person who is consistent throughout the many years of general chairmen who come and go," Graver says.

Matthews is the detail guy who deals with Hara Arena where Hamvention takes place. He makes myriad contractual arrangements, secures necessary permits, arranges ticket printing and program distribution (the program is produced by Mel Berman [W8GTR] & Associates), pays the obligatory fees, secures parking, communications, electrical power, locksmiths, trash collection and disposal, and even works out crowd and traffic flow patterns. "It's because of the relationships that he's developed that makes it happen," Graver says. "It's quite a task he does."

Some even suggest the show wouldn't happen without Garry Matthews.



Dave Taylor of the Hara Food Service staff cooks up some of the 55,000 hot dogs plus other Hamvention fare.

The Madding Crowd and Critical Mass

Hamvention is nothing without the teeming throng of more than 25,000 that gravitates toward the big show each May. Managing and moving the madding crowd is the major logistical challenge for Hamvention officials. And while Hamvention attendance often is seen as a barometer of the show's success, Hamvention officials agree that 30,000 visitors is critical mass, given the current facilities at Hara.

"Anything over 28,000 pushes it at Hara," says Matthews. "It pushes our restroom facilities, it pushes our food concessions, it pushes our transportation, and it pushes our human comfort factor, which is important."

While it's nice to anticipate a bigger crowd each year, Matthews says, if people

Hamventioneers chill (only in a manner of speaking) outside Hara Arena.

don't enjoy themselves because they feel crowded or uncomfortable, they won't come back the next year.

The lack of parking at Hara to accommodate all Hamvention visitors necessitates a system of off-site parking and regular bus runs. "The transportation of folks to and from the show is always one of our biggest concerns," he says. It's also been a focus for complaints.

For the past few years, Graver says, the key to transportation happiness has been timely, professional bus service through an arrangement with the Dayton Regional Transport Authority—the RTA—which has ADA-compliant buses.

"Once we did that and went with the folks who know Dayton and know the area, our complaints have literally dropped to zero," Graver says.

Hamvention arranges the off-site park-and-ride areas, but there have to be enough riders to justify the service. Hamvention parking is available at Salem Mall, the University of Dayton, and other locations. Private parking, available for a fee across from Hara Arena, is not managed by Hamvention.

Hamvention pays for parking on the Hara Arena lot, however, as well as passes for the inside vendors, Graver says, so there's really no "free" parking. A traffic flow pattern worked out by Matthews and local police has eliminated tie-ups in the vicinity of Hara that used to occur each Hamvention weekend.

Once busing, pick-up sites and crowd-control fences have been planned and placed, Graver says, the rest is largely up to the crowd. "We then have to hope that every one goes with the flow and obeys the rules," he says.

Do some people still try to crash the gate at Hamvention? Not very often, Graver says. "For the most part, when people get turned away, usually they get pointed right to where they can buy a ticket, and that's it." Hamvention officials sometimes have to keep other prospective attendees outside the gates altogether, however.

"There's, uhhh, what I'll call 'ladies' who tend to come through the property and advertise their services, and we try as discreetly as possible to show them the door," Graver says, chuckling. "They see some business there themselves, and they break the rules, and we have to say, 'thanks, but no thanks' and move on."

Hamvention and Hara

Hamvention typically evokes the image of Hara Arena, the aging facility that has housed Hamvention for 36 years now. Hara will remain the venue at least until 2003, when Hamvention's current five-year contract with the arena expires.

"Before we signed the last contract, we looked at this area and there just wasn't anything that suited our needs," Miller explains.

Matthews points out that Hamvention is the only show that uses every square inch of Hara Arena. "We've grown with Hara, and Hara has grown with us," he says. "Hara would not be what it is today if it wasn't for Hamvention. By the same token, Hamvention would not be what it is today if it wasn't for Hara."

A Hamvention "roadie" installs one of the Indoor Exhibits.

Matthews also says Hamvention has permanently installed a lot of equipment in Hara that it could not afford to walk away from at this point. The facility's East Hall and North Hall both were added to accommodate a growing Hamvention.

Hara Arena manages certain aspects of Hamvention as part of the contract. For example, food service is entirely Hara's responsibility, and the contract does not allow food items to be brought in. Neither DARA nor Hamvention have a say in this activity, and there's no financial return to either. "They gear up to have the food available," Graver says simply. During the show, visitors consume some 55,000 hot dogs and 1000 dozen pretzels, among other goodies.

Hara handles inside rest room facilities as part of the deal. "There's always a line, and because of the volume of folks, there's *always* some kind of problem," Graver concedes. He says Hara has people on staff to check the bathrooms periodically and take care of problems. "There's always feedback that we get about that, and we do our best to let Hara know."

Hara also maintains and manages the drayage area, where vendors and exhibitors can have products or exhibits delivered and stored in advance of the show. Hara handles local parking, primarily for vendors, exhibitors, and Hamvention officials.

While there are no immediate plans to move Hamvention elsewhere, "we'd be stupid not to be thinking about that in the future," Matthews says. He points out that a new owner could decide to raze the facility or convert it to another use.

"We have contingency plans for other buildings in the local area that we could use for Hamvention if something major happened," he says, "if the facility ceased to be there for whatever reason...tornado, fire." But, he notes, none of the facilities in the Dayton area could accommodate Hamvention's present size. "Our show would have to decrease by about 30 percent in size in order to fit into any other building in Dayton."

The High Cost of Hamvention

Putting on Hamvention costs in excess of $700,000 each year. Keeping expenses in check is a delicate balancing act, according to Graver. "We are continually being faced with increasing costs at Hamvention, and you have to balance that versus not detracting from the quality of the show if you make a cut somewhere," he explains. "You can only raise your prices to a certain point, so we're really struggling with income versus expenses versus maintaining the quality of the show."

Hamvention officials recall the days when the show used to get a lot of things at no

cost. Trash barrels, for example, used to be free, and the community once donated the necessary police and fire services. Now, just about everything carries a price tag. Matthews says costs especially skyrocketed during the past decade, and he's not sure the average Hamvention visitor appreciates the economic side of the show.

"Last year income did not meet projections, so it was not a very good year," he says. "What a lot of people don't understand is that now it's a full-blown trade show; you have to make certain contractual arrangements in advance that have to be paid for, whether you make money or not."

Advance tickets remain $16 for all three days ($22 at the gate), however. "The equation is: Will fewer people pay more money so that we can still make a profit, or do we need the volume at the lower price?" Matthews asks rhetorically.

Matthews is quick to point out that the show generates more than $10 million in business each year for the Greater Dayton area, and local businesses now roll out the red carpet for Hamvention visitors. "This helps make people want to come back year after year."

Transportation is a huge chunk of Hamvention's budget, but it's also one place where show officials have made deep cuts. Hamvention no longer offers park-and-ride service from area hotels or from the Air Force Museum at Wright-Patterson Air Force Base.

"This is one we've taken a lot of heat over," Matthews concedes. Hamvention officials determined that only about 300 cars were parking at the museum, so the route was discontinued last year, saving about $10,000. The bill for park-and-ride bus service used to run $130,000. As a result of cuts, it's now around $70,000, Matthews says.

Another potential budget buster is disposing of the estimated 90,000 pounds of debris left over after the Hamvention crowd goes home each year. The bill runs another $10,000 to $12,000, Matthews says. Some of that detritus is flea market leftovers. "When the show's over, they just leave it set," Matthews says, "and it's gotten to the point that it's a major problem."

Dealing with the Outside World

To produce Hamvention each spring, Matthews deals with several outside entities. These include not just show vendors and exhibitors but local government officials, security service, and other services.

"One of the most critical things is to maintain a working relationship with our vendors, so that we don't have to pay more for the service than we absolutely do, and we get what we absolutely need," Matthews explains.

Some expenses generate additional costs of their own. For example, Hamvention requires some 140 uniformed security personnel. Matthews says the State of Ohio then collects $18 for each of them for the weekend.

Hamvention—which is not really in Dayton but in the City of Trotwood—also must cope with local ordinances. For example, Graver says the local fire marshal now prohibits vehicle traffic in the outside exhibits area.

Life used to be a lot simpler. "Years ago, we never had to do anything with permits. We just went in and did it," Matthews says. Hamvention now spends in excess of $500 just for permits. "They pull inspection on Thursday," he says, "and until we get that final inspection, we don't know if the show's going to open on Friday or not."

When Madison Township was annexed by Trotwood in 1992, Hamvention suddenly came under a totally new set of zoning regulations and had to start paying for fire and police and first aid personnel it used to get for free. Hamvention now pays Trotwood Fire and Rescue personnel to be on site.

Given the show's size, there have been remarkably few health-related problems over the years. Most have been confined to spending too much time in the sun, cuts and bruises, and one apparent heart attack in the distant past.

Hamvention deals with the contractors that provide tents for outside exhibitors as well as those that supply the portable rest room facilities (a recent addition in this regard has been the so-called "Crowd Pleaser" multi-station rest room facility that has running water). Hamvention also arranges to hold Amateur Radio exams and forums at Meadowdale High School.

Required inspections and permits have become an administrative issue as well as a significant budget item. "When we expanded our show a few years ago and put in the outside vendors' tent and the electricity for that tent, we created a nightmare no one could have realized," Matthews recalls. Hamvention spent $60,000 for electricity and "invoked a bunch of new code requirements," as he put it. The locality also requires drawings that are detailed right down to the location of individual trash bins.

The Ins and Outs of Vendors

Don't call it "the flea market" anymore! "Outside Exhibits" is the revisionist Hamvention term. The 2500 outside spaces accommodate roughly 1500 vendors. For "Inside Exhibits" Hara offers 550 spaces typically occupied by some 200 exhibitors—since many larger vendors take up more than one space (the ARRL occupies six).

Hamvention determines who goes where. Typically, all spaces are sold out weeks, if not months, in advance, although officials say it's sometimes possible to squeeze someone in at the last minute. Major exhibitors tend to put in for the same spot each year, so return visitors will know where to find them.

Top Amateur Radio equipment manufacturers anchor prime locations in the inside exhibit area and invest princely sums to put their best faces forward for the Hamvention crowd. Hamvention often marks the start of the "model year" for manufacturers. Yaesu, for example, has most of its Hamvention arrangements in place by January or February. "And then we all start looking for special discount sales on bulk quantities of our preferred pain relievers," jokes Yaesu's Chip Margelli, K7JA. He says while some planning for the next year starts right after Hamvention ends, "we then try to *forget* about Dayton for a few months, as it is a lot of work and one could get depressed thinking about it!" Yaesu's display is shipped in advance to drayage at Hamvention to be ready for setup at show time.

Kenwood's National Sales Manager Paul Middleton, KD6NUH, says his company makes extensive plans for Hamvention each year. The process starts within two weeks after the Hamvention ends, although "serious planning" doesn't start until January. Kenwood's Hamvention display lives in Dayton. "We look at Dayton as the Indianapolis 500 of ham radio," Middleton says. "We need Dayton as the momentum builder for *all* our activities throughout the year."

With its more modest presence, Ten-Tec starts planning some two months in advance, says Scott Robbins, W4PA, the company's Amateur Radio products manager. But the Tennessee company's goal is the same. "I don't think there's any question about it that this is the focal point of the whole year for ham radio," Robbins says.

Maintaining Hamvention's Mystique

Changes at Hamvention are rarely radical and often subtle. Concerts at the Hamvention banquet are among the more recent new wrinkles, but officials greet change cautiously.

"Every year it changes, but at the same time it has a history of being very special, and therefore you don't want to mess with that tradition," Graver says. Hamvention officials try to maintain "the mystique of Hamvention" by making improvements and changes "to the peripherals but not to the core of the show," he says.

But defining that "mystique" is another matter altogether. "That's a question that I think anybody sitting around a campfire that's a ham radio operator has talked about more than once—including us on the committee," Graver says, suggesting that luck plays a role.

"We just know that we've got it, it's cherished, it's nurtured along every year, so that we never lose sight of how valuable that is to the Amateur Radio world." QST

By Eldon Bryant, K7ZQR

Continuous PEP Metering the Easy Way

If you think mercury is limited to tilt switches and esoteric relays, think again. Mercury, dear friends, is the budget op's ticket to "PEP pleasure." Forget about voting, averaging, peak-reading, memory and DSP. When it comes to measuring PEP RF on a budget—it's heavy metal to the rescue!

Although measuring peak envelope power (PEP) *can* be expensive, there *are* cost-saving alternatives to traditional techniques. As with discoveries and innovations in every field, many Amateur Radio breakthroughs are purely accidental. Forget necessity: When you bundle a ham's interest in saving money with his insatiable curiosity, *that's* the real Mother of Invention.

For example, after I installed an indoor/outdoor (mercury) thermometer in my shack, I noticed that the outdoor reading seemed to fluctuate during radio transmissions. The fluctuations *were* slight, but they seemed to hold steady during SSB transmissions. What started this—I think—is the fact that I had run the wire to the outside temperature probe through the same conduit as my antenna coax.

At first the fluctuations weren't sufficient to determine a correlation between the amount of RF power and the temperature readings on the thermometer. Further experiments showed that making three turns in the probe wire about two millimeters apart greatly improved the fluctuations' magnitude.

Now came the last step in the process: correlating the fluctuation (in degrees) to the amount of RF power (in watts). To get an accurate reading, the temperature was recorded when no RF was present. Using a standard wattmeter, I loaded the transmitter to 100 W (key down) and noticed that the outdoor thermometer read 2° higher. Using the exciter *and* an amplifier, I made a chart of observed values as power was increased from 100 W to the legal limit (still key down). Now for the final test—to determine if my mercury based wattmeter could be relied on during SSB transmissions.

Figure 1—The effect of positioning the outside temperature probe *inside*.

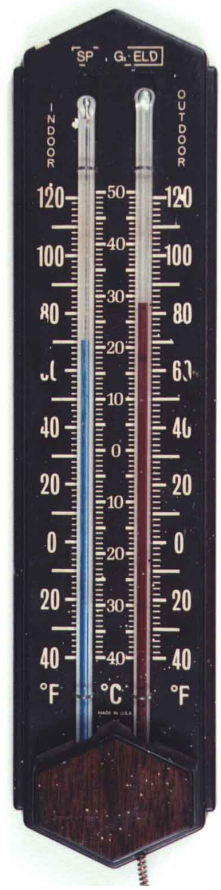


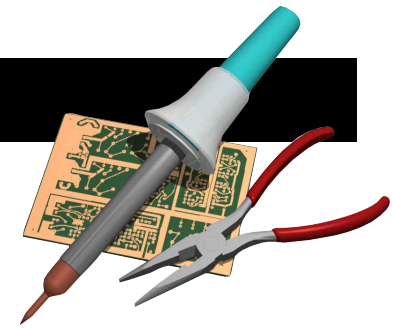
Figure 2—A increase of 12° correlated to 700 W PEP output.

Most ops seem to think that 500 W dc input at the final amplifier will produce about 1000 W PEP. As I observed, this can be misleading. With the exciter again loaded to 100 W (key down), I switched to LSB and, sure enough, the thermometer read 12° higher (See Figure 2), which should correlate with about 700 W PEP. Because the mercury did not fluctuate, it was easy to see the difference. There was no difference between LSB and USB. Although additional fluctuation might be possible by adding turns to the probe wire, I had to be careful to allow sufficient headroom above my present outside temperature to get an accurate reading (below 1500 W PEP).

Further experiments showed that positioning the *outside* temperature probe *inside* increased sensor sensitivity. Because the inside and outside temperatures were now almost the same (see Figure 1), I didn't have to remember to record the outside temperature before transmitting. This also allows the technology to be used in areas that have elevated summer temperatures.

This project is ideal for anyone with the curiosity to pursue additional experiments. For example, I've discovered that weather conditions on certain days of the year can influence performance—especially readings taken on April 1st.

You can contact the author at 70 Bryant St, Ward, AR 72176; k7zqr@futura.net. QST



The Doctor is IN

Q Kim, N6LP asks, "There's a contest on HF again this weekend. The stations are reporting 59 zero-three-four or something else. I'm not a contester, but I like giving them a point for my contact (and picking up new DXCC entities and states in the process). I've heard several different reporting methods. Sometimes it's your grid square (I know that one), and other times it's something else. Why are there so many different contest exchanges? How do I find out what they are looking for without having to waste their time and ask?"

A Contest exchanges depend on the sponsors of the event and generally are different in order to provide variety. Exchanges will range from grid squares (primarily in VHF/UHF contests) to serial numbers (in many contests) to names and states (North American QSO Parties, for example) to multiple pieces of information (ARRL November Sweepstakes). In contests sponsored by the League, you may find the exchange includes your ARRL/RAC section or state. In most contests sponsored by *CQ*, you will find that you exchange the *CQ* zone in which you reside (see Figure 1). Similarly, during the IARU HF World Championship in July you send your ITU zone (which is different from your CQ zone. See Figure 2).

The easiest place to start to unravel the mystery of the contest exchanges is "Contest Corral" which is published monthly in *QST*. See what contests are taking place on a given weekend and listen to several of the stations sending their exchanges. Also, "Contest Corral" will often provide Web links for more extensive rules and other information.

Rules announcements for all ARRL sponsored contests are usually published in *QST* in the month preceding the contest (i.e. September VHF QSO party rules are found in the August issue of *QST*.) You can also find all of the current ARRL contest rules and forms at the ARRL Contest Branch Web page at: **http://www.arrl.org/contests/forms**.

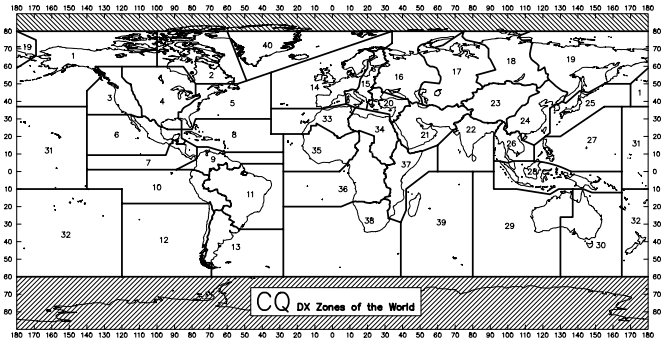


Figure 1—CQ Zones of the world.

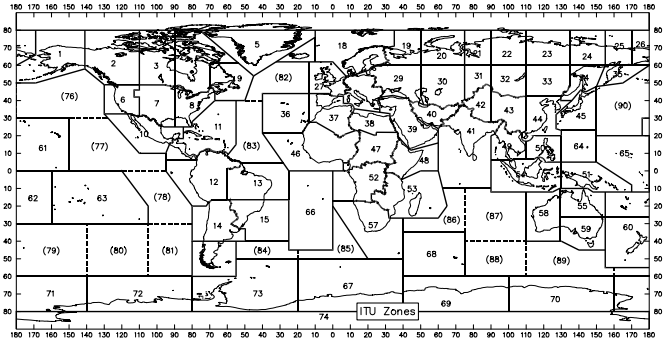


Figure 2—A map of ITU zones.

Q John, K2CF, asks, "Sometimes on 10 or 15 meters I can make contact with stations that are 300 to 400 miles away. We can communicate, although we both report weak signals. The distance seems to be too great for so-called 'ground wave' propagation, and these stations are definitely in the skip zone, which would seem to preclude normal ionospheric propagation. Is there another mechanism involved?"

A The most likely explanation is that you are working them on what is known as "backscatter." Within the skip zone a small amount of RF is scattered off the ionosphere itself, or from irregular ground at an intermediate reflection point within the zone. The levels are usually such that 100-W stations can just hear each other. Occasionally, you may also encounter situations where a sporadic-E cloud of intense ionization is located somewhere between you and another station within the skip zone. This cloud can reflect signals, creating what is known in amateur circles as "short skip."

Q Bill Kendrick, WA6TMT, asks, "Can you define a couple of acronyms for me? I often see mentions of DTMF, CTCSS and DCS in *QST*, but I'm not sure what they mean."

A **DTMF:** Dual-Tone MultiFrequency. Everyone in the country has encountered DTMF signaling, but they wouldn't recognize it by that acronym. DTMF is better known to the masses as *TouchTone*. In the DTMF system two audio tones are combined whenever you press a button on a telephone or radio keypad. Both tones must be decoded on the receiving end for the signal to be "valid." This provides a certain measure of reliability. In amateur applications DTMF is commonly used for remote control.

CTCSS: Continuous Tone-Coded Squelch System. Many hams know this one by the Motorola trade names *Private Line*, or simply *PL*. CTCSS uses individual audio tones of very low frequency. The frequencies are so low, in fact, they are below the normal receiver audio passband. This means that the tones can be sent along with voice audio without causing interference. A receiver with CTCSS enabled will be silent unless it receives a transmission that includes the proper tone. Repeaters often use CTCSS to control access in situations where there is interference from other repeaters on the same input frequency.

DCS: Digital Coded Squelch. This popular method of signaling uses a burst of data tones. As with CTCSS, a DCS-equipped receiver will remain silent until it "hears" a data burst that it has been programmed to recognize.

Q I have a large number of 3.5-inch diskettes—almost all of which appear to be defective! I don't see how this is possible, but recently when I needed to back up some log files on my station PC I kept getting "defective disk" messages. I've been storing the disks properly, and I haven't exposed them to mag-

netic fields. Do you have any idea what might be causing this?

A If you have been carefully storing your diskettes, there is one culprit you may have overlooked: your disk drive. The Doctor is willing to bet that you have a flaky 3.5-inch drive. The read/write head could be dirty, or the tracking mechanism could be faulty. These drives are so inexpensive (less than $20 in some stores), I'd suggest replacing the drive entirely. If that isn't the problem, hang onto to your receipt and take the drive back.

By the way, consider adding a CD-R or CD-RW drive to your station computer. It is *much* easier to do backups when you can dump 650 Mbytes of data at a time! The CD-ROMs are more durable and reliable than diskettes, too.

Q Tim, KC4BBI, asks, "I am blind. As you might guess, I take a lot of taxis. I often call them from restaurants, malls, and other places where pay phones are hard to find. I do not have a cell phone. I would like to use the autopatch of our local repeater to call taxis. Does this violate the 'no commercial use' rule for Amateur Radio?"

A When the FCC liberalized the business rules they stated that amateurs may use Amateur Radio to conduct their personal communications, including ordering food over the air or making appointments.

Between 1972 and 1993, the FCC laid down stringent "no business" rules. Talk-ins to conventions and hamfests weren't legal, among many other things! Effective September 13, 1993, the "no business communications" language was replaced with a prohibition on communications for compensation on behalf of one's employer, or in which the amateur has a pecuniary interest [97.113(a)(2), (3)]. The current language is almost, but not quite, as relaxed as the pre-1972 rules. Now, instead of a flat prohibition on providing an alternative to other radio services, there is a less restrictive one against doing so on a regular basis [97.113(a)(5)].

These rules permit wider use of Amateur Radio to satisfy personal communications needs. To cite a classic example, as far as the FCC is concerned you may now use an autopatch to order a pizza. You may call your dentist's office to let them know you'll be late, or even to make an appointment. On your way home you may ask your spouse if you should pick up a loaf of bread on the autopatch without worrying about whether this will "facilitate the business affairs" of the grocery store. Repeater owners or trustees may set tighter standards if they want, but it's no longer an FCC issue.

The Commission doesn't want to hear questions about whether such-and-such is permitted. The FCC Report and Order, which carries the weight of a regulation, said:

"We [the FCC] have decided to amend the amateur service rules substantially…to allow amateur operators more flexibility to provide communications for public service projects as well as to enhance the value of the amateur service in satisfying personal communications needs. Amendment of the rules as proposed by the League will allow licensee so use amateur service frequencies, for example, to facilitate such events as races and parades, to support educational activities, to provide personal communications such as making appointments and ordering food, to collect data for the National Weather Service, and to provide assistance voluntarily even where there are other authorized services available. We believe that this action will expand the benefits derived from the amateur service by the general public as well as amateur service licensees."

The Report and Order also said, in part, that ". . .any amateur-to-amateur communication is permitted unless specifically prohibited, or unless transmitted for compensation, or unless done for the pecuniary benefit of the station control operator or his or her employer" [PR Docket 92-136, Report and Order].

How can you tell if a particular communication is legal? A simple checklist may help you determine if a communication is permissible under 97.113:

1. Is it expressly prohibited in the rules (music, obscenity, etc) [97.113(a)(1)]?

2. Is it transmitted for compensation [97.113(a)(2)]?

3. Does the control operator have a pecuniary interest? That is, could he or she benefit financially [97.113(a)(3)]?

4. Does the control operator's employer have a pecuniary interest [97.113(a)(3)]?

If you can answer "no" to all of these questions, the communication is okay as far as the FCC is concerned. In that regard, it is perfectly legal for you to use the autopatch to order a taxi.

Having said all that, you could face resistance from repeater owners. Some may not understand the new regulations, or they may simply not allow that type of use of their systems. Remember that repeaters are private property, although the frequencies on which they may operate are public. Some repeater owners may not permit the type of communications you are proposing, even though it isn't a rule violation. Since the repeater is their private property, you must comply.

Q Bruce, KC7ENB, asks, "What are the frequencies of the Citizen Band channels?"

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	26.965	15	27.135	28	27.285
2	26.975	16	27.155	29	27.295
3	26.985	17	27.165	30	27.305
4	27.005	18	27.175	31	27.315
5	27.015	19	27.185	32	27.325
6	27.025	20	27.205	33	27.335
7	27.035	21	27.215	34	27.345
8	27.055	22	27.225	35	27.355
9	27.065	23	27.255	36	27.365
10	27.075	24	27.235	37	27.375
11	27.085	25	27.245	38	27.385
12	27.105	26	27.265	39	27.395
13	27.115	27	27.275	40	27.405
14	27.125				

Q Fred, W9MMZ, asks, "Our club's 2-meter repeater has recently become inhabited by a group who are using it as a party-line, often holding QSOs lasting one, two and sometimes three hours, often in the wee small hours of the night. You rarely hear call signs. When users of a repeater fail to follow the FCC rules for proper station identification, is the control operator liable?"

A If a person operates through a repeater in violation of FCC rules, it is up to the control operator (CO) to take control of the situation. In short, the CO must shut down the repeater as soon as he or she is aware that violations are occurring. If they are aware of the fact that illegal communication is taking place and do not disable the system, they can indeed be held liable.

Of course, most control operators are not monitoring their repeaters in the middle of the night. Whatever takes place on a repeater operating under automatic control while the CO is unavailable is classified as "inadvertent" activity. In this situation, the CO is not liable. According to Part 97:

§97.205 Repeater station.

(g) The control operator of a repeater that retransmits inadvertently communications that violate the rules in this Part is not accountable for the violative communications.

Q Bob, KC2DT, asks, "I have recently returned to the air after a long absence. I notice that the readability report on CW is sometimes followed by NN. For example, RST 5NN. What does NN mean?"

A "NN" is simply shorthand for "99." So, 5NN is actually 599. You'll often hear this used during contest and DX exchanges because it is easier (and faster) to send.

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. QST

By Bert Kelley, AA4FB

Add a Morse Readout to the AA4FB PIC SWR Meter

This easy modification of the popular AA4FB SWR meter makes it an ideal accessory for the visually impaired amateur.

The reader response to my PIC SWR meter project in the December 1999 *QST* has been overwhelming. Many good suggestions have arrived in my e-mail, and one of the best was the idea of providing a Morse code readout for the visually impaired.

It's easy to adapt the PIC SWR meter to send the Morse equivalent of the value shown in the LED display to a small speaker. There is no change in construction except to add a pushbutton and, of course, a speaker. The PIC program does the real work. The existing LED readout is not affected in any way except that it turns off briefly while code is being sent.

The transmission consists of three characters: SWR units, decimal point, and SWR tenths (unless the display is showing either LP or HI). The speed is 20 WPM using 2000-Hz tones. Sending is activated by a pushbutton connected to the formerly unused spare pin 2 of the PIC. The speaker is connected to pin 3. The additions are shown on the schematic in Figure 1.

Parts and Resources

The method used to convert numbers and text to Morse was first suggested in two articles in an early issue of the original *Byte* magazine[1]. A practical design appeared slightly later in *Ham Radio* magazine and I built one of those keyboards[2]. The CPU and port chips used in that design are no longer available. Those interested in more details of how CW can be transmitted by a modern PIC processor can download my commented assembly language listing available on the ARRL Web site[3].

The push button can be a normally open, momentary closure type such as a RadioShack 275-1556. The piezo speaker should be element-only without the driver circuit (RadioShack 273-073 should do). Piezo speakers are high impedance and require very little power, so it is not necessary to reduce the value of the 10 kΩ resistor R6. For Morse output the PIC should be programmed with PIC_SWRR.HEX, where the additional "R" means "revised."

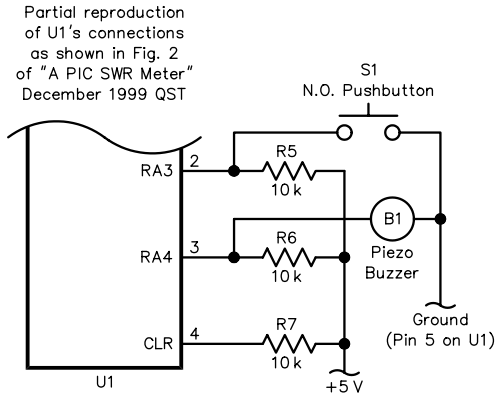
Notes

[1]*Byte Magazine*, October 1976, L. Krakauer, "Efficient storage of Morse character codes", and W. Sewell, "If Sam Morse could see Us Now", same issue.

[2]*Ham Radio*, January 1978, "A Microprocessor controlled CW keyboard."

[3]The PIC code is available in *PICSWRR.ZIP* on the ARRL Web site at **http://www.arrl.org/files/**. The assembly listing is called *PIC_SWRR.ASM*.

2307 S Clark Ave
Tampa, FL 33629-5707; aa4fb@mindspring.com

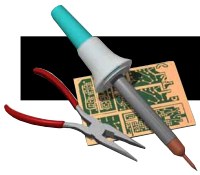


Conversions

BCD to Morse		Other to Morse	
	Morse Equiv.		Morse Equiv.
0	FC	L	48
1	7C	P	68
2	3C	H	08
3	1C	I	20
4	0C	Decimal Point	56
5	04		
6	84		
7	C4		
8	E4		
9	F4		

The Morse equivalents above are hexidecimal representations of the binary pattern that will be shifted to produce CW

Figure 1—The minor hardware modifications necessary to add a Morse readout to the PIC SWR meter. The complete schematic for the meter is shown in the original article that appeared in the December 1999 *QST*.



By H. Ward Silver, N0AX

Test Your Knowledge!

There's always room for an extra helping of "Ohm slaw."

It is futile to resist! Allow me to dissipate your willpower as I conduct this examination on our favorite electronic component and concept—resistors and resistance.

1. What has the lowest resistance at room temperature?
a. silver
b. copper
c. gold
d. hamfest customers

2. In a "carbon comp" resistor, the "comp" is short for…
a. compensated
b. compendium
c. nothing, it's just "comp"
d. composition

3. If your car battery voltage drops from 13 V to 9 V when you key your 25-W mobile rig, you might have a bad…
a. headache
b. cable or connector
c. fuse
d. ground strap

4. If a resistor has a 10% tolerance, what does it have a tolerance of?
a. resistance value
b. bad design
c. power overload
d. badly written quizzes

5. Three known-value resistors are in a series connection. How many measurements does it take to determine the power dissipation of all three?

6. Certain materials, when cooled to very low temperatures, become…
a. extremely cold
b. irritable
c. superconductive
d. hypoallergenic

7. High-voltage resistors are made in long, narrow packages to increase...
a. power rating
b. inductance
c. voltage rating
d. visibility

8. The color-code sequence for resistor color bands is...
a. EGBDF
b. ROTFLMAO
c. ROTFLOL
d. BBROYGBVGW

9. A resistor with a single, black band is…
a. a wire jumper
b. in mourning
c. defective
d. wirewound

10. Wheatstone invented what type of resistive circuit?
a. bridge
b. rat-race mixer
c. subjunctive clause
d. toaster oven

11. Negative resistance is a key feature of which component?
a. dean drive
b. tunnel diodes
c. Channel Tunnel diodes
d. gyrotrons

12. What is the end-to-end resistance of 10 feet of 50-Ω coaxial cable?

Bonus: In the "old days", what common household item could be transformed into a stable resistor with a little whittling?

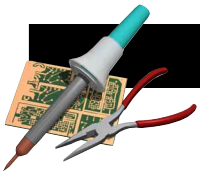
Total Your Score!

There are a total of 12 possible answers in this quiz, not including the bonus question. Give yourself one point for each correct answer.

9—12 Your knowledge is *irresistible*
5—8 Better hit the books again
1—4 Too many insulators in your neural circuits

Answers
1. a
2. d—The resistive material is a mix, or composition, of carbon and other binding materials.
3. b—It only takes 1-Ω of total resistance in a cable to cause a 4-V drop at 1 A.
4. a—A resistor's tolerance is the maximum variation above and below its nominal value.
5. Only 1. Measure either voltage or current across the entire string, calculate total power dissipation for the summed resistance value as if it was a single resistor, then allocate to each resistor its share of the heat in proportion to its fraction of total resistance value.
6. c—A superconductor loses all resistance to current flow below a critical temperature.
7. c—High-voltage resistors are specially made to keep applied voltages from arcing across them or leaking across them from terminal to terminal.
8. d—Black/Brown/Red/Orange/Yellow/Green/Blue/Violet/Gray/White from 0 to 9
9. a—These are often used on PC boards loaded by automatic assembly equipment.
10. a—The Wheatstone bridge is the basis for many sensitive instruments and strain-gages.
11. b—The tunnel, or Isaki, diode shows a negative dynamic resistance, decreasing forward voltage with increasing forward current, and makes a novel amplifier or oscillator.
12. Less than 1 Ω. A cable's impedance rating refers to its characteristics as a transmission line. (Tricky question!)

Bonus: A pencil! Many years ago, pencil leads could be pressed into service as high-value resistors and they were cheaper than the real thing.



By Charlie Hansen, N0TT

A Tool for Winding Small Toroidal Cores

This simple tool and winding approach will help you snake thin wires through tiny iron and ferrite cores.

Have you ever tried to wind thin wire onto a very small toroidal core? It can be a tedious, time-consuming and sometimes frustrating job! Recently, I needed to wind several RF chokes of fairly large inductance on some FT-37-43 cores. You know the ones I mean: You need a magnifying glass and a good light source to work with them! For the job at hand, I used hair-fine #34 wire and intended to put as many close-wound turns on the core as I could. (That is, up to the classic 30° wedge of open core to avoid capacitance effects at the ends.[1]) After struggling to wind a few turns using a bent paper clip and fishing the wire through the core with each turn, I knew I had to come up with a better way!

The Old Shuttle

I thought about using the shuttle shown in Figure 1.[2] But because the hole in the FT-37-43 core is so small, I needed a *very* slender piece of plastic, stiff paper or other material to get through the hole. Also, I had used that shuttle many times before only to have the core slip from my fingers and fall to the floor. (Of course, it *had* to unwind itself on the way down!) I decided I needed a different approach. After some experimenting, here's what I came up with.

A New Shuttle Experiment

The shuttle I designed is shown in Figure 2 and the accompanying photograph. No specialized tools or parts are needed to reproduce it. It's made of two lengths of small-diameter brass tubing available at hobby shops and hardware stores just about everywhere. You'll need a $2\frac{3}{4}$-inch length of $\frac{1}{16}$-inch-OD tubing and a $1\frac{1}{4}$-inch length of $\frac{3}{32}$-inch-OD tubing. The incremental sizes of brass tubing available telescope together for a perfect slide fit. Other materials used in this shuttle are common items likely found your junk box: a short length of plastic insulation and a $1\frac{5}{8}$-inch length of heat-shrink tubing to fit the $\frac{1}{16}$-inch-OD brass tubing.

Cutting the Tubing

To cut the brass tubing to size, secure it in a vise. Pad the vise jaws to prevent deforming the tubing. Keep the area of the tubing being cut close to the vise jaws. Using a sharp edge of a small triangular file, make a groove around the tubing at the proper length dimension, then simply snap off the piece. This action leaves a slightly burred end on the tubing. Use the file to square off the tubing ends, then finish the edges with fine sandpaper. (You could use a hacksaw with a fine-toothed blade to cut the tubing, but if the blade catches, it might bend the tubing.)

It's important to remove all the burrs from the tubing. This reduces the chance of nicking the insulation of the wire being wound on the toroid. Also, the larger-diameter tube (the bobbin) must rotate freely on the smaller-diameter tube (the shaft). To remove small burrs on the inside of the smaller-diameter tubing, I slightly flattened the point of a safety pin with a hammer to produce a small reamer. To ream the ID of the bobbin, I used a small drill bit. Both reamers can simply be twisted by hand.

The Wire Guide

Strip a short piece of thick plastic insulation from a piece of wire (about #16) and force the insulation onto one end of the shaft to act as a wire guide (see Figure 2). The insulation should extend about $\frac{1}{16}$ inch from the end of the shaft. If you cut the wire-guide insulation with wire cutters, the cut end of the tube won't be perfectly square. That's okay because the uneven areas tend to catch the wire and prevent it from wrapping around the guide as the wire is being pulled from the bobbin. The wire guide also provides enough friction to tension the wire while winding the toroid. Normally the wire makes less than one full spiraling turn around the wire guide as it is pulled from the bobbin, through the shaft and out the heat-shrink tubing tail.

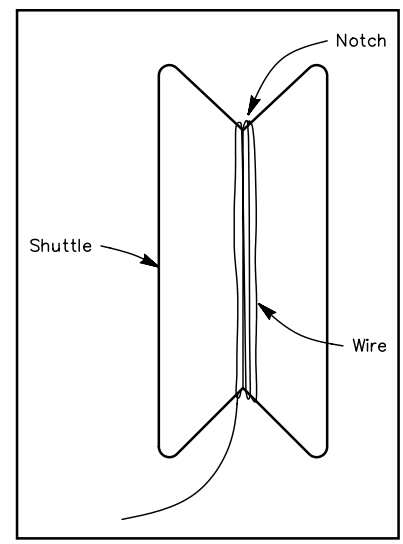


Figure 1—The classic shuttle used for winding toroidal cores. This shuttle, described in *QST* and *The ARRL Handbook* (see Note 2), is usually cut from stiff paper or thin plastic material.

[1]Notes appear on page 64.

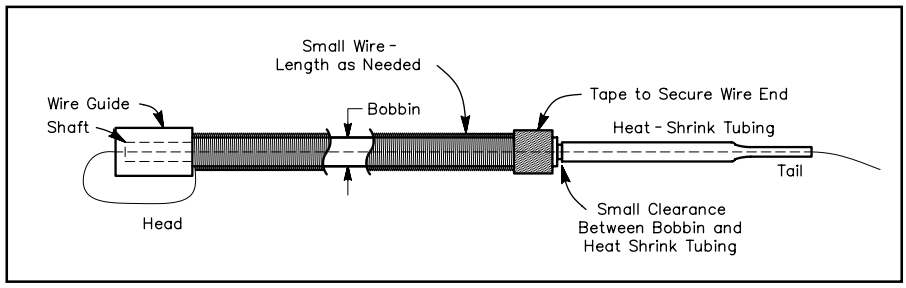


Figure 2—Mechanical details of a shuttle designed for winding small-diameter toroidal cores. The shaft is made of a 2 3/4-inch length of 1/16-inch OD brass tubing. A 1 1/4-inch length of 3/32-inch OD brass tubing is used for the bobbin. In the drawing, one end of the wire (the right-hand end next to the heat-shrink tubing) is held to the bobbin with a piece of tape. The wire is then loaded onto the bobbin, passing the free end over the left-hand wire guide, through the tubing and out the heat-shrink tail (right).

Table 1
Approximate Wire Capacity of a Closely-Wound One-Inch Area of the Shuttle's Bobbin

Wire Size (#)	*Length (Inches)*
26	17
28	22
30	27
32	34
34	42
36	53
38	65
40	84

The #16-wire insulation I used for the wire guide in my prototype is adequate for smaller-diameter wires, ie, those smaller than #33. For larger wire diameters, I use thick-walled Teflon tubing. This tubing is mechanically stiff and damage resistant. If needed, you can use several tubing layers to increase the wall thickness. The thicker plastic tubing works better than thin-walled insulation because it creates a larger bending radius for the wire as it is pulled through. Caution! If the wire cuts its way through the end of the wire guide to the brass tubing, the wire's insulation will likely be damaged.

Slip the bobbin onto the shaft and place the heat-shrink tubing tail at the opposite end of the shaft to hold the bobbin in place. Cut the heat-shrink tubing about 3/8 inch longer than the end of the shaft to allow its use as a threading guide. The tail also helps protect the insulation from damage as the wire is dispensed. Leave a small gap between the bobbin and the heat-shrink tubing to allow the bobbin to turn freely. I didn't apply any lubricant between the bobbin and the shaft, but you could use a single drop of lightweight machine oil at that location. Avoid using too much oil as it might migrate to the outside of the bobbin and prevent the tape (used in the next step) from adhering.

Wire Handling

Before loading the bobbin with wire, cut some short strips of masking tape about 1/8-inch wide. Tape one wire end to the bobbin at the heat-shrink-tail end. Load the bobbin with a rolling motion, and using the thumb and forefinger of one hand, guide the wire with the other hand into a closely wound coil. When the bobbin is full, slip the free end of the wire over and into the wire guide, and push it through the shuttle shaft and out the heat-shrink tubing tail. Hair-fine wire (about #40) is normally difficult to push through the shaft. I use a length of #30 wire with one end bent into a hook to pull the smaller-diameter wire through the shaft.

For its size, the bobbin holds a surprising amount of wire. I've wrapped over 40 inches of the #34 wire on it in a single layer. Table 1 shows the nominal bobbin capacity for a closely wound single layer of a given wire size. The lengths given allow for a 1/4-inch-wide area for taping. The bobbin could be made slightly longer, but there is a practical limit. To accommodate more wire and/or larger cores, the shuttle could also be made of larger-diameter tubing. I've used wire sizes as large as #26 with the tubing sizes specified. Larger-diameter wire is more difficult to work with because of the small radius at the tip of the wire guide. With larger wire diameters, it helps to push the wire on the bobbin toward the guide. As more wire is dispensed, the tape securing the other end of the wire can be removed to allow the remaining wire to move closer to the guide.

Using the Shuttle

Holding a miniature core in your hand and simultaneously wrapping wire around the core can be difficult. Instead, use a small, smooth-jaw vise, lining the jaws with a layer of tape to hold the core by a small section of its sidewalls. The tape cushions the brittle core and provides some friction to keep the core in place. Clamp the core at a corner of the vise. That leaves most of the core material and the hole exposed to accept the wire. Tighten the vise just enough to keep the core from slipping. About halfway through the winding, I usually rotate the core to make the winding more visible, but never clamp the wire that's wound on the core.

To use the shuttle, slip the tail of the shuttle through the toroid and pull out about 1 1/2 inches of wire. Secure the wire end to the top of the vise jaws with some tape. This keeps the wire end out of the way and allows the first few turns to be tensioned. Pull out about four more inches of wire; pass the shuttle around the core, then through the center of the core. With two turns of wire on the core, continue to wind, pulling more wire from the bobbin as needed.

When close-winding toroids (especially with very small-diameter wire), I first space-wind the wire for a few turns while keeping tension on the wire, then push the turns together. This helps avoid any crossovers. The coiled wire has a tendency to spring around the core, so I use a drop of Superglue at the start of the winding and the end. I apply the glue to the core next to the wire and allow capillary action to carry the glue into the winding; it dries in a few seconds. In lieu of glue, I sometimes use a long, narrow strip of cloth tape around the core, pressing it into place as winding progresses.

This simple and inexpensive shuttle makes winding small toroids easy and fast! Add it to *your* workshop arsenal!

Notes

[1]See Figure 25.34 in the Circuit Construction Chapter of *The 2000 ARRL Handbook*, p 25.23—*Ed.*

[2]See Harold Muensterman, N9DEO, "Toroid-Coil-Winding Aids," Hints and Kinks, *QST*, Nov 1984, p 55, and *The 1984 ARRL Handbook*, Chapter 2, p 2-31, Figure 57.—*Ed.*

8655 Hwy D
Napoleon, MO 64074; n0tt@arrl.net

Photo by Joe Bottiglieri, AA1GW

Nova for Windows 32, Version 2.0

Reviewed by Steve Ford, WB8IMY
QST Managing Editor

As the saying goes, you can't tell the players without a program. You also can't operate amateur satellites if you don't know where they are. There is free satellite software available on the Web that will give you "just the facts, ma'am", but if you want satellite-tracking software that will *really* give you the complete scoop, and visually knock your socks off in the process, I strongly recommend the 32-bit *Nova for Windows 32* by Northern Lights Software Associates.

Nova arrives on a single CD-ROM and installation is a breeze. You simply run the *setup.exe* file from the CD and it installs itself within minutes. According to the instructions, *Nova* will run on a 486-PC, but during my brief test I found the operation to be a bit too sluggish. On my 333 MHz Pentium II system, however, *Nova for Windows* ran like proverbial greased lightning. The manual states that Pentium systems are preferred and I suggest that you follow that advice.

Tons of Features

Nova has more features than I've seen in any satellite-tracking software package to date. You have your choice among several "views," including exotica such as the "sky temperature" view looking out into space from your location (this is mostly of interest to moonbouncers, but it is fascinating just the same). One of my favorites is the so-called "radar view" (see Figure 1). In this view you see a circle with your station at the center. The satellite tracks through the circle as it passes overhead, showing you exactly where the bird is in relationship to your antennas.

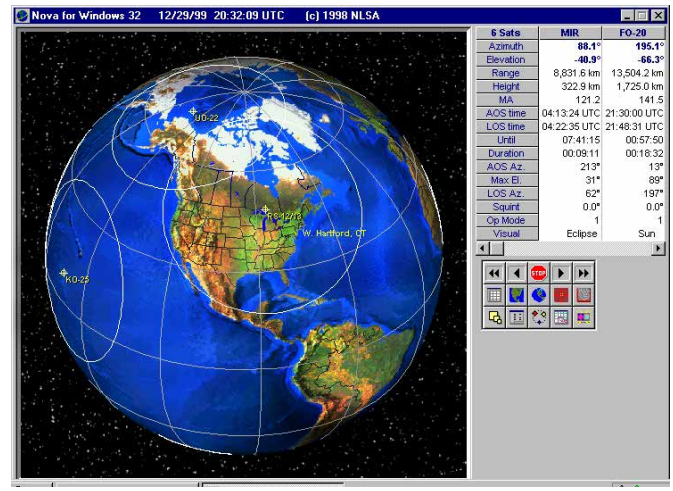
Nova works with a variety of antenna-control interfaces including the Kansas City Tracker, SASI Sat Tracker, AEA ST-1, Orbit Electronics RIF-PC and the M2 RC-2800P. Setup is straightforward, allowing *Nova* to automatically aim your satellite antennas for you. If you don't happen to know the latitude and longitude of your station, you can select from a database of 2,000 cities. No matter where you live, chances are there is a city in the list that is close enough for reasonably accurate predictions.

Nova will provide detailed pass predictions for any satellite, any time and at any location. You can even "model" the horizon at your location, indicating, for example, that you have a large building that blocks the view to the south to an elevation of 45°.

A set of recent Keplerian elements is provided on the *Nova* CD, but I recommend that you grab an updated set from the AMSAT Web site at **http://www.amsat.org** after you install the program. *Nova* will read the Keps automatically if you save them to a standard ASCII text file. If you receive your Keplerian elements by e-mail, *Nova* will *update itself* if you "tell" *Nova* where to find them on your hard drive. You just dump the e-mail to the directory and forget it.

More than Amateur Satellite Applications

As I mentioned earlier, *Nova* is also designed with moonbouncers in mind. There is a database of active amateur moonbounce stations (you can modify the database at will) and you can use it to set up schedules. Best of all, *Nova* will even graphically plot your chances of moonbounce success based on a number of factors including Moon position and sky temperature. By glancing at the graph you can quickly pinpoint the best times to make moonbounce QSOs between any two points on the globe.



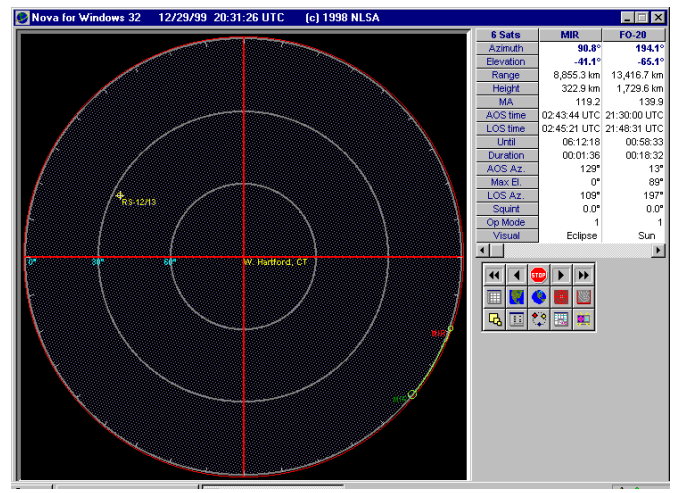


Figure 1—The *Nova* "radar view" (above) centered on West Hartford, Connecticut. RS-13 was passing through when this image was captured.

Many people enjoy spotting satellites visually as they zoom overhead, and *Nova* can assist in that activity, too. The software will predict the best days and times to observe various birds. I used it to find the *Mir* space station as it hurtled through my local sky just after sunset.

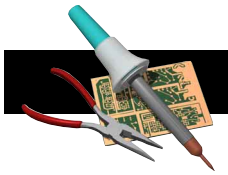
The Ultimate?

Nova may not be the ultimate satellite-tracking program, but it comes awfully close. Since this is a "Short Take," I can't even begin to describe everything that *Nova* can do. That would probably require a multipage full-fledged "Product Review." Suffice to say, however, that *Nova* is likely to provide every feature you'd want in a satellite-tracking program for years to come.

Manufacturer: Northern Lights Software Associates. Available from AMSAT, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703; tel 301-589-6062. $50 for AMSAT members; $60 for nonmembers.

Next Short Take

Steve Ford, WB8IMY ♦ QST Managing Editor



THE HELP DESK

This month we offer a glossary of terms, technical and otherwise, that you're likely to encounter in *QST*.

Ω: The Greek letter Omega, used as a symbol for resistance (ohms).

AGC: Automatic Gain Control. The receiver circuitry that automatically adjusts the gain to compensate for variations in signal strength, keeping the audio output constant.

ALC: Automatic Level Control. The transmitter circuitry that automatically adjusts the audio amplification stages to compensate for variations in audio input levels. ALC can also be applied to RF stages. A transverter, for example, may have ALC circuitry.

Antenna tuner: A device consisting of adjustable coil/capacitor circuits used to provide an impedance match between a transceiver and an antenna system.

APRS: Automatic Position Reporting System. Technology developed by Bob Bruninga, WB4APR, which uses packet radio and global positioning system receivers to track objects.

ATV: Amateur television.

ARES: Amateur Radio Emergency Service, established by the ARRL in 1935. Groups of trained operators who are ready to serve the public when disaster strikes.

Blow-by: Signals that "leak" through or around IF or audio filters. Often a characteristic of layout or system-design problems.

Clover: An HF digital communication mode that offers error-free performance under poor signal conditions. Available only in products manufactured by HAL Communications.

Coax: Coaxial cable—literally, "coincident axes." A transmission line with a center conductor surrounded by a braided or solid metal shield. The center conductor is insulated from the shield by air, plastics or other materials.

COM port: Serial communication port. The part of a computer designed to communicate with external devices ("external" can also include devices plugged into the motherboard bus sockets). Packet TNCs, for example, are often connected to COM ports.

DFing: See "Foxhunting."

DSP: Digital Signal Processing. Converting analog signals into digital data and manipulating the data to perform specific functions. For example, DSP audio filters can notch out the continuous tone produced when someone tunes up their transmitter on a nearby frequency. DSP can also be used to create signals for transmission.

Dupe: Duplicate. In a contest, a station you have already worked.

Dynamic Range: The ratio of the maximum signal level (with a specified amount of distortion) to the noise level (or minimum signal level), usually expressed in dB. When evaluating receiver performance, the higher the dynamic range figure, the better.

EME: Earth-Moon-Earth. Otherwise known as "moonbounce," it is the practice of using the Moon as a giant signal reflector to provide long-range VHF, UHF and microwave communication here on Earth.

Feed line: A cable used to connect an antenna to a transceiver. Also known as "transmission line."

Foxhunting: Tracking a signal (the fox) to its source. Also referred to as "DFing" (direction finding).

GTOR: Golay Teleprinting Over Radio—an HF digital protocol that provides error-free text and data exchanges under poor signal conditions. Available only in products manufactured by Kantronics Corporation.

IARU: International Amateur Radio Union. A federation of international Amateur Radio societies founded in Paris in 1925.

IF: Intermediate Frequency. When a received signal is converted from one frequency to another, the resulting frequency is the IF. In a superheterodyne receiver, for example, the incoming signal is converted to an IF frequency before detection. The conversion can happen more than once, so there can be two or more IFs.

kW: Abbreviation for "kilowatt." 1000 W.

Ladder line: A two-conductor transmission line that uses ceramic, plastic or wood insulators to separate the wires. The insulators are spaced at regular intervals, which gives the transmission line a ladder-like appearance.

LID: A poor operator.

Meteor scatter: The practice of bouncing VHF signals off the fiery trails of meteors as they enter the Earth's atmosphere. By using meteor scatter it is possible to enjoy brief contacts out to a distance of almost 2300 miles.

Mode: A method of communication. SSB is a mode, as are FM, CW, packet, television, and so on. In amateur satellite work, "mode" also refers to combinations of uplink and downlink frequencies used to communicate with various satellites.

Moonbounce: See "EME"

Mountaintopping: In VHF/UHF/microwave contesting, the practice of operating at or near the top of a mountain.

MUF: Maximum Usable Frequency. The highest radio frequency that will support ionospheric communication between two points at a given time. MUF is distance dependent—the longer the distance, the higher the MUF.

NiCd: Nickel-cadmium battery.

NiMH: Nickel-metal hydride battery

PACTOR: A method of HF digital communication where text and data can be exchanged without errors under weak signal conditions.

PIC: Peripheral Interface Controller. A microprocessor that can be easily programmed to perform specific functions, such as transmitting and/or receiving Morse code.

Pileup: When many stations attempt to simultaneously contact a single station in a desirable location (a rare DXCC entity, a rare grid square, etc) on one frequency. The result is usually pandemonium.

Potentiometer: A type of variable resistor. Often referred to simply as a "pot."

Preamp: In Amateur Radio applications, usually used to refer to "receiver preamplifiers"—small amplifiers used to boost the sensitivity of a receiver.

PSK31: A popular HF digital communication mode designed for conversational use. Offers excellent weak-signal performance.

RACES: Radio Amateur Civil Emergency Service. Established in 1952 as a special subset of the Amateur Radio Service. It is designed to provide emergency communication to local or state civil-preparedness agencies. RACES is sponsored by the Federal Emergency Management Agency (FEMA).

RF: Radio Frequency energy.

Rover: A contest station that moves from place to place during a contest. Rovers are typically found in VHF/UHF contests.

Running: In a contest, contacting many stations in rapid succession on the same frequency. "I had a great run going this afternoon on 10 meters."

RTTY: Radio Teletype. A method of sending text via radio. Commonly used on the HF bands.

Signal-to-Noise Ratio: (SNR) The radio of the amplitude of the signal vs. noise, usually expressed in dB.

Silent Key: A deceased amateur. Often abbreviated "SK."

SKYWARN: A National Weather Service network of volunteers, often including Amateur Radio operators, who monitor (and report) severe weather conditions.

Slim: A bogus or pirate DX station.

Splatter: A form of adjacent-channel interference caused by overmodulation.

SSTV: Slow-scan television. A method of transmitting images using audio tones to carry picture information. Although it can be used on many bands, SSTV is primarily heard on HF.

TNC: Terminal Node Controller. In packet radio, a device that acts as the interface between the radio and the computer. A TNC translates radio signals into data and vice versa.

Transmission line: See "feed line."

Transverter: A device that converts a transmit signal from one frequency to another. Transverters usually convert received signals as well. Transverters are often used to communicate on UHF and microwave frequencies when coupled to HF or VHF transceivers.

W: Abbreviation for "watt." QST

W95SSTV version 1.10

Ah, for the good old days of Slow Scan Television (SSTV). Remember those fuzzy amber images that would quickly fade from top to bottom? How about those bulky monitors and demodulators? Only hard-as-nails hams did SSTV in 1970, yes sir!

That was back when amateurs had to make their own integrated circuits out of raw silicon and walk five miles in raging snowstorms just to take their FCC exams. Kids today have it easy. With just a personal computer and a soundcard they can send and receive *color* SSTV images from anywhere in the world. (Color is for sissies; you have to be a real man to watch monochrome TV!)

W95SSTV from Silicon Pixels would astonish SSTV operators of 30 years ago and, yes, the software does make SSTV awfully easy and—perish the thought!—*fun*.

If your shack includes a 486/100 PC or faster (Pentium preferred) running *Windows 95/98*, and if the computer is equipped with a modern 16-bit sound card, you already own an SSTV station. All you need is *W95SSTV* to bring it to life.

A happy K8JGY, as received on 20 meters (14.230 MHz). Noise appears as speckled horizontal lines.

Features

W95SSTV is packed with useful features, but not so many that you'll find them overwhelming. Everything is manipulated by mouse clicks or drag-and-drop. *W95SSTV* supports a variety of image formats in the registered version (BMP, EPS, GIF, JPG, PCT, PCX, PNG, PSD, RAS, TGA, TIF, WMF, WPG), so you can send almost any digital image that is presently sitting on your hard drive. *W95SSTV* even includes an image processor (Figure 1) that allows you to retouch images at will, adding your name, call sign or whatever. Any image that you take with a digital camera, or scan into your system, can become an SSTV picture.

With *W95SSTV's* dynamic spectral display you can quickly tune in SSTV signals. *W95SSTV* does a good job of receiving in noisy conditions, no doubt thanks to its DSP bandpass filtering. Rather than tuning the signals after they begin, however, I achieved excellent results by just tuning for a natural sounding voice in USB. If the sender's voice was tuned correctly, the subsequent SSTV signal would probably be on target as well.

W95SSTV offers an *auto-start* function that is activated by data carried on a portion of the image waveform known as the vertical interval signal (VIS). Many SSTV programs (including *W95SSTV*) encode VIS data during transmission so that receiving stations can automatically identify the SSTV mode and begin reception. If you enable "VIS Start", *W95SSTV* will respond to the to VIS signal by entering the receive mode and selecting the correct mode. *W95SSTV* can receive and transmit images in all of the popular modes including Scottie 1 and 2 (Scottie 1 is the most common mode among US hams); Martin 1 and 2 (Martin 1 is used heavily in Europe); Robot 36, 72 (used primarily in Japan, and with "stand-alone" scan converters); AVT 24, 90, 94 and Wrasse "SC2" 120 and180.

You can activate the *W95SSTV* auto-save function, which automatically stores images while you are away. Use this feature with care because image data can quickly fill up a directory! I used the auto-save function one day to monitor 28.680 MHz for 10-meter SSTV while I was at the office. I had 24 images waiting for me when I returned home.

Installation

You can set up *W95SSTV* to receive images by merely connecting a shielded audio cable between your transceiver (at the speaker or accessory audio output) and your PC's sound card audio input (preferably the line input if one is available). You may have to use *W95SSTV's* slant controls to properly align your first few images, but once you have the alignment established you won't have to touch it again unless you switch sound cards.

You can transmit SSTV by routing the audio from your sound card output to either the accessory audio input or microphone input of your transceiver. You can use your VOX to key the rig, although I prefer "hard keying" with a single transistor interface plugged into my computer COM port. (The *W95SSTV* documentation describes how to wire your radio for transmission and reception.)

If this set up sounds familiar to those of you who operate PSK31 or one of the other digital modes with your sound card, it should. You can use the same set up to operate SSTV with *W95SSTV*. No changes required.

Download and Get Started

You can download an unregistered trial version of *W95SSTV* on the Web at **http://www.siliconpixels.com**. My guess is that you'll find *W95SSTV* to be remarkably easy and enjoyable. If that's the case, go back to the Silicon Pixels site and buy it using their secure server. Trying new modes and expanding your horizons is always worth a modest monetary investment!

Manufacturer: Silicon Pixels, PO Box 579, Selah, WA 98942; **N7CXI@SiliconPixels.com**. $50.

QST

Steve Ford, WB8IMY ♦ QST Managing Editor

GE MASTER-II REPEATER MODIFICATIONS

◊ Commercial crystal-driven FM radio equipment is proliferating at flea markets with attractive prices. GE Master-II mobile radios are available, not because they're inferior or lack performance, but due to the incessant desire for more channel capacity. In the 1950s, a two-channel radio was thought to be all the radio anyone would want; today 64 channels are not enough.

The Master II radio is user friendly, reliable and simple to service. To convert a mobile (with its original control head and accessory cables) into a repeater is simple and easy as this article shows. All one need add is a duplexer, a time-out timer board and a controller board if "bells and whistles" are required. A few changes make the radio into a repeater with good audio and a dropout delay using very few components.

Table 1 explains the frequency ranges coded into digits eight and nine of the model number. If the radio frequency range suits your application, no tuning is necessary. If you need to shift the operating frequency range, there are several conversion articles on the Web.

First, obtain a service manual for the version of radio you have. You can find one at two-way service shops; GE radios are now serviced by Ericsson Inc, Private Radio Systems. A manual speeds up the conversion and is necessary to find the jumper connections (GE prefixes them with "H") on the systems board. Locate and cut the jumper between H95 and H96; this eliminates receiver muting when transmitting. Cut another jumper between H79 and H80 on the same board to isolate the receiver-oscillator control from the switched +10 V receiver power. Now install a jumper between pin 11 and 12 on J903 of the same board. This jumper keeps the receiver channel-element energized all the time, thus keeping the receiver operating while the transmitter is on the air.

Table 1
GE Master II Frequency Ranges

Model #	*Frequency*	*Model #*	*Frequency*
Digits 8 and 9	*Range (MHz)*	*Digits 8 and 9*	*Range (MHz)*
12	25-30	66	150-174
33	42-50	77	406-420
56	138-150	88	450-470

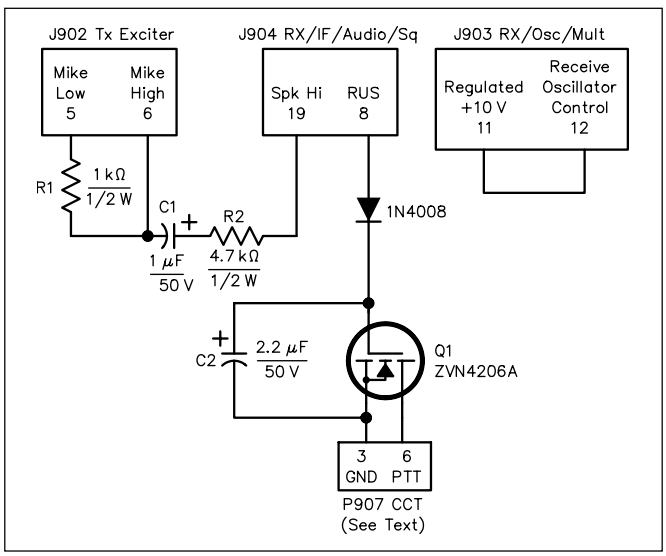


Figure 1—Modifications to a GE Master II land-mobile two-way radio for use as a repeater. In addition, two jumpers must be cut as described in the text. Unless otherwise specified, use 5%-tolerance carbon composition or film resistors. Equivalent parts may be substituted.

Next, we need to make the receiver key the transmitter when it hears a signal. This is accomplished by installing a diode, MOSFET and capacitor from pin 8 of J904 (see Figure 1) to pins 3 and 6 of P907, the connector to which a carrier-control timer board (CCT) mates. This CCT board is a factory timer that can be set to end transmissions after a fixed period. Suitable used boards are #19B226617G1 or #19C320134G1. Make the connections close to the systems board so that the CCT board can inserted without any obstructions. The capacitor and diode in conjunction with the MOSFET produce a transmitter dropout delay (hang time) of a few seconds. The length of this delay can be altered slightly by changing the value of the capacitor. If you substitute an LED for the diode, it serves as an on-board transmit indicator.

The mobile radio control-head volume control adjusts the audio level going into the transmitter. Set this control so that the average deviation of the transmitter is high and set the deviation control so that the deviation does not exceed 5 kHz. If the speaker volume is too great, install a padder at the speaker to reduce it.

If your repeater will have a lot of users or long-winded operators, reduce the transmitter power output setting, which is controlled by a power control on the transmitter PA board. This will reduce chances of the PA overheating—these mobiles were not designed for continuous duty. A fan to cool the PA would also be helpful. This modification works well for me and the audio sounds great.

To go on the air, add an antenna duplexer and identifier circuit. Connect the duplexer transmitter port to the UHF connector on the radio front panel and the receiver port to J1 (phono jack) on the receiver RF/Mixer assembly. You can use a different controller to make the radio into a repeater, but the cost of the modification described here is easily less than $10. Have you seen a controller lately for this price?—*William Plante, K1PPN, 2 Debra St, Farmingdale, ME 04344;* **billplante@hotmail.com**

SAVE NiCdS FROM OVERCHARGING

◊ As we all know, nickel cadmium (NiCd) battery packs for H-Ts and other equipment can be very expensive to replace. They're also rather difficult to repair by replacing bad cells, because they are usually glued into nonserviceable plastic cases. I have successfully performed surgery on many such cases, but it is tedious and time consuming.

One way that cells in a pack can go bad is by overcharging. One mechanism appears to be the breaching of the cell vent, which allows the electrolyte in the cell to dry up. I understand that this

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

can result from oxygen gas generated at the anode, or may be due to electrolyte expansion from heat build up. Whatever the mechanism, it has been my experience that cells can go bad this way, or their life can be shortened.

The standard charge rate for NiCds is 10% of their rating (often expressed as 0.1 C) for fifteen hours. Many specially designed cells can be charged at much faster rates because they have special oxygen-absorbing anodes and perhaps other design improvements, but the tradeoff can be a somewhat shorter life span. In any event, overcharging fast-charge NiCds can be even more disastrous to cell life. Some better packs include technology to reduce the charge rate if overcharging is approached, but why depend on failsafe mechanisms that may not be perfectly failsafe when you can easily resolve the problem?

I have a problem remembering when the pack should be removed from the charger after 15 hours, or whatever amount of time the manufacturer of the charger/battery pack recommends. I have put a charger on a 24-hour timer, but sometimes forget to remove it—even after a day or two. The resulting double or triple overcharge can cause cells to go bad. I have also thought of designing a suitable one-shot circuit, but why go to all that trouble when you can purchase a solution inexpensively at your local department store!

The Intermatic #TN711 24-hour timer is ideal for charging NiCds! It can be purchased for less than $10 at many stores.This and many similar timers use removable pins to set the start and stop times on the timer. The procedure for failsafe recharging is very easy: Insert the green (start) and red (stop) pins into the dial face to set the correct charge-time duration. (Insert the pins fully or they may not activate the ac switch. If a stop pin is not fully inserted, the timer will not switch off!) Then plug the charger into the timer and the timer into an ac outlet. Turn the timer face until the start pin just clicks the switch on; this enables 120 V ac to the charger. Now immediately *remove* the green start pin entirely, but leave the red stop pin in the timer. You now have a one shot timer that will run the required time to charge your batteries and shut off at the required time. It will *never* switch on again, no matter how long you forget about it! It is impossible to overcharge your expensive NiCd battery pack by this method!

I set the green (start) pin at 12 AM and the red (stop) pin at 3 PM, for a 15-hour charge. I turn the timer dial until the green pin just trips the switch, then remove the green pin. Fifteen hours later, my NiCds are perfectly charged, even if I go away on vacation for a week and forget to remove them from the charger. This means I have no more overcharged cells. Now battery-pack surgery is only needed when a cell fails from old age!

Remember! Don't leave those little green and red pins lying around if you have small children in the house, as the pins could be easily swallowed. Place your timer out of reach of small children (they could also turn the dial and switch it off prematurely).

I hope this technique helps you avoid the frustration of NiCd overcharge and get the maximum use out of your rechargeable batteries. Except for long-term storage, *always* keep your NiCds charged! Charge them as soon as they are fully discharged. Never leave uncharged NiCds lying around, and don't overcharge them. That way you should get the maximum life from your batteries. Best of luck.—*Owen O'Neill, N2IWN, PO Box 222, Clarksburg, NJ 08510;* **wilycoyote@juno.com**

A QUICK, EASY MOBILE RADIO MOUNT

◊ Some vehicles have plastic boxes built into the dash to hold tapes, CDs and so on. I had a '92 Ford 150 pickup and a '96 Mercury Mystique that had them. Since most VHF-UHF transceivers will fit into these boxes, I developed a mounting system that works well. The boxes have small external ribs behind the instrument panel that snap them into place; they can be easily removed and replaced without any trouble.

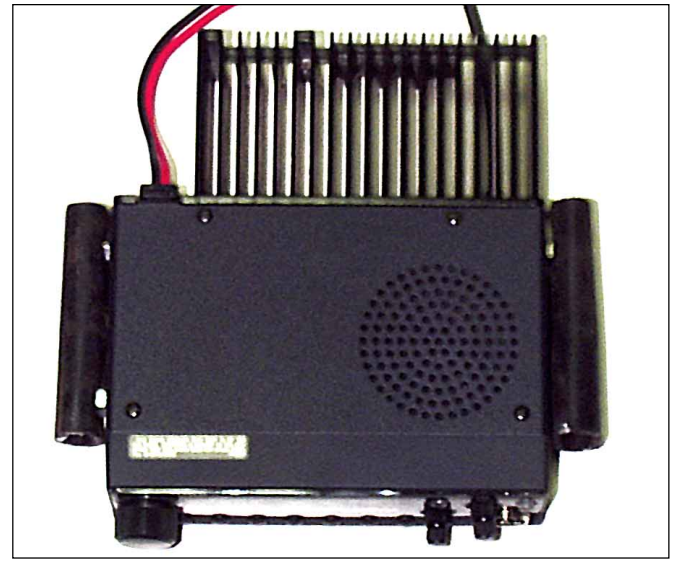


Figure 2—A photo of W5LAN's mobile radio mount, with the hoses on each side.

I removed the backs of the boxes, so that the radio heat sinks and leads can protrude through the back. To hold the radios in place, I cut two three-inch-long pieces of ordinary automobile heater hose. I drilled two 1/4-inch holes in each hose that engage the radio's two mounting bolts on each side (see Figure 2). With both hoses in place, the radio makes a good friction fit with the box. Radios mounted with this arrangement can be easily removed and replaced.—*Marland Old, W5LAN, Rte 1 Box 141b, Boston, TX 75570-9730;* **m.old@att.net**

RF-PROOFING PEAK-READING WATTMETERS

◊ Monitoring your peak power output is not only necessary to insure compliance with FCC power limitations but can provide you with invaluable information. However, my peak-reading meter uses an external power supply and was quite susceptible to RF, making its readings useless.

After considerable experimenting with several possible fixes, I found the following procedures to be quite effective:

1. Use a toroid core as a common-mode choke on the ac line of the dc supply used to power the meter (for example, a RadioShack 273-104 or 273-105). Place the choke as close to the cabinet of the power supply as possible.

2. Place the meter as close to its power supply as possible and use shielded wire for the connection. I have tried both shielded microphone cable and miniature coax with equal success.

These procedures eliminated the RF effects on my meter. I also experimented with different methods of supplying power to the meter. I discovered that the best method was to use a "real" power supply, such as a 3 to 7 A regulated supply. The worst method, and most susceptible to RF, was to use an ac to dc wall adapter.

Being able to adequately monitor your peak power output can be an invaluable aid in setting your microphone gain and amplifier tuning. However, in order to use an externally powered peak-reading meter, it's a good idea to make its power leads"RF-proof."—*T. Stephen Thomason, W4IJ, 601 Black Oak Blvd, Summerville, SC 29485*

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

Multimode Communication Processor Roundup

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

In the "old days" of amateur digital communication, your choices were simple. Prior to 1982, you operated RTTY using one of several *terminal units* on the market. Once the personal computer revolution was fully underway, your choices suddenly expanded to include AMTOR and packet—the first *handshaking* modes that could detect and correct errors. In the early '90s more sophisticated error-correcting modes appeared including PACTOR, PACTOR II, CLOVER II and G-TOR. And in 1999, a weak-signal alternative to RTTY known as PSK31 made its debut.

As early as 1985 hams were clamoring for a way to consolidate the necessary hardware and firmware for several digital modes into one convenient box. Manufacturers responded with devices known as multimode communication processors, or *MCPs*. Others might refer to them as *multimode data controllers*.

For more than 15 years the MCP has reigned supreme, offering an attractive assortment of digital modes. MCPs remain popular today, although they are beginning to encounter serious competition from software-based processors that exploit the capabilities of the ubiquitous PC sound cards.

There are several reasons for the MCP's enduring popularity:

• MCPs usually offer more modes in a single unit than you'll find in any of the current software/sound card products.

• MCPs can be used with just about any computer, old or new. If your computer has a serial port and terminal software of some sort, chances are it can "talk" to an MCP.

• MCPs are easy to install. It's usually just a matter of connecting the cables and switching on the box. There are no maddening software-compatibility issues.

• In some instances an MCP can operate independently of the computer if necessary. For example, you can set up an MCP to function as a PACTOR mailbox, then disconnect the computer and allow the unit to carry on by itself.

In this roundup we take a look at two new entries in the MCP market as well as two familiar units that have undergone significant changes. Our review team included Larry Wolfgang, WR1B, and Mark Wilson, K1RO.

Kantronics KAM '98

The KAM '98 is the latest in a family that can trace its roots back to the dawn of the MCP era. The original KAM and KAM Plus are among the most popular MCPs ever manufactured. So what does this relatively new contender have to offer?

Like its predecessors, the KAM '98 provides the standard list of modes (see Table 1) and includes G-TOR, Kantronics' proprietary competitor to Clover and PACTOR II.

The KAMs of yore boasted the ability to operate separate VHF and HF ports simultaneously, which gave their owners the ability to work, say, VHF packet on one port and RTTY on the other. While this was a neat trick for contesting (you could watch the PacketCluster in one part of your screen while you chased HF contacts in the other), the feature strained the limits of the design, added to the expense and appealed only to a limited number of users. In the KAM '98 they've chosen a single-port design, but with greater flexibility. Owners of HF/VHF transceivers can use the KAM '98 on HF or VHF through a single audio/keying cable rather than the separate lines required with the earlier KAMs.

The KAM '98 includes a useful feature in the form of its AUX (auxiliary) port. Combined with the KAM '98's remote-access function you can use the AUX port to communicate and control outside

Table 1
MCP Feature Comparison

	KAM '98	*PK232DSP*	*PTC-IIe*	*DXP38*
PACTOR	X	X	X	X
PACTOR II			X	
CLOVER II				X
G-TOR	X			
AMTOR	X	X	X	X
NAVTEX	X	X	X	
CW	X	X	X	
RTTY	X	X	X	X
PSK31			X	
ASCII	X	X	X	X
FAX	X	X	X	
HF Packet	X	X	X	
VHF Packet	X	X	X	
FSK	X	X		X
GPS compatible	X	X		
Mailbox	X	X	X	

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

devices. For example, there are four inputs with A/D converters that can be used to report temperature, signal levels, wind speeds or whatever. Two outputs can be coupled to switching circuits (optoisolators and relays, for example), allowing you to activate devices—or just turn on your house lights—via radio. The only catch is that remote control must be conducted using packet.

Installation of the KAM '98 was straightforward, assisted by detailed diagrams and other helpful information in the manual. Kantronics provides a DB-9 connector in the package, attached to a 3-foot long cable that connects to your transceiver. Setting up the audio drive levels is accomplished with software commands.

Kantronics has tightened up the modem filters in the KAM '98, going to a more selective 8-pole design. The difference was noticeable when copying RTTY. The KAM '98 did a good job of copying weak signals and held up well to interference (better than any of us remember seeing with the KAM or KAM Plus), but it fell somewhat short of the ability of the HAL DXP38 (the best of the group in terms of providing clean RTTY text). For casual RTTY operating, however, it is perfectly acceptable.

PACTOR performance was quite good. We were able to maintain QSOs even when conditions were decidedly marginal. CW copying ability was on par with the rest of the MCPs in the group—if the signal was of moderate strength and fist was good, you could copy 100%. When conditions deteriorated even slightly, however, the human ear/brain was the obvious winner.

G-TOR performance was outstanding—when you could find someone to link to. Despite that fact that thousands of KAMs have been sold over the years—most with G-TOR capability—it was difficult to find G-TOR signals on the air. After several days of monitoring and calling, we managed a couple of G-TOR links. In both cases conditions were poor, but G-TOR kept the text flowing with barely a hiccup.

The KAM '98 has a versatile packet TNC that has kept pace with amateur packet developments. In addition to the remote control/access functions we've already mentioned, the KAM '98 is fully GPS compatible for use with APRS.

Manufacturer: Kantronics, 1202 East 23rd St, Lawrence, KS 66046; 785-842-7745; fax 785-842-2031; **sales@kantronics.com**; **http://www.kantronics.com**. Suggested retail price: $449.

Timewave PK232DSP

The PK232 is another MCP veteran. The original PK232 was the brainchild of AEA, and, like the KAMs, they sold by the thousands. Several years ago Timewave purchased a portion of the AEA product line, including the PK232. Initially they offered DSP upgrade kits for the PK232s (and they still do), but Timewave also began manufacturing a substantially modified version of the PK232 that they call the PK232DSP.

One of the hallmarks of the original PK232 was its hardware flexibility, and Timewave has continued this in the PK232DSP. On the rear panel you find two radio ports, both with separate receive audio inputs. The PK232DSP will not handle two radios simultaneously, but you can select between the radio inputs by pressing a front-panel pushbutton. If you prefer to operate RTTY, AMTOR or PACTOR in FSK (where your radio does the job of generating the mark/space signals), there is 5-pin DIN jack for the purpose. Most hams use AFSK these days (where the MCP supplies mark/space tones to the radio), but FSK is handy—particularly if your rig allows you to use narrow IF filters only when you are in the FSK/RTTY mode. Finally, the rear panel offers keying outputs for CW and a connector in case you ever wish to add an external modem. (For example, you could add a PSK modem to copy data from the 1200-baud packet satellites.) Timewave has also included something not often found on MCPs—an external reset button.

The front panel is adorned with a bewildering array of LED status indicators, along with a small tuning indicator. You can adjust the receive audio threshold level with a front-panel control—always an appre-ciated feature! Timewave added an overload indicator to let you know when you are driving the PK232DSP with too much audio.

RTTY performance was on par with the Kantronics KAM '98 and rivaled some soundcard-based RTTY decoders in our informal tests. The only complaint concerned the tiny tuning indicator. Yes, it is the same one that has graced the PK232 for years—and it is still just as cumbersome to use in the PK232DSP.

The automatically adaptive aspects of the new DSP filtering were quite noticeable when operating PACTOR. Depending on the condition of the "channel" at any given time, the filters would adapt accordingly (increasing or decreasing bandwidth). As a result, we noticed that the PK232DSP seemed to maintain PACTOR links in poor conditions longer than the Kantronics KAM.

The PK232DSP copied CW about as well as you would expect, which means it did well with machine-sent code and badly with less-than-perfect code. Its performance was nearly identical with the KAM '98 in this respect.

SIAM, the Signal Identification and Acquisition Mode, was a disappointment. SIAM is supposed to be able to identify unknown digital signals. Its performance was shaky in the PK232 and nothing has changed in the PK232DSP. SIAM often misidentified signals, or seemed to give up altogether (it labeled one PACTOR transmission as "noise"). In all fairness though, none of the other units in this roundup offer a similar feature.

A more notable feature is an oscilloscope output. This can be used with an external 'scope that is capable of X-Y display to supplement the built-in tuning indicator.

As a packet machine, the PK232DSP is essentially the same as earlier versions with one important exception—it is now GPS compatible for use with the Automatic Position Reporting System (APRS).

The PK232DSP is shipped with a demo version of *PK-Term 99*. The full version is available from Timewave. Of course, there are also third-party software packages that will work with the KAM '98, and you can always use whichever terminal program already resides on your computer (*HyperTerm*, in *Windows 95/98*, for instance).

Manufacturer: Timewave Technology, 58 Plato Blvd E, St Paul, MN 55107; 651-222-4858; fax 651-222-4861; **sales@timewave.com**; **http://www.timewave.com/**. Suggested retail price: $450. Upgrade kit, PK232 to PK232DSP, $150.

SCS PTC-IIe

The SCS PTC-IIe is the smaller sized, and smaller priced, brother of the PTC-II controller. The PTC and PTC-IIe are the only MCPs that offer PACTOR II—and the PTC-IIe is the only MCP to date that includes PSK31 in its list of modes.

SCS invented both PACTOR and PACTOR II, the most widely used HF "burst" modes in Amateur Radio. PACTOR was a hit almost from the moment it

appeared in the early '90s, but PACTOR II has been slower to catch on. This has been primarily due to the $800-900 price tag of the PTC-II controller. The PTC-IIe offers greater economy, but at $649 it is still almost equal to the cost of a low-end HF transceiver. Is it worth it?

The PTC-IIe's PACTOR II performance was astonishing. In several instances we successfully accessed BBSs under abominable conditions where we could scarcely hear the other station's signals in the noise. With PACTOR II the data flowed smoothly, albeit more slowly in the midst of deep fades. On the basis of on-air tests, the PTC-IIe implementation of PACTOR II clearly outperformed G-TOR. When we put it up against Clover II, however, the differences were less obvious. In fact, it was impossible to determine a "winner" between the two modes.

In PSK31 the PTC-IIe was mediocre. We matched it head-to-head against sound card-based PSK31 software and the sound cards came out on top every time. Part of the problem may have involved the level of tuning precision required for PSK31. The PTC-IIe uses its multisegment LED bargraph in an interesting way, adjusting the intensity of the segments until the center three are glowing brightest when the PSK31 signal is properly tuned. Clever as this may be, it seemed as though we were able to achieve more accurate tuning, and better copy, using the more common PSK31 software "waterfall" displays.

RTTY performance was very good, better than either the KAM '98 or PK232DSP, but not quite as sharp as the HAL DXP38. One of our reviewers tried the PTC-IIe during the 2000 ARRL RTTY Roundup and was impressed with its ability to copy weak signals in strong interference. The PTC-IIe works strictly in AFSK; it does not provide an FSK output.

The PTC-IIe offers both HF and VHF packet, but the manual is vague about this feature. It spends several pages discussing 300-baud (HF) packet—correctly disdaining it as a poor mode for HF work—with hardly a mention of 1200-baud (VHF) packet. With a little experimentation we had the PTC-IIe working nicely at 1200 baud. The only drawback is that the unit is not GPS compatible for use with the Automatic Position Reporting System.

The DSP filtering functions of the PTC-IIe can be put to work for other applications. By entering the *Audio* mode you can use the PTC-IIe in the same way you would an external DSP audio filter. We fed the audio to an amplifier and listened as we experimented with the notch filter, noise filter, etc. All adjustments are made from the keyboard. This is a nifty feature for those times when you'd like to take a break from digital and work a little phone or CW.

Speaking of CW, yes, the PTC-IIe does that, too. Once again, the copy ability was similar to the other MCPs we tested. The PTC-IIe also does SSTV and fax, but for these modes it functions more like a modem and requires external software to do the actual signal processing and display.

Installation of the PTC-IIe is fairly simple. On the rear panel there is a DIN jack for the audio in/out and transceiver keying lines. Connect the lines as shown in the manual and you are in business. Audio output levels are controlled through software commands.

The English manual has been translated well from the original German, but the organization is poor. It is not easy to locate the information you need, and you often find it lacking in detail. The software provided with the PTC-IIe is *DOS* only, and it performed reasonably well. At this price level, however, we had expected to find a full-featured *Windows* program.

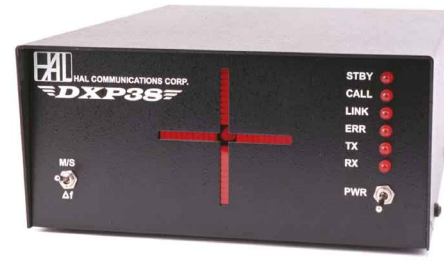
So the question arises once again—is the PTC-IIe worth it? The PTC-IIe is targeted to a particular market: the traveling hams. These are the folks who cruise the roads for months in recreational vehicles or roam the seas in private boats. Many of these travelers depend on the global Winlink 2000 BBS network to stay in touch via Internet e-mail (see "Digital Dimension" in your March 2000 *QST*). The great majority of these Winlink gateway stations operate using PACTOR or PACTOR II (usually both). So, it is important to have a high-performance PACTOR/PACTOR II MCP that can maintain connections under the worst conditions. When e-mail is one of your lifelines to friends and loved ones, price is less of a consideration than quality. For the average housebound ham, $649 may be too steep to justify—even for the remarkable performance of PACTOR II. For the traveling amateur, however, that price tag is quite reasonable.

Manufacturer: SCS, Roentgenstr 36, D-63454, Hanau, Germany; **http://www.scs-ptc.com/**. Distributed in the United States by Farallon Electronics, 2346 B Marinship Way, Sausalito, CA 94965; 415-331-1924; fax 415-331-2063; **pactor@yachtwire.com**. Suggested retail price: $649.

HAL Communications DXP38

The HAL DXP38 does not offer as many modes as the other MCPs in this group, but it does extremely well with what it *does* offer: PACTOR, RTTY, ASCII, AMTOR and CLOVER II.

The DXP38 manual is the best of the group. It is well written, well organized and concise. The writing style is conversational with a slight touch of humor.



You hardly need the manual to install the DXP38. Unlike the other MCPs in this group, the DXP38 uses RCA phono jacks on the rear panel, which makes cabling a breeze. (If you've ever soldered several wires onto a DIN plug, you know what we mean.)

Once you're up and running, you have your choice of FSK for RTTY, AMTOR and PACTOR, or AFSK for the entire set. Clover II must be sent using AFSK, so we opted for AFSK for all of our testing. A trim pot to adjust the transmit audio level is accessible from the rear panel.

HAL Communications has a long history in HF digital communication. Its RTTY terminal units are still considered among the best in the world. It's no surprise, then, that the RTTY performance of the DXP38 was the best in the group. In weak-signal conditions and brutal contest environments, the DXP38 consistently copied RTTY when the other MCPs displayed mostly gibberish. The hardware tuning indicator—an LED emulation of the traditional "crossed bananas" oscilloscope display—was a joy to use. Even weak, interference-laden signals could be tuned quickly and accurately.

The DXP38's PACTOR performance (HAL refers to this as *P-Mode*) was also outstanding. We were able to establish and hold PACTOR links under marginal conditions. Only the SCS PTC-IIe could top the DXP38 in this category.

We ran into difficulty testing the DXP38 on AMTOR, but that had nothing to do with the device itself. AMTOR signals are as rare as proverbial hen's teeth these days and the only way we could conduct AMTOR tests with this or any of the other MCPs was to arrange skeds. Despite the hassles, the DXP38 seemed to acquit itself very well in this mode.

And then there is Clover II. This complicated 4-tone mode is the chief competitor to SCS's PACTOR II. Both modes have been doing battle for dominance in the commercial and amateur markets for years. Of course, both companies insist that their mode is superior and can present evidence to prove their cases. In our brief, informal tests… it was a draw. We did not notice substantial performance differences between PACTOR II and Clover II. Under identical conditions

both modes appeared to transfer our sample files in roughly the same amounts of time. As with PACTOR II, the overall performance of Clover II was remarkable, maintaining links and transferring data in conditions under which we could just barely hear the other stations.

Clover requires high transceiver stability (+/- 5 Hz drift per hour, maximum) and slow, careful tuning for optimal results. The DXP38's tuning indicator was helpful, but it is only updated every 2 seconds in Clover II, so you have to tune very carefully. Once you find a Clover signal (it sounds like an extended *brrrrrrr*) and tune it in, the best thing to do is leave your radio alone. Even a slight VFO tweak is sufficient to break the link.

HAL Communications was the only company to provide both *DOS* and *Windows* software with their product. We used the *Windows* software and it worked extremely well. (Some preferred the *Windows* tuning indicator for Clover II rather than the hardware display.) Unlike the other burst modes, Clover II is bi-directional, which means that it is sending and receiving information at regular intervals without waiting for an "over" command from the operator. This made live QSOs a bit tricky because the one operator could begin commenting on something you said before you were even finished saying it!

Despite the excellence performance of Clover II, hams have not embraced this mode in large numbers. The fact that the Winlink 2000 e-mail network is almost exclusively based on PACTOR will not help this situation in the immediate future. Clover BBSs and live QSOs are not as scarce as G-TOR or AMTOR contacts, but they are not plentiful, either.

Manufacturer: HAL Communications, 1201 W Kenyon Rd, Urbana, IL 61801; 217-367-7373; fax 217-367-1701; **halcomm@halcomm.com**; **http://www.halcomm.com**. Suggested retail price: $395.

RadioShack HTX-10 10-Meter Multimode Transceiver

By Wayne K. Irwin, W1KI
Assistant to the ARRL VEC Manager

RadioShack has been a major player in the Amateur Radio business longer than most of today's hams have been licensed. Equipment manufactured by Hallicrafters, National, Johnson, Hammarlund and Drake, to name just a few, once graced their shelves.

Any truly successful company has to be sensitive to the changing marketplace if it is to survive. These days, RadioShack's primary focus is on the sales of "consumer electronics"—computers, TV, video, audio and telephone equipment. Nevertheless, they continue to cater to the amateur and business band communications market and still provide a convenient and respectable inventory of parts for the electronics experimenter and hobbyist.

Over the last decade or so, RadioShack has carried on their ham tradition by offering a selection of Amateur Radio transceivers under their own brand name, and has also made available (primarily by special order) amateur station accessories by a handful of the well-known manufacturers. Over this time span, their "house brand" transceivers have included a single band 10-meter mobile—the HTX-100—their wildly popular HTX-202 and HTX-404 VHF and UHF single band FM H-Ts, a now discontinued dual-band H-T and a VHF FM mobile transceiver.

With the incredible number of RadioShack franchises that dot the landscape (there are five within 20 minutes driving distance of ARRL HQ) and their constant barrage of newspaper inserts, direct mailings and catalogs, it's not surprising that so many new hams' first transceivers bear the RadioShack label.

At last year's Dayton Hamvention, RadioShack debuted replacements for the HTX-202 and 404 H-Ts—the all-new subcompact HTX-200s and 400s. Even then, the rumors were already flying about a new 10-meter mobile transceiver to replace their long-discontinued HTX-100. The level of sunspot activity was right—the market was ready.

A couple of months ago, the HTX-10 10-meter mobile transceiver started showing up in the inventories of local RadioShack stores. The suggested price was just under $150, and it was already sporting a lower "sale" price! We just *had* to have a closer look.

At First Glance

By today's standards, the HTX-10 is fairly hefty—it's a bit taller and considerably deeper than the typical single band VHF mobile transceiver. With a little ingenuity, however, it should be able to take up residence in all but the tiniest cars.

The busy front panel includes five knobs and six buttons. The knobs are rubberized and the buttons are large and nicely spaced. All of the controls are clearly labeled. Each button performs multiple operations—a **FINE** tuning knob, when pressed, activates a "function" operation that evokes these buttons' secondary assignments.

An LCD display window dominates the front panel. Frequency digits and function icons appear as black segments on a light gray background. The LCD display backlighting level is fixed, and "halos" of light appear around the perimeters of the rotary controls. The information shown in the window is easy to read—even at extreme angles. A 5-section LCD S/RF meter extends across the entire lower edge.

Packaged with the transceiver is a simple mobile mounting bracket, a 5½-foot power cord with a conventional T-type power connector, a mobile microphone with frequency **UP** and **DN** keys and a hardware pack containing a spare fuse, mounting screws and a mike hanger clip.

BOTTOM LINE
The RadioShack HTX-10 SSB/FM/AM 10-meter transceiver can be your low-priced ticket to worldwide radio adventure.

Table 2
RadioShack HTX-10, serial number 901811

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency coverage: receive and transmit, 28-29.7 MHz.	Receive and transmit, as specified.
Modes of operation: USB, LSB, FM, AM.	As specified.
Power requirements: 12-16 V dc; Receive, not specified; transmit, 5 A (maximum).	Receive, 0.75 A; transmit, 5.2 A, tested at 13.8 V.
Size (hwd): 2.0×6.1×9.6 inches; weight, 3.3 lb.	
Receiver	*Receiver Dynamic Testing*
Sensitivity, 10 dB S/N: 0.5 μV.	FM, 12 dB SINAD: 0.54 μV. AM, 10 dB S+N/N: 0.48 μV; SSB, noise floor (mds): –135 dBm.[1]
Blocking dynamic range: Not Specified.	86 dB.
Two-tone, third-order IMD dynamic range: Not specified.	FM 53 dB; SSB, 68 dB.
Third-order intercept: Not specified	–34 dBm.[1]
FM adjacent channel rejection: Not specified.	79 dB.
Spurious response: Not specified.	IF rejection: 74 dB; image rejection, 42 dB.
Squelch sensitivity: Not specified.	0.41 μV at threshold.
Audio power output: 2.5 W at 10% THD into 8Ω.	2.2 W at 10% THD into 8Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: 25 W FM, SSB; 7 W AM.	FM, SSB, 30 W; AM, 7 W.
Spurious signal and harmonic suppression: 65 dB.	65 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: Not specified.	48 dB.
Undesired sideband suppression: Not specified.	>65 dB.
Third-order intermodulation distortion (IMD) products:	See Figure 1.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 80 ms. Unit is not suitable for use on AMTOR.
Receive-transmit turn-around time ("tx delay"): Not specified.	SSB, 32 ms; FM, 36 ms.
Composite transmitted noise: Not specified	See Figure 2.[2]

All dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

[1]Due to the absence of CW mode capability, these measurements were taken at SSB bandwidth. This data should not be used for direct comparison with the numbers we typically report that are taken at or near our standard 500-Hz bandwidth.

[2]This parameter was measured in FM mode with the microphone input grounded. Although not directly comparable to a CW measurement, it is a reasonable approximation.

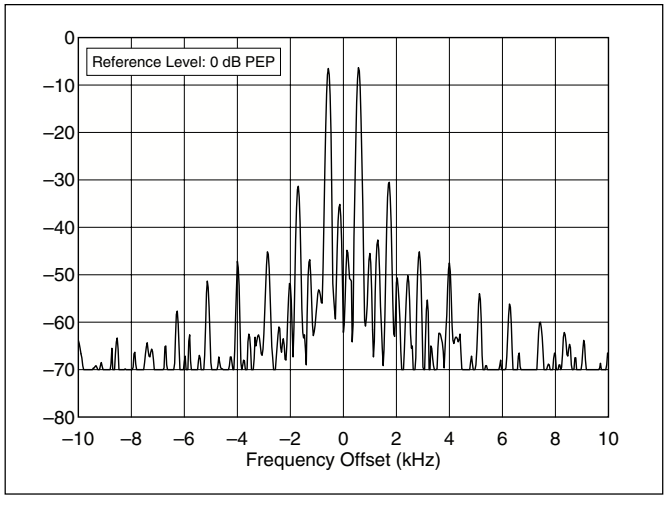


Figure 1—Worst-case spectral display of the HTX-10 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is approximately 46 dB down. The transmitter was being operated at 25 W output at 28.350 MHz.

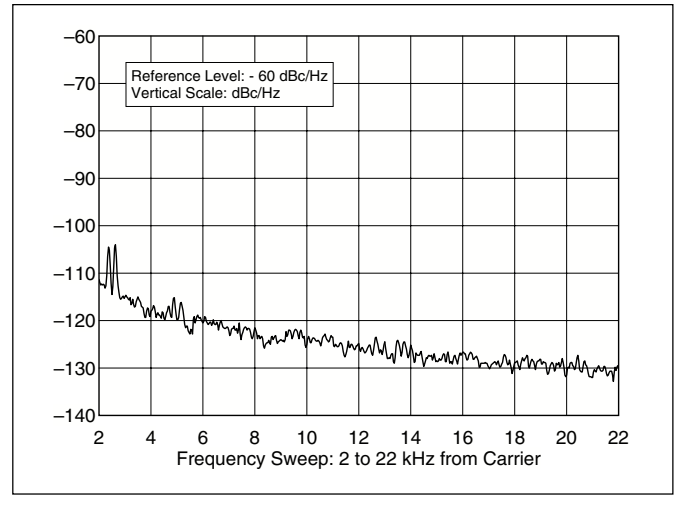


Figure 2—Worst-case spectral display of the HTX-10 transmitter output during composite-noise testing. Power output is 25 W at 28.020 MHz. The carrier, off the left edge of the plot, is not shown. The plot shows composite transmitted noise 2 to 22 kHz from the carrier.

A few points related to the microphone deserve mention. If the mike is not connected, you will not hear receive audio from the internal speaker. The microphone plug is a bit unusual too. While most amateur transceivers use an 8-pin microphone jack, the '10 uses a 6-pin. RadioShack does not currently stock 6-pin microphone plugs in the stores—they do, however, typically stock the 4- and 8-pin varieties. Hopefully they'll be adding these to their usual inventories for those of us interested in experimenting with the digital modes. The microphone pin configuration diagram is not included in the *Owner's*

Manual. Break out the DVMs!

The HTX-10 is capable of operation in four modes: upper sideband, lower sideband, FM and AM. RF power output is specified at 25 W on SSB and FM; 7 on AM. There are just 5 memories—but that's probably adequate to satisfy the needs of most casual operators. (My main station transceiver provides 100 programmable memory channels, but I've never had more than a handful of them loaded.) There's a "call" frequency key, a "last frequency recall" button and a scan feature that will search the entire band. The ability to scan just the five memory channels, or between user set frequency limits, is not available.

Notable highlights include a noise blanker, an all-mode squelch, adjustable microphone and RF gain controls and a frequency shift setting—primarily intended for accessing the 10-meter FM repeaters. This shift feature can also be enabled in the SSB mode for working "split." This is an operating method sometimes used by highly sought-after stations—rare DX and DXpeditions for example—for taming unwieldy pileups. (Refer to the *ARRL Operating Manual* [ARRL order #6141] for the gory details.)

That Closer Look

The 33-page $4^1/_2 \times 7$-inch manual, although not overly detailed or technical, should be more than adequate to get you up and running quickly. Sections on amateur licensing requirements, installation, operation and troubleshooting are included. The step-by-step instructions are easy to follow and are accompanied by helpful diagrams. Unfortunately, a schematic diagram is not provided.

Curiously, unlike RadioShack's earlier 10-meter mobile, the HTX-10 is not equipped for CW operation—but then again, that model didn't include the FM or AM modes. This omission may come as a bit of a shock to a recently-licensed HF operator who worked hard to fulfill his 5-wpm code requirement only to discover that the entry-level HF radio he purchased doesn't even operate in this mode!

If your primary use for this transceiver will be mobile operation, you may not find this a major concern. Although mobile CW can be an enjoyable form of amateur communication (*ask N1RL*), most of us are content to settle for just voice operation—especially from the driver's seat! For fixed station and portable use (and transverter applications), the lack of the CW mode may certainly be considered by some to be a significant shortcoming.

For moving around in the band, the tuning increment of the main encoder knob can be set for 100, 10 or 1 kHz steps. Once you've "coarse tuned" to a frequency of interest, you use an independent **FINE** tuning control to vary your frequency between the 1 kHz steps. The transmit and receive frequency are both simultaneously changed with this knob—the radio does not provide a separate receiver incremental tuning (*RIT*) control. The **FINE** control will allow frequency excursions of up to approximately 1.3 kHz above or below the displayed frequency. The manual is a bit vague concerning the behavior and proper operation of this control—you'll probably want to keep it in the 12 o'clock position while trawling for activity (and especially while operating in the FM mode).

Memory operation couldn't be easier. To program a memory you dial up the desired frequency, push in the **FINE** knob to activate "function," press the **M-LOAD/M-SAVE** button and then press one of five available front panel buttons you want to assign the frequency information to. Once programmed, the memory channels are accessed by pressing the **M-LOAD/M-SAVE** button followed by the key labeled with the desired memory number. Memory number 2 serves double duty for one-touch call channel access. Each of the memories will hold the frequency, the mode and—for FM repeater operation—the repeater offset frequency and direction (typically -100 kHz for 10-meter FM repeaters). The memories will not retain the setting of the **FINE** control, so for SSB operation some final retuning may be required.

CTCSS capabilities are not provided and, apparently, there are no internal sockets for installing an optional tone board. The serious 10-meter FM repeater aficionado will consider the lack of CTCSS to be a disadvantage. While not *all* 10-meter repeaters are CTCSS protected, a significant number of them are. CTCSS is typically not used for FM simplex.

Aftermarket manufacturers, such as Communications Specialists (and others), offer a selection of CTCSS tone boards that should be adaptable for use with this transceiver, but some minor radio surgery will be required. Break out your soldering irons!

The microphone gain and the RF gain controls are a concentric pair of knobs located to the lower left side of the display. For single sideband operation, the RF power output can be varied using the microphone gain control. For the AM and FM modes, the power output is essentially fixed at the maximum level, but adjusting the control will still change the level of the transmitted audio. For SSB operation, you'll want to avoid setting the mike gain (and subsequently the RF power output) to the fully clockwise position. This invariably results in reports of distorted transmit audio. Settings between 2 and 3 o'clock seemed to solicit reports of the best balance between signal strength and audio quality. Set it much higher than that and—just as with any other HF SSB transceiver—you'll end up overdriving the ALC (shame on you!).

RadioShack has tossed in an interesting function labeled **T-LOW** (tone low). When enabled, this circuitry acts as a low-pass audio filter, or as the manual calls it, a "high cut filter." This feature is reasonably effective for reducing interference.

On-the-air reports were all favorable, with comments such as "nice sounding audio" commonplace. The received audio from the built-in speaker is acceptable, but—as with most radios—the improvement in the sound quality when using a decent external speaker was definitely apparent.

At 25 W, the HTX-10 is not exactly a powerhouse, but propagation on 10 meters can be a great equalizer. When the band is open, the world will be at your doorstep, even with simple antennas and "just" 25 W. When the band is closed, this same power level will give a good account of itself for local communication.

A Few Closing Thoughts

It would have been nice to see CW, CTCSS and RIT on the HTX-10. With these points noted, this transceiver still certainly deserves serious consideration. Used 10-meter rigs are available, but with the great 10-meter band conditions we're currently enjoying, it's getting harder to locate any bargains in "pre-owned" equipment. RadioShack's HTX-10 is definitely a viable option for those looking for a good basic 10-meter mobile transceiver, a convenient rig to take on trips or a simple, inexpensive radio for use at home.

At this price—lower than most single band FM H-Ts—it's easy to imagine that RadioShack will be selling these by the boatload. Hopefully the combination of the comparatively small initial investment and the growing number of owners using and experimenting with this radio will lead to homebrew circuit changes and improvements that will help to overcome what some may perceive as its shortcoming. I'm wagering that this neat little rig will be generating *Hints and Kinks* material for years to come. Now, my ham brothers and sisters, go forth and modify!

Manufacturer: RadioShack, a division of Tandy Corp, Fort Worth, TX 76102; 800-843-7422; fax 817-415-2303; **http://www.radioshack.com/**.

Manufacturer's suggested retail price: $150. Typical current street price: $140.

The ICOM IC-T81A Quad-Band FM Hand-Held Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

As close as I can tell from the advertisements in the musty, dog-eared copies of *QST* in the HQ archives, the first commercially available truly hand-held single-band FM VHF transceivers first appeared about 30 years ago.

Yaesu broke the single-band H-T barrier sometime in late 1986 when they introduced their dual-band VHF/UHF FT-727R. ICOM was first to crack the two band limit in 1993 with a tribander (2 meters, 70 cm and 23 cm)—the IC-Δ1A.

Last year ICOM struck again—toppling the three band barricade with their IC-T81A—a *quad-band* H-T that covers 6 meters, 2 meters, 70 cm and 1.2 GHz. Kinda makes you wonder which manufacturer will lay claim to the world's first quint-bander. (At that point, I hope we can just agree to start referring to them as "multiband" H-Ts.)

1.2 *Gigahertz* ?!

The real hook for the IC-T81A is its 23-cm coverage. With the total number of 2-meter, 1¼- and 70-cm repeater systems steadily increasing, it's becoming more difficult for groups or individuals interested in setting up new repeaters—especially in densely ham-populated areas—to locate available frequency pairs. While several of the amateur transceiver manufacturers do produce 1.2 GHz mobile and handheld transceivers, up 'til now the relatively small US market for this equipment has resulted in extremely limited stateside availability and astronomically high prices.

Not Any More

For the US ham interested in experimenting on 1.2 FM, the IC-T81A is really quite a breakthrough. The current street price on this unit is actually less than what some of the single band 23-cm H-Ts were recently selling for. Add to this 6-meter, 2-meter and 70-cm transceive; 120 alpha-numeric memories; expanded receive (including AM aircraft, television audio and FM broadcast); multiple scan settings; 9 autodial memories; independent CTCSS encode and decode; CTCSS tone scan; radio to radio cloning; and optional *Windows* computer programmability; and you can begin to imagine just how welcome this transceiver is in the 1.2 GHz community!

In spite of this impressive list of capabilities, the 'T81 is surprisingly compact. Its short, squat stature is similar to—and in most cases smaller than—the other one band at a time hand-helds that are presently dominating the H-T market. Like those transceivers, the IC-T81A is not capable of dual- (or tri-, or quad-) band simultaneous receive. Consequently, full duplex cross band operation is not possible. *Unlike* some of the others, there are also no provisions for programming half duplex cross band splits (typically used for FM satellite operation).

All in the Family

At first glance, it's easy to mistake the IC-T81A for ICOM's triband (6 meters/2 meters/70 cm) IC-T8A. They're nearly identical in size, color and shape, and share the same NiMH battery series. The overall quality of the fit and finish of the IC-T81A is excellent

The baseball bat-shaped antennas common to both models are bulkier than those used on most H-T's, but thankfully the 'T81's quad-band antenna is about half as long as the 'T8's king-sized 12-inch plus triband antenna.

The most salient difference between the two is a 5-way **MULTI** button on the left side of the new transceiver's front panel. This joystick-style control keeps the number of front panel buttons to a minimum and is used to command a staggering number of operations.

The primary assignments for the **MULTI** button are volume and band changing. Rocking the control up or down adjusts the volume; rocking right or left will step you through the band selections—6 meters, FM broadcast, AM airband, 2 meters, 70 cm and 23 cm. Pressing and holding the left or right edges will initiate a scan on the presently selected band.

Bottom Line

The IC-T81A provides nearly all of the most desirable features of the other one-band-at-a-time multibanders and offers the opportunity to experiment on the microwaves as well.

The Rub

The **MULTI** button is also used to enter set menus. Initially, gaining access to these led to a considerable amount of frustration.

After unpacking the radio and charging the battery, I was anxious to get on the air. The first thing I wanted to do was set up a CTCSS tone and duplex offset for one of our local repeaters.

The *Instruction Manual* clearly stated that to enter the set mode, you press and hold the center of the button. It certainly sounded simple enough…

Each of my early attempts to perform this feat resulted in an undesired response—the band would change, the volume would change, the scan feature would activate—there was no sign of a set menu whatsoever. I finally convinced myself that something must be wrong with the control on our unit. Rather than break out the screwdrivers and the contact cleaner (just kidding!), I decided to touch base with my local ICOM dealer.

The good news?—nothing was actually wrong with our transceiver. In order to press the **MULTI** button "straight" in, you need to take into account its position on the curved face of the radio. Even then, you've got to aim carefully—any variation of dead perpendicular to the surface of the button isn't going to cut it—the "sweet spot" seems very small.

I moaned and whined about this to ICOM, the local dealer, my coworkers, complete strangers—nearly anyone who would listen. After a bit of practice though, I must admit that working it quickly became second nature.

Once *you've* managed to get "the knack" and break in to the main set menu, you'll be rewarded with access to five choices—a scan timer, the repeater offset, the tuning step size, the CTCSS tone and the CTCSS tone squelch frequency settings. When you first toggle up each item, the current value with an abbreviated label appears—"5.0 TS" for example. A few seconds later, scrolling text—"TUNING STEP" in this case—appears to help you positively identify the specific menu selection.

Provisions to vary the duplex direction and CTCSS tone and/or tone squelch are accessed by quickly pressing (without holding) the **MULTI** control. Several other operations—including the receive mode type; an RIT/VXO for 23 cm; the memory naming feature and an *initial set mode*—

ICOM IC-T81A, serial number 01271

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency Coverage: Receive, 50-54 MHz, 76-108 MHz (WFM), 118-136 MHz (AM), 136-174 MHz, 400-470 MHz, 1240-1300 MHz; transmit, 50-54, 144-148, 430-450, 1240-1300 MHz.	Receive and transmit, as specified.
Power requirements: 4.5-16.0 V dc; receive, 0.22 A; transmit, 1.4 A (maximum, high power).	Receive, 0.18 A (maximum volume, no signal); transmit, 1.4 A, with BP-200 battery pack and 13.8 V dc.
Receiver	*Receiver Dynamic Testing*
FM Sensitivity: 12 dB SINAD, VHF and UHF, 0.18 μV; 1270 MHz, 0.25 μV; WFM, 76-108 MHz, 2.0 μV.	For 12 dB SINAD, 52 MHz, 0.13 μV; 146 MHz, 0.14 μV; 440 MHz, 0.14 μV; 1270 MHz, 0.16 μV; 76-108 MHz (WFM), 0.6 μV.
AM Sensitivity: Not specified.	10 dB S+N/N, 1-kHz tone, 30% modulation, 120 MHz: 0.32 μV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 52 MHz, 57 dB*; 146 MHz, 54 dB*; 440 MHz, 61 dB*; 10 MHz offset: 52 MHz, 89 dB; 146 MHz, 68 dB; 440 MHz, 66 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 52 MHz, 57 dB; 146 MHz, 54 dB; 440 MHz, 61 dB.
Spurious response: VHF, 60 dB (except IF rejection on 50 MHz); UHF, 50 dB; 1270 MHz, 38 dB.	IF rejection, 52 MHz, 51 dB; 146 MHz, 105 dB; 440 MHz, 99 dB; 1270 MHz, 82 dB; image rejection, 52 MHz, 101 dB; 146 MHz, 94 dB; 440 MHz, 59 dB; 1270 MHz, 67 dB.
Squelch sensitivity: VHF and UHF, 0.18 μV; 1270 MHz, 0.25 μV.	At threshold, VHF and UHF, 0.13 μV; 1270 MHz, 0.18 μV.
Audio output: 250 mW at 10% THD into 8 Ω.	320 mW at 10% THD into 8Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: VHF and UHF, 5.0 W high; 0.5 W low; 1270 MHz, 1.0 W high; 0.5 W low.	With BP-200 battery pack, 52 MHz, 5.1 / 0.6 W; 146 MHz, 5.7 / 0.7 W; 440 MHz, 4.5 / 0.5 W; 1270 MHz, 0.9 / 0.3 W; with 13.8 V dc: 52 MHz, 5.6 / 0.5 W; 146 MHz, 6.0 / 0.7 W; 440 MHz, 6.0 / 0.7 W; 1270 MHz, 0.9 / 0.3 W.
Spurious signal and harmonic suppression: VHF and UHF, 60 dB; 1270 MHz, 40 dB.	52 MHz, 64 dB; 146 MHz, 70 dB; 440 MHz, 67 dB; 1270 MHz, 65 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF, UHF and 1270 MHz, 200 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	52 MHz, 108 ms; 146 MHz, 122 ms; 440 MHz, 112 ms; 1270 MHz, 122 ms.
Size (hwd): 4.2×2.3×1.1 inches; weight, 10.9 ounces.	

*Measurement was noise limited at the value indicated.

all involve pressing straight down on the **MULTI** control.

Up and Running

I received universally good reports on the 'T81's transmit audio quality. The receive audio, although not as strong as some of the other recently released H-Ts, was adequate for hand-held applications. While some of the operating descriptions so far might lead you to believe that the IC-T81A is a handful to control, once you've become used to physically manipulating the **MULTI** control, radio operation is easy.

The button functions for the **0** through **9** digit keys on the main keypad are restricted to either frequency digit or DTMF tone activation. The fourth column (the DTMF **A**, **B**, **C** and **D** keys) serve multiple duties for VFO, memory write and recall, call channel and high or low power output level. The keypad **#** key also provides quick access to the CTCSS tone scan feature and, when operating on 23 cm, the RIT control.

As has been the case with most of their recent documentation, ICOM's *IC-T81A Instruction Manual* is complete and easy to follow. A pocket-sized 4-page fold out *Operating Guide* is also packed with the radio and is probably sufficient information for experienced operators. A schematic diagram is not included.

Lab Results

When commenting on the level of performance of a radio, we typically like to try to roughly define a category of similar transceivers on which to base our comparisons. Since there are no other available quad-banders, the radios that seem most appropriate to use for this purpose are the one band at a time dual-banders and tribanders.

Two-tone third order dynamic range for 10 kHz offset on 6 meters measured an impressive 89 dB, easily besting the performance of the other 6-meter equipped multibanders and even managing to top the numbers posted by the single band 6-meter H-Ts we've looked at. The 2-meter 10 MHz offset performance, usually a good indicator of a transceiver's ability to fight off interference from nearby commercial communications, is about on par for one band at a time radios. On 70 cm, it was near the top of the class. The adjacent channel rejection numbers, while respectable on 6 meters and 70 cm, fell below the median running average on 2 meters for similar units. Unfortunately, the ARRL Lab is not currently equipped to collect data for these particular parameters on 23 cm.

Consider Your Options

Before you gleefully dive on to the "more bands is better" bandwagon, you may want to take a few minutes to investigate the level of 23-cm activity in your area. Ask local hams, or at least scan through the *ARRL Repeater Directory*.

But whether you're joining in on existing activity or pioneering a move to the higher frequencies in your area, you'd certainly be hard-pressed to find a more fully featured and economically priced piece of gear to put you on 23-cm FM. And that's not even taking into account the added convenience of having 6, 2 meter *and* 70 cm capabilities—and expanded receive as well—all neatly packed into a single compact enclosure.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004; 425-454-8155; fax 425-454-1509; **75540.525@compuserve.com**; **http://www.icomamerica.com**. Manufacturer's suggested retail price: $479. Typical current street price: $350. CS-T81 programming software, $13; OPC-478 computer programming cable, $45; OPC-474 radio to radio cloning cable, $18.

TECHNICAL CORRESPONDENCE

SOME TOOLS AND TRICKS OF THE HOBBY

By Wayne Yoshida, KH6WZ, 16428 Camino Canada Ln, Huntington, Beach CA 92649;
kh6kine@earthlink.net

◊ Following Paul (N1FB) Pagel's invitation in Technical Correspondence to identify one's favorite workbench tools,[1] I submit the following, along with a few construction tips.

Smoothing Out Burrs

Take a look at the pencil-like device in Figure 1. It's a General #482 swivel-head deburring tool, and comes with an assortment of blades. I found this tool in a wood and metalworking specialty shop. After years of using my old pocketknife, I find this deburring tool to be a much more elegant way of cleaning holes in chassis, boxes and panels. It's useful for any size and shape of hole. (Another way to quickly deburr round holes is to use an oversize twist drill bit. A few twists by hand will smooth out the rough spots.)

A Robust Tool for a Common Task

If you use spade lugs or other solderless terminals, get a *real* crimping tool. I've owned several terminal-mashers, but the ones that work the best are those ones that resemble a pair of pliers (see Figure 2). This pair is made by GB, and can be found in the electrical section of your local Home Depot.

Soldering Tips and Tricks

Here are two old money-saving tricks to add to your soldering repertoire. If you have a soldering gun, you may never again have to buy a new tip! (See Figure 3.) Scraps of solid copper house wire can be recycled for this purpose; I've used pieces of #14, 12 and 10 wire. Simply strip the insulation from a six-inch length of wire and bend it into shape. If you want to get fancy, you can build a jig for this; see Figure 4. I find it easier and quicker to just bend the wire by hand.

When soldering SMD (surface-mount device) components, sometimes even the smallest tip in my toolbox is too big for the job! I employ the old "tip-extension trick." Strip a length of solid copper wire and wrap a few turns around the soldering iron's barrel and tip, extending the wire past the existing iron tip as shown in Figure 5. The end can be shaped with a diagonal cutter, or can be squashed in a vise and then cut or filed to shape. Usually though, a quick snip with the cutters is all it takes. Warm up the iron, tin the new tip extension, and you're ready to go. This is also a good trick to use when repairing a hard-to-reach joint in a tight chassis corner or behind a panel.

Wire Strippers

I've collected several different wire strippers, from plain knives and razor blades (I've even used my teeth on Field Day...) to fancy, automatic strippers that use heat combined with a grip/strip/cut action.

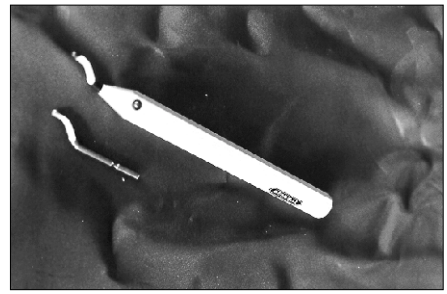


Figure 1

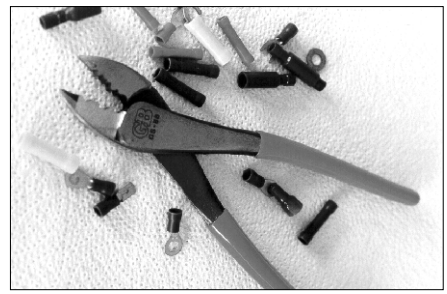


Figure 2

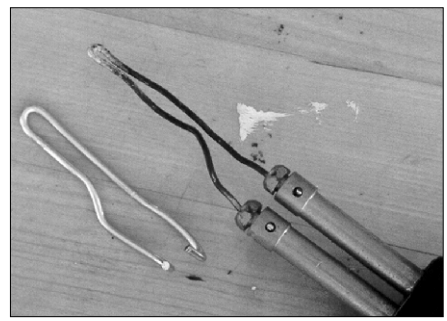


Figure 3

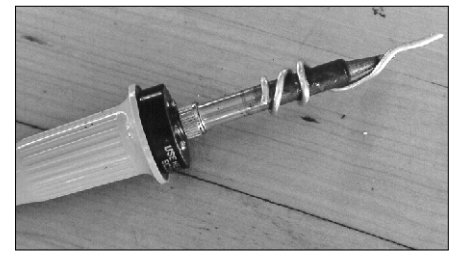


Figure 5

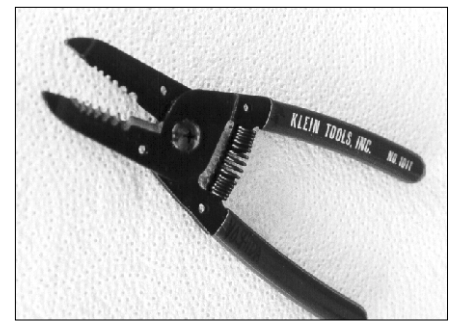


Figure 6

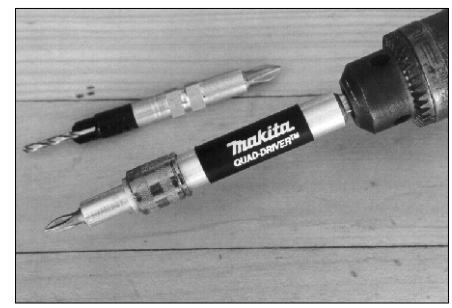
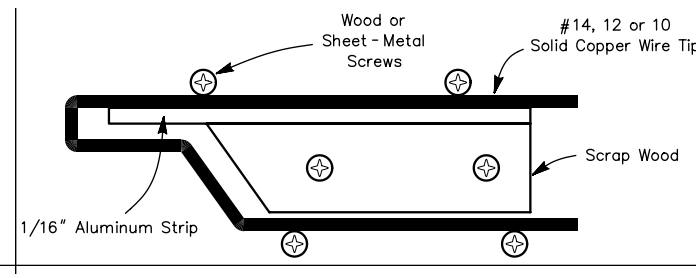


Figure 7

Figure 4

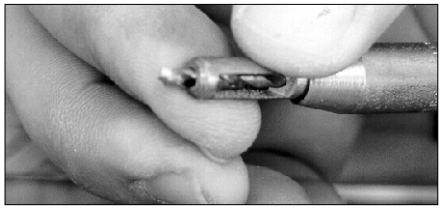


[1]Paul Pagel, N1FB, "Tool Tip," Technical Correspondence, *QST*, Dec 1998, pp 63-64.

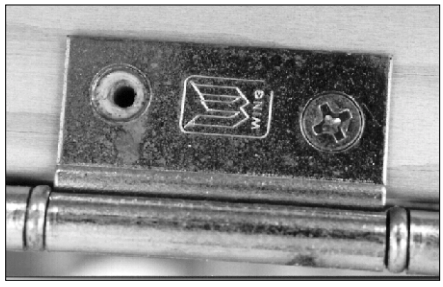
Paul Pagel, N1FB ♦ Senior Assistant Technical Editor

Lately, though, I've been using the tool shown in Figure 6. This Klein stripper comes in two versions, but the most useful for electronics work is the model number 1011, which handles wires from 20 to 10 AWG. It cleanly strips solid or stranded wire without nicking. It also looks easy to sharpen, since it is held together with a screw, something that I didn't find in the other stripping tools I've owned. Simply put the wire into the appropriate slot in the jaws, squeeze the handles, twist a bit and pull off the insulation.

Here's a tip: For repair work, it's usually necessary to work with a wire that is already attached to something on the other end. Stripping wire with a mystery end can be annoying. You don't want to break the wire, because you may never know where it was attached before your repair. Here, you can hold the wire tightly with a pair of long-nose pliers near the end you need to strip, safely protecting the existing joint at the other end.



(A)



(B)

Figure 8

Figure 9

Useful Bits

There are two drill accessories I have to mention—they're shown in Figures 7 and 8. The Makita bit drills a hole and countersinks it, then can drive a Phillips-head screw. Figures 8A and 8B show a VIX bit, designed to drill pilot holes for hinges. This bit can be used to drill matching holes in enclosures. The VIX bit is always spot-on. Both devices are designed around a twist bit, so they can be used for working on metal and plastic as well as wood.

The VIX bit is especially useful for making precisely spaced holes in a pattern. I use the following method to drill out panels for speakers and ventilation.

Use an existing hole pattern from a piece of metal borrowed from a piece of equipment or use a piece of pre-punched sheet metal available from your local hardware store. For example, I usually use the top panel of a commercially built power supply as a hole template. Visualize your final pattern. You can drill the holes to make a square, hexagonal or other-shaped pattern in your panel as easy as 1-2-3:

1. Lay out the overall size and shape for your hole pattern on your panel. You don't have to mark each hole of the pattern, just the outline. Use double-stick tape (such as carpet tape) to fasten the sheet metal pattern to the panel.

2. Drill out the pattern using the VIX bit.

3. Remove the pattern sheet, remove the tape residue with a solvent (*Use adequate ventilation and safety measures*—Ed.) and admire your work of art!

To remove sticky tape residue, I've successfully used many solvents, lubricants and oils including alcohol, acetone, WD-40, 3-in-1 oil, car wax, olive oil, peanut butter, margarine and butter. The last four are biodegradeable. I select my remover based on the material beneath the sticky residue. On plastics, I recommend using one of the biodegradeable removers; they usually don't affect plastics as some other types of removers do. Simply smear the remover onto the sticky area, let it soak a bit and wipe off the residue with a rag. It works every time!

The Tap and Die

Figure 9 shows a Sears Craftsman 9-52069 tap and die set. This set has the most common and useful machine screw threads used in electronics work. I use threaded holes to mount large and thick objects, such as heat sinks, brackets, and die-cast metal parts to chassis. A lock washer helps keep things in place.

The Batteryless, Cordless Screwdriver

Here's a tool that an electrician friend owns—and I just had to get one! It is the first tool that made me laugh! The crank screwdriver (Figure 10) is fun to use! The one pictured is made by Ideal Industries and can be found in the electrical section at your local Home Depot. A Phillips version is also available. The screwdriver has a crank-action, which speeds up the screwing-in and -out processes. It's a great time saver for electrical work, when you have dozens of breakout and pull-boxes to wire up. Yet, you still have more control than a powered screw gun or drill-driver. Best of all, it is energy-efficient.

Safety

Finally, don't forget to wear safety glasses or a face shield and use hearing protection when working with power tools.

[Editor's note: Wayne is a former ARRL HQ staffer.]

Letters for this column may be sent to Technical Correspondence, ARRL, 225 Main St, Newington, CT 06111, or via e-mail to **ppagel@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 a work, please send the author(s) a copy of your comments. The publishers of *QST* assume no responsibility for statements made herein by correspondents. QST

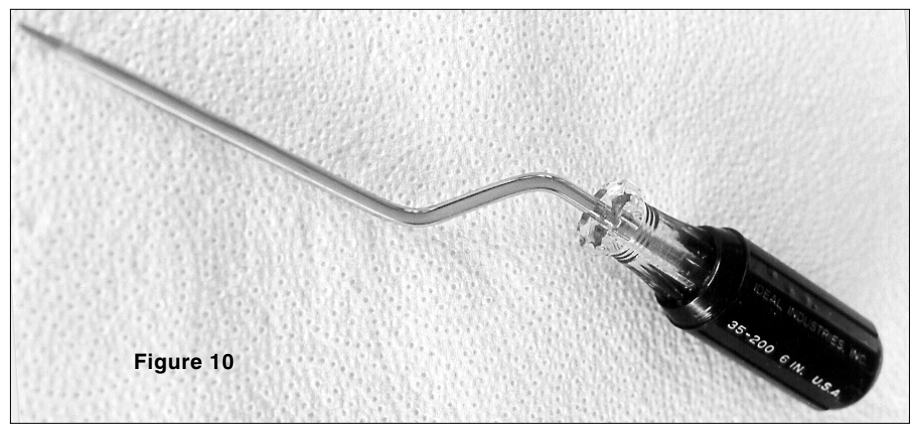


Figure 10

ARRL to Seek Partial Reconsideration of Restructuring *Order*

The ARRL will seek partial reconsideration on two points in the Amateur Radio license restructuring plan announced by the FCC December 30 and set to go into effect April 15.

The League will ask the FCC to continue to maintain records that indicate whether a Technician licensee has passed a Morse code exam to earn current Tech Plus HF privileges. Under the current system, the license class of Technicians is designated by a "T" in the FCC's amateur database, and of Tech Plus licensees by a "P." Under restructuring, Technician and Tech Plus licensees all will be known simply as "Technician." The ARRL says the change eliminates any easy way to tell which licensees have passed the Morse code exam and which have not. The FCC has said that it would be up to Technician licensees to prove—if asked—that they have successfully passed the 5 WPM code test.

"We're going to try to persuade the FCC that it made a drastic error in deciding to change all those Ps back to Ts in the database," said ARRL Executive Vice President David Sumner, K1ZZ.

The ARRL also plans to ask the FCC to stipulate that any amateur who provides proof of having passed an FCC-recognized Morse code exam prior to April 15 be entitled to receive Morse code exam element credit when applying for future upgrades. The FCC has indicated that starting April 15, code credit for Technician applicants passing Element 1, the 5 WPM test, would not survive beyond the 365-day term of a *Certificate of Successful Completion of Examination*—or CSCE. Without a change in the rules, affected Technicians attempting to upgrade more than a year after passing Element 1 would have to retake the Morse code examination, although their HF operating privileges would continue in effect.

The FCC already has made a small move in the direction of expanding Morse element credit. When posting the new rules February 10 in *The Federal Register*, the FCC included a provision giving Morse element credit to anyone who ever held a Novice ticket—expired or otherwise. FCC rules already give Element 1 credit to those holding an expired or unexpired FCC-issued Technician Class operator license document granted before February 14, 1991, as well as to applicants possessing an FCC-issued commercial radiotelegraph operator license or permit that's valid or expired less than 5 years. (Tech Plus amateurs who held a Technician license prior to March 21, 1987, are eligible to apply for a General license on April 15, 2000.)

There has been no indication, however, that the FCC intends to extend Element 1 credit to applicants who once held any other FCC-issued licenses now expired, although many hams at one time held a Novice ticket. At least for now, the ARRL recommends that holders of Novice or Tech Plus licenses retain their license documents or copies in the event they need to claim Element 1 credit to upgrade under the new rules.

LEAGUE READIES CERTIFICATION PROGRAM FOR ROLLOUT

The League's new Certification Program is expected to be up and running within a few months. The program is aimed at inspiring amateurs to continue acquiring technical knowledge and operating expertise beyond that required to become licensed and give them a chance to test their own limits. Following up on the "2010 Vision" discussions at last July's Board meeting, ARRL Executive Vice President David Sumner, K1ZZ, presented the broad strokes of the Certification Program during the January ARRL Board of Directors' meeting.

Sumner said he sees the certification program not only as a welcome opportunity for individual self-development but a response to the perceived "dumbing down" of Amateur Radio qualifications—especially in the aftermath of the FCC's license restructuring announcement. Although the Certification Program was not developed in response to restructuring, its timing could not be better, Sumner said, conceding that the restructuring debate "has moved it up the agenda."

A Web-based message board was set to open in early March to solicit the ideas of ARRL members on appropriate topics to include in the initial rollout. "The idea is to make this program what members want it to be, and not something imposed from 'on high,'" Sumner said. Noted Amateur Radio antenna and technical expert L.B. Cebik, W4RNL, has been tapped to serve as the moderator/facilitator for the message board. Members are being asked to suggest specific programs and areas of study or skills development they would like to see as part of the Certification Program. The League plans to seek outside expert assistance in setting the knowledge or performance threshold at the optimal level.

"Many ARRL members believe there is a widening gap between what the FCC requires amateur licensees to know and what it takes to be truly knowledgeable about Amateur Radio," Sumner said. "Whether or not you agree, it's certainly true that those of us who took our FCC exams years ago have never had to demonstrate an understanding of current technology. We could use a new challenge."

The new Certification Program will offer participants an opportunity to earn credentials at various levels of depth and difficulty in different courses of study—perhaps in such areas as ionospheric propagation, receiver design, and Morse code proficiency. Sumner said the ARRL should and will continue to encourage the development of Morse code proficiency beyond the basic HF licensing require-ments. He observed that the standards for ARRL certification could be more stringent and more uniform than those used for FCC exams.

As envisioned, the program will be largely self-supporting, but startup costs will be funded from the Exceptional Merit Stipend established by the late Ethel Smith, K4LMB. The Certification Program will be dedicated to her memory. Smith—who helped found the Young Ladies Radio League and served as its first president—died in 1997, leaving the bulk of her estate to the ARRL.

The program hopes to include some professional development aspects and in some cases might be able to grant Continuing Education Units—CEUs. The

Rick Lindquist, N1RL ♦ Senior News Editor

FLAMES CLAIM HAM RADIO OUTLET'S ANAHEIM STORE

Ham Radio Outlet's Anaheim, California, store was destroyed by fire January 23. The fire—said to be of suspicious origin—apparently broke out in a dental office at one end of the strip mall that housed the HRO store, then spread through the rest of the business center, engulfing the HRO store and other shops.

The Anaheim HRO store's manager, Janet Margelli, KL7MF, said she was alerted to the fire by the store's alarm company. She arrived just in time to see flames engulf her store. "Talk about feeling helpless and hopeless—you just watch it burn," she said. Margelli said the store and its contents were a total loss.

More than 80 firefighters were called out to battle the four-alarm blaze, and it took them the better part of two hours to bring it under control. Margelli said flames were shooting 200 feet into the air as she arrived on the scene. No injuries were reported. Damage was estimated at $1.5 million.

JANET MARGELLI, KL7MF

Operations at the HRO Anaheim store were handled temporarily by the company's Burbank store, using staffers from both stores.

A plastic owl decoy—of the type sold to scare birds away from towers and beams—was the only item recovered from inside the HRO store. "Smokey" (as it's now being called) has become the store's new mascot, Margelli said, and will get his own display case in the new store.

HRO operates a dozen stores across the US, including five stores in California. HRO expected to have the new Anaheim location open for business by mid-February in an undamaged store area in the same business center.

NOTABLE SILENT KEYS

• **Spread spectrum inventor, actress Hedy Lamarr:** Hedy Lamarr, the sultry, sexy screen star of the 1930s and 1940s who also conceived the frequency-hopping technique of spread spectrum, died in January. She was believed to be 86. Born Hedwig Kiesler in Austria, Lamarr came to the US in 1937 after being signed by MGM. Among her most successful films was the 1949 *Samson and Delilah*, directed by Cecil B. DeMille. In her 1992 book *Feminine Ingenuity*, Lamarr recalled how she came up with the idea of a radio signaling device for radio-controlled torpedoes that would minimize the danger of detection or jamming by randomly shifting the frequency. She and composer George Antheil developed the concept and received a patent for it in 1942. The concept never saw fruition during World War II, but when the patent expired, Sylvania developed the idea for use in satellites. "I read the patent," Franklin Antonio, chief technical officer of the cellular phone maker Qualcomm Inc, said in 1997. "You don't usually think of movie stars having brains, but she sure did." Lamarr lived in an Orlando, Florida, suburb in recent years and shunned publicity. Lamarr's role in spread spectrum is described in the IEEE book *Spread Spectrum Communications*, published in 1983.—*thanks to André Kesteloot, N4ICK and Bill Ricker, N1VUX*

• **Swan, Atlas Radio Founder Herbert G. Johnson, W6QKI, SK:** Herb Johnson, W6QKI—who founded Amateur Radio equipment manufacturer Swan Electronics in the 1960s—died February 1. Johnson, of Cardiff, California, was 79 and had been in ill health for several years. According to Gary Smith, VE4YH (proprietor of the VE4YH Virtual Swan Museum, **http://www.pcs.mb.ca/~standard/**), Swan Electronics, then Swan Engineering, began during the winter of 1960-1961 as a one-man operation with Johnson, then W7GRA, building the first 10 Swan SSB rigs in a garage in Benson, Arizona. Johnson previously had been employed by Gonset. Swan moved to California in 1962 and became a subsidiary of Cubic Corporation in 1967. Amateur equipment production continued until around 1979. In its heyday, Swan cranked out some 400 transceivers a month from its Oceanside, California, plant. Swan was among the first manufacturers to contribute to the shift from AM to SSB in the early 1960s by providing economical transceivers for the mode. Swan also manufactured station accessories. Johnson subsequently formed Atlas Radio, which produced solid-state transceivers, including the popular Atlas 210. In 1995, a revived Atlas Radio promised to produce a new-generation Atlas 400X and even collected deposits and full payments for radios it ultimately failed to deliver or that failed to meet expectations.

• **Former Vermont SCM, James H. Viele, W1BRG, SK:** Former Vermont Section Communications Manger James H. Viele, W1BRG, of Burlington, died January 2. He was 90. Viele served as Vermont's SCM from 1972 until 1976. During his professional years, he rose to become president of Vermont Hardware Company. He also was active in church and community affairs. He was a member and past officer of the Burlington Amateur Radio Club. His wife, Helen, and two children are among his survivors.—*Joseph E. Frank, W1SOV*

• **Hallicrafters engineer Ferdinand W. Schor, K6HPB, SK:** Former Chief Engineer of the Hallicrafters Company, Ferdinand W. Schor, K6HPB, died January 14 in Santa Barbara, California. He was 94. During World War II and the years following, Schor was responsible for the design of many of the Hallicrafters products and receivers, including the S-40, SX-42 and SX-62. Survivors include his son, Warren Schor, KD3GA, and daughters Kathleen and Mary.—*Warren Schor, KD3GA*

• **Larsen Antenna Founder Jim Larsen, K7GE, SK:** The founder of Larsen Antenna, Leland J. "Jim" Larsen, K7GE, of Vancouver, Washington, died February 2, reportedly after suffering a heart attack. He was 81. An ARRL member, Larsen had been a ham for more than 67 years. He and his wife, Chris, sold their interest in Larsen Antenna in 1986. Larsen was a contester and DXer, enjoyed CW, and was a member of the First-Class CW Operators Club. Paul Nyland, K7PN, described Larsen as an "experimenter and mad scientist." Memorial donations are invited to The Radio Club of America, c/o Meredith & Hopkins 244 Broad St, Red Bank, NJ 07701-2003 and the First-Class CW Operators' Club, c/o E. Wolheim, W2MUM, 41 Silversmith Ln, Levittown, NY 11756.—*thanks to Paul Nyland, K7PN, and Ty Stober*

• **Wilbur E. "Bip" Bachman, W6BIP, SK:** Well-known San Francisco-area amateur and contester Wilbur E. "Bip" Bachman died of heart failure February 2 at his home. He was 88. During his working years, Bachman was employed as an electrical engineer at Ford Aerospace. An ARRL member for nearly 70 years, Bachman also was an active member of the South Peninsula Amateur Radio Klub in Palo Alto. "Bip" was an active CW operator, and W6BIP was a familiar call sign in the ARRL November Sweepstakes and many other contests. Survivors include his wife, Elsie, and five children.—*R. Gary Hendra, W6NOE/SPARK*

• **Forms 610 phased out:** The FCC has reminded Amateur Radio applicants that the FCC Form 610 series is no longer valid for use. As of February 17, applicants must use the Universal Licensing System forms (Forms 605, 606). There is *one* exception: FCC Form 610B Club Station application continues to be valid until the FCC finalizes its privatized club station call sign administrator program.

• **FCC to retest on "old" elements:** FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth says licensees called in for retesting by the FCC after the April 15 restructuring will face examination elements comparable to the ones in force when they got their tickets—with the exception of the Morse code test. Although the FCC no longer will issue Advanced class licenses after April 15, an Advanced licensee called in by the FCC to retake his or her amateur examinations would retest using the pre-April 15 examination elements, not the new ones. Similarly, Amateur Extra licensees who qualified for their licenses before April 15, 2000, would have to take Elements 4A and 4B as part of their requalification, instead of the new single Element 4 test. Morse code retesting, if required, would be at the 5 WPM speed, however. The FCC has the authority to require any licensee who obtained an amateur license through a volunteer examiner session to retake his or her examinations.

• **Hollingsworth honored in sunny San Juan:** Special Counsel for Amateur Radio Enforcement Riley Hollingsworth was honored as "Citizen of the Year" by the Puerto Rico Amateur Radio League during its convention January 23. Puerto Rico SM Victor Madera, KP4PQ, said the recognition goes annually to someone who's shown interest in the enhancement of Amateur Radio. During his visit, Hollingsworth spoke to more than 250 convention visitors to outline the FCC enforcement program. He told the gathering that the survival of Amateur Radio depends on the integrity and the character of licensees and how much they appreciate the hobby. He also promised more action on examination fraud.

Amateur Enforcement News

MICHIGAN HAM YIELDS LICENSE UNTIL 2004 IN EXAM CASE

The FCC has cut a deal with former ARRL-VEC Volunteer Examiner Andrew Penn, N8JVA, whose license was designated for a revocation hearing in the wake of 1997 examination irregularities in Michigan. A February 7 letter to Penn from FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth affirmed the terms of a voluntary agreement calling for Penn to turn in his Amateur Extra class license for three years and ten months in lieu of facing a license revocation hearing.

The FCC action stemmed from a June 3, 1997, Oak Park, Michigan, examination session for which Penn was a VE and submitted the paperwork for applicants, one of them his son. As a result of an FCC investigation, the FCC downgraded the license class of two applicants and canceled the license of Penn's son, Steven A. Penn, formerly KC8HUM. FCC evidence indicated that Andrew Penn added paperwork to the exam session package for applicants who did not pass the required examination elements at the Oak Park session. Evidence also indicated that Andrew Penn apparently applied to the application papers the signatures of three other VEs without their knowledge.

The FCC said three of the examiners knew nothing of the scheme. The other three VEs brought the situation to the attention of the ARRL-VEC and the FCC.

The FCC agreement calls for Andrew Penn to turn in his license by April 20, 2000. He will be allowed to request renewal of his license on February 21, 2004, the day before his current license term ends.

FCC WIDENS W5YI-VEC AUDIT

Citing complaints concerning the administration of Amateur Radio examinations, the FCC has expanded its audit of the W5YI-Volunteer Examiner Coordinator operated by Fred Maia, W5YI, in Dallas, Texas. In a February 2 letter, FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said the complaints "allege the selling of both original licenses and upgrade licenses in Puerto Rico and the Virgin Islands" by W5YI-VEC volunteer examiners.

The eight-page FCC letter also cited an ongoing probe begun late last fall into three 1999 W5YI-VEC exam sessions in South Carolina and sought additional details from Maia. At the South Carolina sessions, Hollingsworth said, VEs have filed statements claiming their names were forged on session documents by the W5YI session manager. The FCC said a session manager's license apparently was upgraded to Amateur Extra, an unannounced "sub session" was held after a regular VE session, and a General class session manager administered an Extra class examination.

Maia, who's been cooperating in the FCC's South Carolina probe, told the ARRL that he was surprised, confused, and "a little discouraged" to learn that the FCC had expanded its audit. He suggested that the FCC might be acting on the basis of "incorrect information" and said he's not aware that anyone ever paid for any licenses through a W5YI-VEC volunteer examiner.

In his letter, Hollingsworth noted that no Virgin Islands licensees originally tested by W5YI-VEC and later called in by the FCC for retesting have appeared for retesting. The FCC canceled licenses of five US Virgin Islands residents for failing to appear for retesting. Maia said the W5YI-VEC has not administered amateur exams in the US Virgin Islands since 1992. "I am totally in the dark on that one," Maia said of the Virgin Islands inquiry.

Of W5YI-VEC examinees recalled in Puerto Rico, the FCC said, only one showed up for retesting. Maia said he knew of only one situation in Puerto Rico that involved a VE who was disaccredited after being called in for retesting.

League is seeking cooperative arrangements with related professional organizations. It already has a memorandum of understanding with the National Association of Radio-Television Engineers and has approached the Society of Broadcast Engineers for a similar agreement.

The voluntary certification program dovetails neatly with goals expressed by the League's new President Jim Haynie, W5JBP. Following his January election, Haynie said he favors even greater promotion of Amateur Radio, especially among youth and in schools, as well as programs to rekindle interest and activity among current licensees.

LEAGUE OFFICER ELECTIONS SET MUSICAL CHAIRS IN MOTION

Officer elections at the January ARRL Board of Directors meeting generated a ripple effect of vacancies within the ARRL hierarchy. The elevation of West Gulf Director Jim Haynie, W5JBP, to the League presidency set off a game of musical chairs that saw Vice Director Coy Day, N5OK, accede to the director's slot, creating a vacancy in the West Gulf Vice Director's chair. Haynie has appointed Dr David A. Woolweaver, K5RAV, of Harlingen, Texas, to be the new Vice Director. Dr Woolweaver is a periodontist in private practice.

The FCC letter asked Maia if he'd received complaints about the possible selling of licenses and upgrades by W5YI-VEs in Puerto Rico, the US Virgin Islands, and South Carolina and, if so, how they've been handled. Among other things, the Commission also sought details regarding screening and accreditation of W5YI-VEC volunteer examiners; examination materials and their handling and grading; how exam results are verified; and the names of VEs and the applicants they tested over the past three years. The FCC asked W5YI-VEC if VE sessions are announced publicly in advance, as required by Part 97, and if any have not been.

The FCC asked the W5YI-VEC to respond within 30 days.

In January, the Commission wrote Volunteer Examiner William J. Browning, ex-AB4BB and AF4PJ, and several W5YI-VEC volunteer examiners as part of an audit of a July 14, 1999, W5YI-VEC Amateur Radio examination session in Clemson. Browning was listed as the manager of the session. His Amateur Extra license was canceled after he failed to appear for retesting.

Subsequently, the FCC sought details on another W5YI-VEC exam session in Iva, South Carolina. In separate letters January 28 Hollingsworth requested that Volunteer Examiners Eugene D. Watring, AF4DB, and James F. Chambers, KF4PWF, provide detailed information concerning an October 9, 1999, exam session in Iva, at which both were listed as assisting VEs under Browning. Copies of testing-related documents that Browning had submitted following the examination session accom-panied the FCC inquiry. Watring and Chambers were requested to provide the information within 30 days. The FCC has requested that Chambers retake his Amateur Extra class examination.

FCC PROBES CALIFORNIA ARRL-VEC TEST SESSION

The FCC is investigating possible irregularities in a Huntington Park, California, ARRL-VEC examination session late last summer. In separate letters on January 28, 2000, FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth posed a series of questions to the three Volunteer Examiners listed on the manifest for the September 12, 1999, session—Moises Morales, KB6QMR, of Garden Grove; Juan Huitron, AC6HK, of Santa Ana; and Daniel Granda, KA6VHC, of Whittier.

In his letter, Hollingsworth noted "several irregularities regarding the examinations" and requested the VEs provide specific details regarding several Form 610 packages submitted following the session. None of the 20 applicants in question at the September 12, 1999, session has been issued an Amateur Radio license.

The FCC asked for an explanation of missing and/or incorrectly graded Morse code and written examination documents. The FCC also asked each of the VEs whether he signed the documents in question; whether he authorized anyone to sign on his behalf and, if so, whom he authorized; whether he was present for the September 12, 1999, examination session at Huntington Park or any part of it; and his involvement, if any, in the examination session. The FCC also wants to know why 19 of the 20 applicants cited missed Question 5 of the Morse code examination.

The VEs were given 30 days to reply to the FCC. The ARRL-VEC is cooperating in the FCC investigation.

VIRGINIA GENERAL ASSEMBLY HEAPS HIGH PRAISE ON HAMS

Virginia's General Assembly has praised Amateur Radio efforts during the response to Hurricane Floyd last fall. A joint resolution unanimously passed the House and Senate January 27. A signing ceremony was held February 17 at the Capitol in Richmond.

MARTIN GARY, W2MG

Holding the General Assembly resolution are Virginia Section Manager Lynn Gahagan, AF4CD (left) and A.F. "Fred" Vincent, Deputy Operations Director, Virginia Department of Emergency Services.

The resolution praised the work of Virginia's ARES/RACES members last September when Hurricane Floyd totally isolated the City of Franklin, and rising flood waters forced city officials to abandon their Emergency Operations Center, forcing the city to rely completely on Amateur Radio for communication. "With traditional lines of communication inoperable, the Amateur Radio operators, members of the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES), provided the only reliable communication into and out of the flood-ravaged Franklin area," the resolution said.

The resolution noted that the Hurricane Floyd activation was "the widest geographical and longest-running ARES/RACES activation in Virginia's history" and involved nearly 150 ARES/RACES volunteers who put in some 9500 hours of duty to help coordinate emergency operations in Franklin.

"Due to the tireless efforts of amateur radio volunteers, the tragic effects of Hurricane Floyd were mitigated, the lives of those in the flood zone safeguarded, and the suffering of Franklin's residents alleviated," the resolution said in expressing the General Assembly's "admiration and gratitude for the vital contributions of Virginia's amateur radio operators."

For more information, visit **http://www.aresva.org/**.—*Tony Amato, KR4UQ*

Haynie filled vice directors' openings in the Atlantic and Roanoke divisions from within the section manager ranks. In the Atlantic Division, Director Kay Craigie, WT3P, was elected a Vice President, and Vice Director Bernie Fuller, N3EFN, moved up to Director. Western Pennsylvania SM Bill Edgar, N3LLR, has been appointed as the new Atlantic Vice Director. In the Roanoke Division, Director John Kanode, N4MM, was elected a Vice President, and his second-in-command, Dennis Bodson, W4PWF, moved into the top slot. South Carolina SM Leslie Shattuck Sr, K4NK, was tapped to replace Bodson as Roanoke Vice Director.

Replacing Edgar as Western Pennsylvania SM is John V. Rodgers, N3MSE, of Butler. In South Carolina, Patricia Hensley, N4ROS, of Richburg has succeeded Shattuck.

January was a good month for Edgar. A Tech Plus licensee, Edgar passed all of the written elements he'll need to upgrade to Amateur Extra when the new FCC licensing rules go into effect April 15.

Meanwhile, Puerto Rico got a new section manager as a result of a resignation. ARRL Field and Educational Services Manager Rosalie White, WA1STO, has appointed Victor Madera, KP4PQ, to replace Raul Escobar, KP4ZZ, who stepped down for personal reasons.

ARRL ASKS FCC TO DENY KENWOOD "SKY COMMAND" PETITION

The League says the FCC should deny a request by the Kenwood Communications Corporation to permit operation of its "Sky Command" system in the 2-meter band. In November, Kenwood asked the FCC either to declare that Sky Command complies with Commission rules or to waive applicable sections of the rules to make it legal. The ARRL filed comments on Kenwood's petition January 31.

On the market for more than two years, Sky Command lets users control a fixed HF station via a pair of dual-band transceivers. Sky Command advertisements have not appeared in *QST*, however, because the League maintains that the system is not legal to use as configured.

Sky Command operates in full duplex, using a 70-cm frequency to transmit audio and control commands to a dualband transceiver at the remote station and a 2-meter frequency to transmit received audio via the remote station's Sky Command transceiver to the operator's transceiver. The League said Kenwood's use of a 2-meter frequency would cause amateurs using the system to violate Section 97.201(b), which limits auxiliary operation to certain frequencies above 222.15 MHz.

In its comments to the FCC, the League said the type of operation employed by the Sky Command System is "clearly auxiliary operation, and as such is not permitted in the 144-148 MHz band." Kenwood had asserted that the 2-meter link constitutes third-party communications. The League noted that third-party traffic relates only

News in Brief:

• **What's the *Frequency*, Dennis?** *Frequency*, a new movie that features Amateur Radio as a plot device, is set for release in April. The movie stars Dennis Quaid and is directed by Gregory Hoblit. The ARRL was consulted in the interests of accuracy and came up with an unused W2 call sign for the movie's protagonist (Quaid) to use. *Frequency* is billed as a sci-fi thriller. The gist of it is that a long-dead father and his adult son meet up on the airwaves via ham radio (during the mother of all sunspot cycles), and the son tries to prevent his father's death by altering the past. Both also attempt to prevent a murder. Information on *Frequency* is available at **http://www.frequencymovie.com**.

• **Court of Appeals upholds FCC preemption on RFI issues:** The US Court of Appeals for the 10th Circuit has upheld FCC preemption of RFI issues. In Southwestern Bell Wireless Inc v Johnson [Kansas] County Board of County Commissioners, the court invalidated a zoning regulation adopted by the county that permitted the county zoning administrator to determine that a communications tower or antenna was causing interference to public safety communications and to order the site to cease operations. The county included a restriction that tracked the terms of the regulation in a conditional-use permit to construct a 150-foot tower to be used by Southwestern Bell. Southwestern Bell successfully sought a declaratory judgment that the regulation was preempted by federal law. On the county's appeal, the 10th Circuit held that Congress intended the FCC to have exclusive jurisdiction over RFI matters, leaving no room for local regulation.—*Edward Ricco, N5LI/Ham-Law Reflector*

• **Kansas has PRB-1 legislation in the hopper:** Kansas has become the latest state to introduce a PRB-1 companion bill in its legislature. HB 2644, the Kansas Amateur Radio Service Act, cites PRB-1, reinforces the concept of "reasonable accommodation" and sets minimum allowable restriction heights for three tiers of lot sizes. The bill was introduced by 121st District Rep Jim Morrison, K0CVY, (R-Colby). Morrison says the bill has a good chance to become law. HB 2644's author Kerry Steffens, W0ON, of Wichita and ARRL Midwest Vice Director Bruce Frahm, K0BJ, of Colby led a group that testified February 8 on behalf of the measure. For more information, visit **http://www.ink.org** .—*Bruce Frahm, K0BJ*

• **1999 outgoing QSL stats reflect increased activity:** In 1999, the ARRL Outgoing QSL Service shipped more than 1.8 million cards to DX stations, up from nearly 1.6 million in 1998. The final tally was 1,853,870, according to Martin Cook, N1FOC (see right), who manages the Service at ARRL HQ. He says that works out to approximately 5.8 tons of cards. The Service serves approximately 260 DXCC countries, including nearly every active country. Cards are forwarded from the ARRL Outgoing Service to a counterpart bureau in each of the respective countries. ARRL members can ship cards to DX bureaus for $6 a pound (or $1 for 10 or fewer cards; $2 for 11 to 20 cards; $3 for 21 to 30 cards). For more information on the ARRL Outgoing QSL Service, contact Cook at **n1foc@arrl.org**. Here, Cook sorts some of the nearly six tons of QSL cards that passed through the Service's hands last year.

• **France authorizes 136-kHz amateur band:** The 135.7-137.8 kHz band has been authorized for use by French amateurs on a secondary basis and in conformance with conditions existing in other European countries. Maximum radiated power is 1 W.

• **American Lung Association seeks hams for 2000 "Big Ride":** The American Lung Association is recruiting ham radio "communicators" to assist in its Big Ride

RICK LINDQUIST, N1RL

Across America 2000. The 2000 ride—only the second to use ham radio operators—is the third annual event to raise money and awareness for the American Lung Association's fight against lung disease. It's a 3500-mile bicycle trek from Seattle, Washington, to Washington, DC, from June 19, 2000 to August 5, 2000. Details are available at **http:/www.bigride.com**. For more information or to volunteer, contact Volunteer Support Manager Mark Ewert, KB1ECH, **bigride@lungusa.org** or call toll free at 877-BIGRIDE (877-244-7433).

• ***QST* Cover Plaque Award winner:** The winner of the *QST* Cover Plaque Award for January was John Devoldere, ON4UN, for his article "The 1999 Solar Eclipse and Amateur Radio." Congratulations, John!

to the message content, not to the station's technical configuration.

The League called Kenwood's Sky Command System "a fine product" that would be of interest to many hams if designed for frequencies where auxiliary operation is legal. Carving out an exemption by waiving the rules for Kenwood's product, the League argued, would amount to "inappropriate favoritism."

The League suggested that Kenwood could remedy its problem by using its TH-89 transceiver, which operates in the 430 MHz and 1.2 GHz bands. "Auxiliary operation is permitted in both of these bands," the League said. "Kenwood markets the TH-89 in Japan but has chosen not to export it to the United States."

The full text of the ARRL comments is available at **http://www.arrl.org/announce/regulatory/arrl-da99-2805.pdf**.

CLEARWIRE WITHDRAWS SPREAD SPECTRUM PETITION

Clearwire Technologies has withdrawn its *Petition for Reconsideration* asking the FCC to reconsider the revised spread spectrum rules it issued last summer. The new rules became effective November 1.

Clearwire manufactures high-speed wireless Internet and network access devices operating at 2.4 GHz, where there's an amateur allocation. Fearing possible amateur interference with its Part 15 products, Clearwire had asked the FCC to require that amateur transmitters capable of operating in excess of 1 W on bands in which its Part 15 devices operate be FCC certificated. It also wanted transmitters in those bands to automatically transmit an ID and telephone number and the spreading algorithms made available on a public Web site.

Calling Clearwire's *Petition* "frivolous," the ARRL in January asked the FCC to dismiss it and to reaffirm its original *Report and Order*. The League said none of Clearwire's requests was reasonable and suggested the company had no standing to propose "new, burdensome restrictions" on amateur operation. The ARRL noted that FCC rules do not afford Part 15 devices any protections from interference from licensed services, such as Amateur Radio.

In mid-February, Clearwire told the FCC that it was withdrawing its *Petition for Reconsideration*. But the company said it "expressly reserves" its position that Part 15 users such as Clearwire are "entitled to seek protection from an Amateur station that operates unlawfully." Disagreeing with the ARRL's stance, Clearwire said that while Part 15 devices must accept interference from "authorized" radio stations,"Clearwire does not waive its right to seek relief from unlawful Amateur operation in the future."

TAPR—Tucson Amateur Packet Radio—also had filed in opposition to the Clearwire petition.

SECTION MANAGERS ELECTED

Section manager election ballots were counted February 22 at ARRL Headquarters in races in North Carolina and South Dakota. In North Carolina, John Covington, W4CC, outpolled G. Roger Allen, KD4MYE, 951 to 891. Covington, an Extra class licensee from Charlotte, will succeed outgoing SM Reed Whitten, AB4W. In South Dakota, incumbent SM Roland Cory, W0YMB, defeated challenger Katherine "Trina" Blanks, KB0TYW, 146 to 88. An Extra class licensee, Cory lives in Mobridge.

Candidates in six other ARRL sections ran uncontested. In Louisiana, Mickey Cox, K5MC, was elected to succeed retiring SM Lionel "Al" Oubre, K5DPG. Cox holds an Extra ticket and lives in West Monroe. Incumbent section managers reelected were Robert Leiden, KR2L, Eastern New York; Tuck Miller, K6ZEC, San Diego; Allen R. Breiner, W3TI, Eastern Pennsylvania; Ronald Phillips, AH6HN, Pacific; and Lynn Gahagan, AF4CD, Virginia.

Terms of office begin April 1, 2000.

CANADA, AUSTRALIA EYE MORSE REDUCTION

Canada and Australia could follow the US in reducing the Morse code examination requirement to 5 WPM for full HF access and privileges. Radio Amateurs of Canada announced plans in February to ask Industry Canada to eliminate that country's 12 WPM Morse requirement. If enacted, the change would leave 5 WPM as the sole Morse code examination requirement for full HF access in Canada.

Meanwhile, the Wireless Institute of Australia said it's seriously considering whether to push the Australian Communications Authority to reduce the maximum Morse code license test speed Down Under from 10 to 5 WPM. The WIA says a majority of its membership divisions appear to favor the reduction. The general issue of Morse code licensing requirements is expected to be a topic for debate at the IARU Region 3 conference the WIA will host later this year. Discussion of the Morse code requirement in the *International Radio Regulations* could come up as early as the 2003 World Radiocommunication Conference.

A single 5 WPM Morse code examination requirement for full HF access and privileges goes into effect in the US on April 15. The United Kingdom and Sweden also have adopted 5 WPM as the Morse code examination requirement for full HF access.

Section Manager Election Notice

To all ARRL members in the Connecticut, Idaho, Minnesota, North Dakota, Ohio, Oklahoma, Southern Florida, Western New York, Puerto Rico, and Virgin Islands 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 June 9, 2000. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before July 1, 2000, to full members of record as of June 9, 2000, which is the closing date for nominations. Returns will be counted August 22, 2000. Section managers elected as a result of the above procedure will take office October 1, 2000.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 2000. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the October 2000 *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, WA1STO, Field & Educational Services Manager* QST

Is Your Foot in the Door?

Among the comments heard from Emergency Coordinators after Y2K-night, one of the most frequent was, "We'd been trying for years to work with that agency, but got our foot in the door when they asked us to be on standby for Y2K problems." If you got your foot in the door, keep working the whole body in. What follows is what one ARES group did to get their services welcomed into the community.—Rosalie White, WA1STO

AMATEUR RADIO EMERGENCY SERVICE AND SCHOOLS

By Jim Andera K0NK, alternate Johnson County (Kansas) Emergency Coordinator

(l-r) Dale Braathen, KC0CGJ; Josh Tuel, KB0GUS; Steve Rainey, WD0DPB; June Jeffers, KB0WEQ and Jim Andera, K0NK, at the Johnson County (Kansas) ARES Command Center.

While we would like to think our schools are safe havens from disaster and tragedy, school officials across the nation have learned that crisis situations can develop at any school, any time. They are becoming aware of the importance of good communication in a crisis, and how inadequate their present communication system may be. In Olathe, Kansas, school officials have not only integrated Amateur Radio into their crisis plan, but have also put an Amateur Radio station in their Crisis Command Center (CCC). School districts nationwide are now starting to consider Amateur Radio for part of their emergency plans.

Even before the Columbine school tragedy, Olathe School District (OSD) officials realized their communications network might not be adequate in an emergency. They were working on a crisis plan that included buddy schools where students could be evacuated. One problem became apparent: If phone lines went down, how could officials communicate with schools? When OSD instructor, Darryl Evans, W5VK, mentioned Amateur Radio's capabilities to OSD's Crisis Management Team (CMT), they listened. Darryl put OSD in touch with our Johnson County ARES group. The groups met regularly over the next year. Emergency Coordinator June Jeffers, KB0WEQ, worked to understand OSD's needs and explain how ARES could help.

What They Need—What We Need

During an emergency, OSD needs communications between the CCC and any of their 37 schools. Our ARES suggested positioning VHF/UHF mobile units at affected schools, and proposed a permanently installed base station and antenna system at the CCC. OSD purchased a dual-band station because we helped them understand what we needed to support them. We avoided technical details. We simply said our response time could be decreased significantly by mounting an antenna as high as practical and having a station at a key location.

To meet communication needs of OSD and other served agencies, our field units needed to be properly equipped as a quick response team. Because our units may operate from someone else's vehicle (school official's car or bus), we ask hams to have a mag-mount antenna, cigarette-lighter cable for their mobile rig and a gel-cell battery (buses may not have cigarette lighters). Many members can operate Field Day style from a gym or principal's office. Members enjoyed shopping for gear and accessories to support ARES, or building ARES-related projects.

An important item in the field is proper identification. Our ARES group's bright yellow ball cap with ARES patch has been invaluable for served agencies to easily spot us. We can also purchase matching ARES T-shirts and jackets.

What Schools Learned—What We Learned

Those who think cell phones are replacing Amateur Radio in emergencies need to think again. At last July's National School Public Relations Association (NSPRA) crisis communication conference, schools recently experiencing tragedies stated that inadequate communication was their most widespread problem. Schools learned that cell phone networks quickly become overloaded by media up-links, the batteries don't last, and school telephones are blocked by parents calling. Two dozen agencies may be on site, and communities may have a frequency for fire, ambulance and police, but the frequency may become swamped. School officials, utility companies or hospitals may not be linked.

OSD learned it had the only school representatives at the conference who had addressed crisis communications. When OSD Information Coordinator Lauralee Baker-Rapue discussed the relationship she helped forge between OSD and our ARES, other schools listened. Based on her report, NSPRA's October newsletter encouraged schools to, "…consider forming a partnership with a local chapter of the ARES." With schools learning about emergency communications, don't be surprised if your school asks your ARES group for assistance. Better yet, ask your school if they need your help!

We experience great satisfaction seeing our hobby elevated as it becomes part of an emergency plan involving our children. If you have questions on integrating ARES within your school, contact June Jeffers, KB0WEQ, at **kb0weq@arrl.net** or 913-764-3683. June serves as NSPRA national contact person for schools wishing to get in touch with their ARES. QST

Rosalie White, WA1STO ♦ Field & Educational Services

ARRL Numbered Radiograms—Continued

The letters ARL are inserted in the preamble in the check and in the text of a radiogram message before spelled out numbers that represent texts from this list. Note that some ARL texts include insertion of numbers. There are two groups of ARRL Numbered Radiograms: Group One for relief emergency use and Group Two for routine messages. The first twenty Numbered Radiograms appeared last month in March *QST*, p. 85.

Group One— For possible "Relief Emergency Use" — *continued*

TWENTY ONE	Search and Rescue assistance is needed by local authorities here. Advise availability.
TWENTY TWO	Need accurate information on the extent and type of conditions now existing at your location. Please furnish this information and reply without delay.
TWENTY THREE	Report at once the accessibility and best way to reach your location
TWENTY FOUR	Evacuation of residents from this area urgently needed. Advise plans for help.
TWENTY FIVE	Furnish as soon as possible the weather conditions at your location.
TWENTY SIX	Help and care for evacuation of sick and injured from this location needed at once.

Emergency/ priority messages originating from official sources must carry the signature of the originating official.

Group Two — Routine messages

FORTY SIX	Greetings on your birthday and best wishes for many more to come.
FIFTY	Greetings by Amateur Radio.
FIFTY ONE	Greetings by Amateur Radio. This message is sent as a free public service by ham radio operators at _____. Am having a wonderful time.
FIFTY TWO	Really enjoyed being with you. Looking forward to getting together again.
FIFTY THREE	Received your _____. It's appreciated; many thanks.
FIFTY FOUR	Many thanks and good wishes.
FIFTY FIVE	Good news is always welcome. Very delighted to hear about yours.
FIFTY SIX	Congratulations on your _____, a most worthy and deserved achievement.
FIFTY SEVEN	Wish we could be together.
FIFTY EIGHT	Have a wonderful time. Let us know when you return.
FIFTY NINE	Congratulations on the new arrival. Hope mother and child are well.
SIXTY	Wishing you the best of everything on _____.
SIXTY ONE	Wishing you a very Merry Christmas and a Happy New Year

Field Organization Reports

Public Service Honor Roll
January 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

843
NM1K
404
W9RCW
384
N5JZ
371
KB8ZYY
311
WB8SIW
289
KB5WEE
244
WB5ZED
WB2UVB
220
KA2ZNZ
218
KK3F
205
WA9VND
N7DXH
202
N2YJZ
K7BDU
201
W7TVA
199
KB2RTZ
198
N5IKN
W4ZJY
195
KB2LML
WB5NKC
194
WB4GM
193
WA4GQS
191
K5IQZ
188
W6DOB
185
KA4FZI
183
WX8Y
181
K7VVC
N5XGI
N2LTC
N2OPJ
180
W4EAT
179
K9FHI
NN7H
178
AD4DO
175
KC5OZT
174
K4IWW
173
KR4MU
171
KJ3E
170
N0KJ
N2RPI
168
KA2GJV
K6YR
167
N8FPN
W6IVV
164
KD2AJ
W4CAC
N5NAV
WA5I
W6IVV
163
KA5KLU
162
WA1JVV
W6QZ
161
KC2ALG
160
N8JGS
WB4TVY
KB2VVD
159
KB2VVB
156
N0SU
155
N2KPR
153
K2UL
WD9FLJ
K4RBR
WN0Y
152
KA8FCC
W0OYH
WU4C
KR4MU
151
W5GKH
150
K5MC
K3CSX
K2GTS
N2JBA
AF4PU
N7YSS
149
N5OUJ
148
KC4TLG
NY2V
K9LGU
WA1TBY
147
W2AKT
146
NR2F
145
KB2KLH
WO0A
N2CCN
WA1FNM
K4YVX
144
WA0KS
AF4GF
143
N8FWA
N2XOJ
WA4QXT
K4AKC
KC4ZHF
142
K8GA
N5JCG
KB5W
KD4GR
141
WD8IMO
K5DPG
WA4DOX
WB2ZCM
140
W0LAW
KF1L
139
AA3GV
N2WDS
W2MTA
N9BDL
N2GJ
KB5TCH
W7ZIW
WA4DOX
138
WD8DHC
WB0ZNY
W3BBQ
N2WXF
K4SCL
W7GB
WA6ODQ
KT6A
137
N2AKZ
N1VXP
136
N3WKE
K4YVX
K2DN
NN2H
WD4JJ
N2XJ
W2EAG
W7NWP
134
W2RJL
133
KE4JHJ
W3YVQ
W9CBE
KA4UIV
K1FP
N1LKJ
132
KC4PZA
KF4NFB
WX4H
KFOIF
131
WB2GTG
W9YCV
WB2FGL
130
AA3SB
KO4A
AA8SN
KA1GWE
KC4VNO
129
K6AGD
K5VV
N4QX
W7LG
128
WA0TFC
K5DMC
KC2ETO
WB2QIX
W7GHT
127
K0BXF
W1PEX
KD1LE
WD4MIS
126
K4FQU
125
NC4ML
WA8EYQ
123
W1ALE
N3WAV
K7GXZ
122
KE1AI
121
N3WK
KA4LRM
120
KI4YV
N7DRP
WD9HII
121
W1JX
N1JBD
AA2SV
AA2ED
AF2K
120
W3BBQ
119
WA1QAA
KB2VRO
118
KA8WNO
KA7AID
K9GBR
W9ZY
K4MTX
K0PIZ
W4CKS
KA2DBD
W3OKN
N9KHD
N9TVT
KE4IFD
W5MEN
K7MQF
117
W1QU
KD3JK
KG2D
WA3HJC
K0IDS
116
KC8LYY
W3VK
K0IBS
K3RB
115
KB0DTI
KA2CQX
N7AIK
KF6UMU
113
K4AIF
KA1OTN
KO4OL
KB2ETO
KT4PM
112
N8DD
WA8SSI
W2FR
WI2G
AG9G
KO6RZ
KA4HHE
111
N2WFN
WD0GUF
W2MTO
AD4IH
KD6YJB
110
WA4EIC
W3BL
K6VOA
109
KC7ZZB
KG5GE
WB5NKD
108
AE4NW
KB2VYZ
W4NTI
KT4SJ
K5MXQ
KC5VLW
N0MN
107
K3UWO
KJ4N
NZ1D
106
K5WOD
W2PII
K2PB
104
W1JTH
WA8DHB
KF5A
KJ7SI
102
N2WXG
W4XI
NY2CQ
101
N3ZKP
K8LEN
KE4DNO
W4CAC
100
KC3Y
AF4NS
99
KE6MIW
98
KE0K
K2VX
97
WA2YBM
96
AA4YW
W3CB
KC6SKK
N1LAH
K1SEC
95
WB2IJH
KA9FVX
WB4PAM
N1IST
94
K8IG
KA2ZKM
KT4TD
93
N9KNJ
KC8GMT
WA2CUW
AA4BN
K4WKT
WB7VYH
92
KB3AMO
WB4ZNB
N2ZMI
91
N5JUU
KB2WII
90
N2WXE
KB1CTC
KA1VEC
W4PIM
89
W2CC
W8SZU
AB4XK
88
KC8HTP
KF4KSN
KD5AHW
W5AYX
87
WX2NJ
KC2DAA
86
WA4GLS
KD4HGY
KA0DBK
85
W7EP
N4CQR
W5XX
84
KK1A
KB2ETU
W2LC
PY2CGB/
W5
83
W7VSE
KE4SKY
KB2UQZ
82
KF3FL
KB2GEK
W4DGH
K9JPS
WB4ZNB
KE4PAP
81
K8ZJU
AA8PI
80
K8VFZ
K8SH
79
KC0CEG
78
K4BEH
77
AC5Z
76
AC4ZO
W4ZBA
75
KB4WBY
73
WA8WBZ
KE4WBI
71
K5UCQ
KB2YJD
W2AZ
KA7TTY
N4MM
70
KB2YBM
KC2ETU
KC4CHW
W2JHO
KA1VAX

The following stations qualified for PSHR in December 1999, but were not listed in this column last month: WA3HJC 115, W5AYX 87, KE3FL 72. (Nov) W5ZX 185.

Section Traffic Manager Reports
January 2000

The following ARRL section traffic managers reported: AL, AR, CO, CT, EMA, ENY, EPA, GA, IA, ID, IL, IN, KS, KY, LA, MDC, ME, MI, MN, MO, NC, ND, NFL, NH, NLI, NNJ, NTX, OH, OK, OR, ORG, SBAR, SC, SD, SDG, SFL, SJV, SNJ, STX, SV, TN, VA, WI, WCF, WMA, WNY, WPA, WWA, WY.

Section Emergency Coordinator Reports
January 2000

The following ARRL section emergency coordinators reported: CT, ENY, EWA, IN, KY, MDC, MI, MN, MO, NLI, SD, TN, VA, WCF, WMA, WPA, WWA.

Brass Pounders League
January 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*
WX4H	12	847	1395	20	2274
NM1K	714	279	887	3	1883
W1PEX	0	946	132	13	1091
W9RCW	0	587	27	319	933
K7BDU	26	440	422	8	896
N2LTC	0	401	428	13	842
K9JPS	0	381	48	348	777
WA9VND	13	435	304	14	766
N5IKN	0	356	104	252	712
K7VVC	10	255	386	3	654
W6DOB	0	302	281	50	633
W5SEG	47	297	266	0	610
W6IVV	6	303	300	0	609
W9YPY	0	289	328	0	609
KK3F	28	146	366	54	594
N0KJ	42	247	257	32	578
N5JZ	221	95	228	25	569
W9IHW	0	272	37	244	553
K9GU	0	253	31	253	537

BPL for 100 or more originations plus deliveries: WX7V 218, WB8SIW 133, KB5WEE 111, N7DXH 105.

Sao Tome and Principe

By Matthew De La Hunt, DA1MH

My wife and I enjoy reading about DXpeditions in *QST*. It seems that each time I read about a new location, I'm tempted to pack my bags and be off on the next flight! Recently, after years of interest in DXing, I was able to make a contribution to the fascinating field myself by going to Sao Tome and Principe, S92.

The December 1999 "How's DX?" column titled "Never Pay Airline Overweight Charges! Well, Almost Never" contained great tips on getting airlines to accept extra heavy and long bags at no charge. My wife and I muddled through and paid only a minimal amount, but next time we'll have a better idea how to go around it—thanks to that column. We also found a hard-bottomed, three-meter long rig bag for windsurfing that was perfect to transport antennas and masts. The bag, from Northsails, has built-in pockets just the right sizes for the elements and mast sections, heavy-duty zippers and padded canvas sides and, best of all, wheels at one end so we didn't have to lug it around.

Tucked into the Gulf of Guinea, Sao Tome is a tiny tropical island and one of Africa's smallest independent nations. DXers have visited the island recently, but none of them took along equipment for my favorite band, 6 meters. In fact, as far as we could determine, no one had ever put 6 meters on the air from Sao Tome. Given the current upswing in the sunspot cycle, fall of 1999 seemed an ideal time for someone to get active from S92. But who?

The more we thought about it, we realized how much we enjoyed the idea of doing it ourselves. While Sao Tome is part of Africa, it's a peaceful, quiet place without civil unrest, perfect for getting our feet wet on our first DXpedition. In July 1999 Markus Hammelmann, DK5AX, and I applied for a license to operate. We made an invaluable contact on the Internet with Francisco Costa, CT1EAT, of Portugal, who had done his own trip to Sao Tome and advised us on everything from hotels to getting the permits from CST, Companhia Saotomense de Telecomunicacaoes. He also advised us not to worry when the licenses didn't come in September, October or November. In the end, we left on a flight from Germany without licenses, but with assurances they were waiting for us. When we showed up at the CST office the morning after our arrival, there they were: S92DX and S92CW.

Matt, DA1MH (left) and Markus, DK5AX (right), operated from Sao Tome Island in November 1999 as S92DX and S92CW.

We chose a hotel that had its own generators in case of power outages (an everyday occurrence). They were kind enough to allow us to erect two antennas in the garden: an A3S tribander on a 15-meter Fiberglass mast for 10, 15 and 20 meters, and a 5-element Yagi on an 8-meter aluminum mast for 50 MHz. Our location directly on the island's northeast coast was ideal, giving us a clear shot in almost all directions.

Markus mainly worked the HF bands. Meanwhile, I monitored 6 meters religiously, listening for the slightest flutter of an opening. I made my historic first contact with PY5CC on Noivember 24 at 2304Z. Among the countries I worked were Italy, Sicily, Sardinia, Spain, Portugal, Greece, Slovenia, Croatia, England, Netherlands, Belgium, Germany, Luxembourg, France, Switzerland, Madeira, Malta, Ceuta and Melilla, Burundi, Tanzania, Nigeria, Brazil, Puerto Rico, Fernando de Noronha, and Paraguay. Worth noting were the ZD8 and 7Q7 beacons, which came in every evening.

Markus and I took turns operating during the CQ World Wide CW DX Contest on November 27 and 28. We ended up with a total of 4637 contacts worked in eight days. To our extreme disappointment, conditions on 6 meters weren't as productive as we had expected. However, we can report 167 happy 6-meter fans who'll be receiving QSL cards from S92DX.

The good news is that we met a local resident, American Gary Shirk, S92AT, who was looking for a new diversion on the airwaves. We left our Yagi with him to be installed on his 90-foot tower. Once his new 6-meter radio arrives, perhaps I'll also get a chance to add S92 to my logbook.

Al Watson, W4ABW, completed the DXCC 2000 Millenium award application and faxed it to the DXCC Desk on January 3! You still have about 10 months left to send your application.

DX TIDBITS FROM AROUND THE WORLD

Chesterfield Islands

Don't forget that members of the Association des Radio Amateurs de Nouvelle Caledonia (ARANC) plan to be operating as TX0DX from the Chesterfield Islands from about March 15 to April 1. More than likely this will be a new DXCC Entity so make sure you work them just in case. Keep a close eye on the DX bulletins for future developments on this possible new one. The TX0DX Web site can be found at **http://www.n4gn.com/tx0dx**. OH2BN will be the QSL manager for all contacts except for 6 meters, which go via JA1BK.

New *CQ* DX Editor

Congratulations to Carl Smith, N4AA, editor of *QRZ DX* and *The DX Magazine,* in his new role as editor of *CQ Magazine's* DX column. Carl replaces Chod Harris, VP2ML/WB2CHO, who passed away in early December 1999. He'll be a busy fellow now with three deadlines!

DXCC 2000 Millennium Award

Congratulations to Al Watson, W4ABW; Joe Reisert, W1JR; and Cliff Ahrens, K0CA, for being first to receive the DXCC 2000 Millennium Award. These guys were fast; all three had their applications faxed in to HQ on January 3. Bob Rosier, K4OCE, took exactly 2 weeks to clinch his award, but he was QRP running 5 W! It's not too late for you to earn your DXCC 2000 certificate. You have until 2359Z on December 31, 2000. See the December 1999 *QST* page 47 for full details, or visit the ARRL DXCC home page at **http://www.arrl.org/awards/dxcc**. You can see the attractive DXCC 2000 Millenium award in "Up Front" in this issue.

2000 International DX Convention

This year's International DX Convention

Bernie McClenney, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ howsdx@dailydx.com

will be sponsored by the Southern California DX Club and will be held on April 14, 15, 16 at the Holiday Inn in Visalia, California. At press time Harv, K6EXO, was still working on the final program and has some great presentations lined up for this year's event. For complete details contact the SCDXC by e-mail at **visalia@scdxc.org**, or visit their home page at **http://www.scdxc.org/**. If you don't have access to the Internet you can write to the Southern California DX Club, Attn: Herb Rosenberg, KG6OK, 17861 Fairhaven Ave, Santa Ana, CA 92705-1111. Becky, N3OSH, and I look forward to seeing everyone at Visalia this year.

3DA—Swaziland

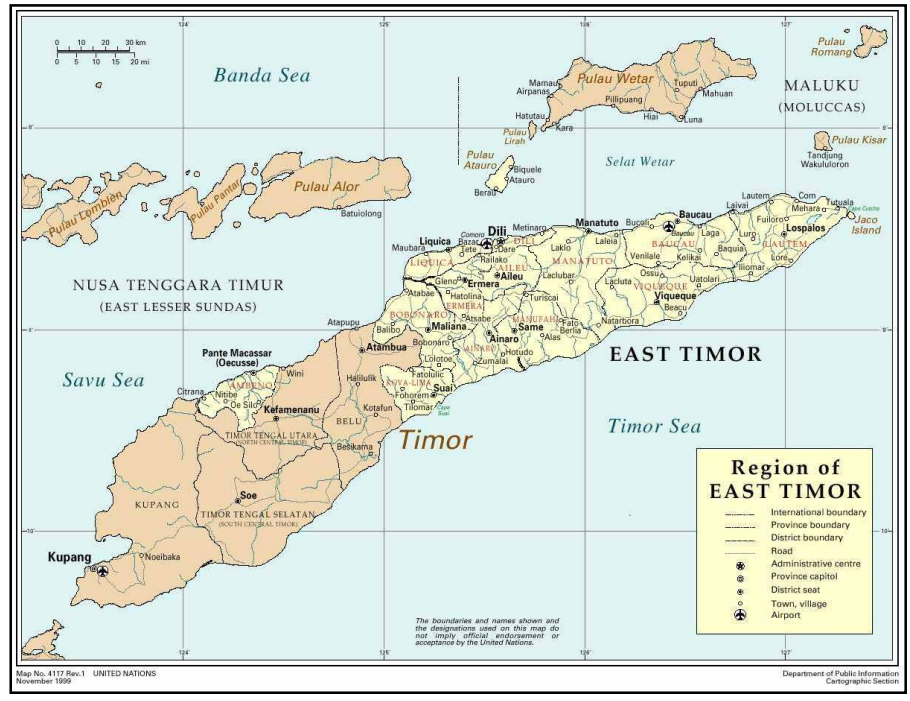
Andre, ZS6WPX, has recently made two trips to Swaziland and operated as 3DA0WPX. Since Jon, 3DA0CA, departed there has been little activity. Andre plans to be active in the following contests: ARRL SSB DX, CQ World Wide WPX SSB, IARU HF World Championship, CQ World Wide SSB DX, and Japan International DX. He is also looking into the possibility of operating from Mozambique (C9) sometime in May.

East Timor

An official from the International Telecommunication Union (ITU) stated that meetings were underway in January with the telecommunication administrators from East Timor and the United Nations concerning the transfer/reallocation of call signs. Once completion of these procedures takes place, the pertinent information will be given to the ITU member nations. When asked how long this could take, the official responded, "The time frame for implementing changes depends mainly on the action taken by the telecommunication administration concerned and is beyond the control of the ITU Radiocommunication Bureau." He did, however, go on to say, "Each official request which fulfills the criteria for a new allocation is treated by the Bureau with high priority." In late January Fred Eckhard, a spokesman for the Secretary-General of the UN, stated, "East Timor has won the approval of its own international country code from the International Telecommunication Union (ITU); its new code will be 670, although it will take some more time before that code is operational." No word yet on a call sign prefix block, which would open the door for a new DXCC Entity. The good news is that several UN peacekeeping members there are Amateur Radio operrators. We should see this new country sometime in 2000.

BV9P/BQ9P—Pratas Island

Charles, W1FH, found a interesting article in his local paper that reports Taiwanese officials are eyeing Pratas Island (BV9P/BQ9P), about 432 kilometers south of Taiwan (BV), as a possible future tourist spot. The tiny horseshoe shaped island is located in a flashpoint area of the South China Sea and has been home to a military garrison up until now. Last November military officials announced plans to withdraw troops from the Pratas and Taiping Islands. Chen Wen-hsiung, a cruise director from Kuohsiung, said, "It's kind of different, but we definitely see possibilities" and "we ought to make visitors feel safe." Taiwanese officials and tour groups say they can get by the current infrastructure by having tourists lodge on floating hotels. Don't be surprised to see some activity from this semi-rare one, possibly this month!



East Timor will consist of the eastern half of the island of Timor, the former enclave Ocussi-Ambeno on the north coast of West Timor and the islands of Palau Atauro and Jaco.

FR/T—Tromelin Island

Gil, F5NOD, reports a French expedition to Glorioso Island in the Indian Ocean (#9 on the ARRL's '98 DXCC Most Wanted list) that was announced last August is still on! But the plan has been changed and the target is now Tromelin, which is one notch higher (#8) on the list. Gil says it should happen in July or August and the call sign still is not known. The operation has been authorized for four operators and they'll be on Tromelin for 15 days. Gil also mentioned, "This expedition will be possible only if we can gather enough money to cover the budget." See the Tromelin 2000 DXpedition Web page at: **http://perso.easynet.fr/~f5nod/** and follow the FR/T link.

JX—Jan Mayen

Per, LA7DFA, says he will once again be active and working from Jan Mayen starting April 7 as JX7DFA. He will be there for either 6 or 12 months this time. Plans are to take a Yagi for his 144 MHz EME station, which will have 20.8 dBd with vertical and horizontal polarity and full az/el. On 6 meters he will take a 100-W rig and a 6-element Yagi. Yes, he will also be active on 10 through 160 meters and plans to put up a 25-meter-high inverted **L** with 100 radials. Also in the works is an AP-8 at 20 meters above the ground at the west side QTH, which will be perfect for the US and Pacific. He plans to be at that QTH during some weekends. Per prefers CW but will also be on SSB, RTTY, PSK31 and SSTV. While there he hopes to make the first JX-USA contact on 6 meters. QSL via LA7DFA Per-Einar Dahlen, Royskattveien 4, 7670 Inderoy, Norway.

YV0—Aves Island

Ramon, YV5EED, reports the February 2000 scheduled DXpedition to Aves Island (YV0) had to be cancelled because of a December storm, that devastated parts of Venezuela. The group of 20 operators from both Venezuela and several other nations had transportation with the Venezuelan Navy. However, due to the navy's budget and recent humanitarian relief work, the team would have only been able to go for either one day or 30 days. The group decided it would be best to postpone because it would take too much effort for just one day, and members of the group could not spend 30 days on the island. The group has not given up and will continue to work closely with the officials to help activate Aves Island in the future.

4U/KC0PA—Western Sahara, 1995

Tim, KC0PA, notified us that due to the long-term illness of his manager, QSL requests for his operation in Western Sahara in 1995 were not always answered. Tim has assumed all responsibility for acknowledging QSLs and asks anyone who did not receive a response to their QSL request to contact him either by e-mail or regular mail. His e-mail address is **kc0pa@arrl.net** and his mailing address is KC0PA, 207 River Valley Trail, Kathleen, GA 31047-2135, USA.

WRAP UP

That's all for this month. Looks like DX is alive and well. Thanks this month go out to BV4FH, DA1MH, F5NOD, G3NOM, K6EXO, KC0PA, KE3Q, KG6OK, LA7DFA, N4GN, N6RT, W1FH, YV5EED and ZS6WPX for their contributions. Please continue to send your pictures, articles, letters and newsletters. I really appreciate them. I look forward to meeting some of you in Visalia in mid April. Until next month, see you in the pileups!—*Bernie, W3UR*

What's Happened to Cycle 23?

It has been clear for many months now that Solar Cycle 23 has not been living up to most predictions. Many 6-meter operators around the world looked forward to a glorious winter season of DXing, but actual results fell well sort of expectations. The most spectacular contacts were primarily along the easy paths adjacent to the equator and one- or two-hop contacts across the equatorial zone. Mid- and high-latitude east-west contacts, such as between North America and Europe, were scarce from November to January—the high point of the F_2 season for much of the US.

The spring season, just reaching a peak as you read this, may be better. Preferred paths from early March to May are from the South Pacific to much of the southern half of the US. There is a considerably smaller chance that stations in more northerly portions of the US can work into the Pacific as well. Auroral and transequatorial field-aligned irregularities are statistically more common and perhaps more intense around the equinox periods, so late March and early April could bring some other sorts of surprises.

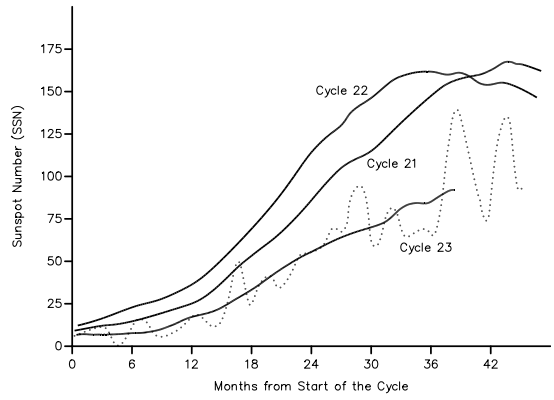


Figure 1—Solar Cycle 23 compared with the two previous cycles. Solid lines show 13-month moving sunspot averages. The dotted line shows the monthly averages for Cycle 23 through January 2000. Cycle 21 started in June 1976 and lasted 10 years, 3 months. Cycle 22 began in September 1986 and lasted 9 years and 8 months. Cycle 23 began in May 1996 and had been in progress for 3 years, 8 months, by January 2000. Based on the graph at the DX Listeners Club Web page http://www.dxlc.com/solar/cyclcomp.html.

Symptoms

Consistent transatlantic 50 MHz propagation usually occurs when the solar flux is sustained above 175 (135 SSN) during the late fall and early winter seasons. Even with the daily flux at 200 (158 SSN), experience from Cycle 22 has demonstrated there is just a 40% chance of openings from New England to western Europe. The solar flux did exceed 200 for several days running in November and again in December, but these were short-lived peaks. The flux just as quickly dropped below 175. In addition, the long-term average has not risen as steeply as in previous cycles (see Figure 1). Consequently, there were only a few days with mediocre transatlantic openings in each month, and they were nothing like the openings at a similar stage in Cycle 22.

There have been many fewer and less intense geomagnetic storms as well. This also may be an indirect result of overall lower solar activity. In contrast, the early years of Cycle 22 had several strong auroras and one quite extraordinary event—the great aurora March 13-14, 1989. During this geomagnetic storm, stations as far south as Florida, Texas and Arizona made aurora contacts. Nothing like that has happened yet this cycle.

Reasons

Solar activity has simply been lower than expected. The underlying causes are simply not clear. Each of the 22 recorded solar cycles has been unique in terms of rise to maximum, peak activity, duration and other quantifiable characteristics. Most predictions are essentially statistical probabilities based on the observations of previous cycles, with some modifications based on certain recurrent patterns. Some experts suggested, for example, that the peak of Cycle 23 might be one of the highest on record because odd-numbered cycles have generally been more active than even-numbered ones. It seems clear that Cycle 23 is going to upset that rule.

What Next?

As of early this year, the Cycle 23 appeared to be building toward a peak that still seems on track for late this year or early next. It is unlikely that the peak will be anywhere near as high as the previous two cycles. Thus, it now appears that 6-meter activity will probably not be as good as during Cycle 22. Next fall may well provide the best opportunities for worldwide DX on 6 meters for this cycle. How good that activity may be is anyone's guess.

You can follow the progress of the cycle and the changing predictions of the experts on the NASA Web site at **http://science.msfc.nasa.gov/ssl/pad/solar/predict.htm**.

This Month

April 8-9	DUBUS/REF 432 and 2300 MHz and Up EME Contest
April 14-15	Southeastern VHF Society Conference (Marietta, GA)
April 16	Good EME conditions
April 28-30	CQ Spring VHF Activity Weekend

ON THE BANDS

January's activity was quite a mixed bag. Lackluster solar activity trimmed 6-meter DXers' hopes, but expected sporadic-E openings and several ordinary auroral events took up the slack. Propagation during the January VHF Contest weekend was the best in many years. There was some aurora on Saturday evening and most areas of the country had several opportunities to make 6-meter E-skip contacts on Sunday. Finally, a rare winter tropo event across the Gulf of Mexico provided a good deal of excitement and a new DX record. Dates and times are UTC unless otherwise noted.

Tropospheric Ducting

Ducting rarely makes top billing in January's news, but one of the strongest openings in many months covered the southeastern US and Gulf of Mexico on January 11 and 12. Figure 2 summarizes some of the longer paths. Note the number of 2.3 GHz contacts plotted—probably the largest tally ever in one session over the Gulf of Mexico.

Across the Gulf of Mexico on January 11

There was good activity on all the bands from 144 through 2304 MHz between the

Emil Pocock, W3EP ♦ Box 100, Lebanon, CT 06249 (Voice 860-642-4347, fax 860-594-0259) ♦ w3ep@arrl.org

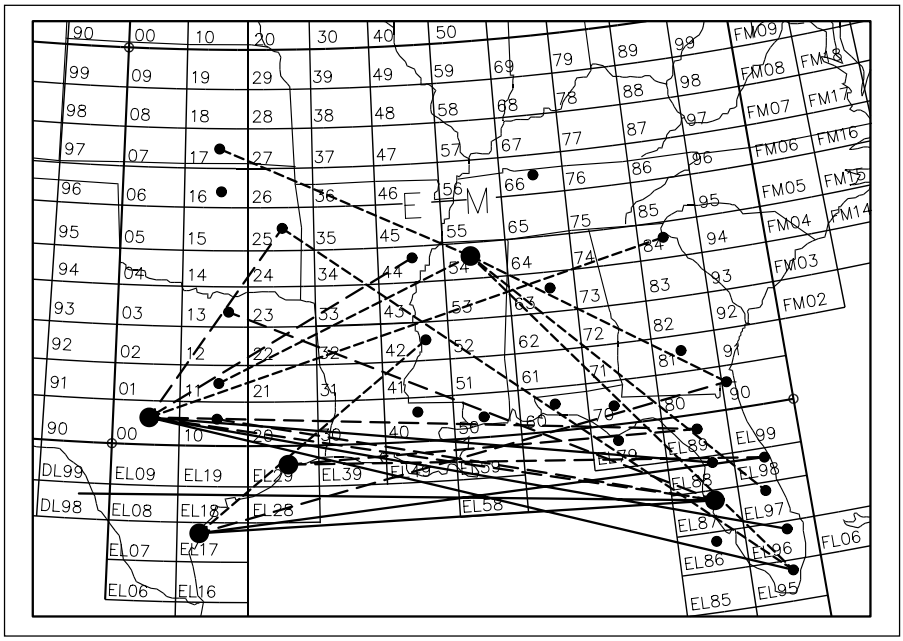


Figure 2—Representative DX contacts on 144, 432 and 2304 Mz on January 11 to 12, 2000. Temperatures had been well above normal for some days over the southeast. A huge high-pressure system dominated the region when ducting conditions appeared and then slowly drifted northeast. Large dots represent grid locations of reporting stations. Small dots indicate other grids in which there was VHF activity. Solid lines show 2304-MHz contacts, dashed lines are 432 MHz and dotted lines are 144 MHz. Many more contacts were made than can be shown here, including those on 222 and 1296 MHz.

Texas coast and Florida on the evening of January 10-11 and continuing into the next morning. John Butrovich, W5UWB (EL17), worked a dozen Florida stations on 144, 222, 432 and 1296 MHz after 0540 on January 11. He hooked up with K0VXM (EL98) on all four bands at about 1675 km for his longest series of the evening. John also worked W2BZY and KU4WD (both EL98) and K5WTA (EM90) on 144 MHz at distances over 1500 km.

John Goodwin, K5IUA (EL29), had similar results the next morning, but on 2304 MHz. He completed 13-cm contacts with K0VXM at 1327 and KB4DFO (EL89) at 1408, using 432 MHz for coordination. The contacts were over the quite remarkable distances of 1474 and 1334 km—just under the existing US DX record of 1540 km. They were also probably the first Texas-Florida contacts on 13 cm.

Former "World Above 50 MHz" columnist Bill Tynan, W3XO/5(EM00), worked many Florida stations on 144 MHz, but also completed with N0LBH (EL88), KD4ESV (EL87) and WD4MGB (EL87) on 432 MHz. These contacts were in the 1500 to 1600 km range. W5UWB continued to work across the Gulf. John found K0VXM on 1296 MHz at about 1650 km and worked WA8TTM and WD4MGB on 144 and 432 MHz as late as 1930 in the morning. Paul Womble, AJ4Y (EL97), worked XE2OR (DL98) on 144 MHz for a new country and probably the longest contact of the entire opening—about 1875 km. As extraordinary as these contacts were, there were more the following evening.

Activity Expands on January 12

W3XO/5 resumed working across on the Gulf on 144, 222 and 432 MHz after 0200 that evening. Bill extended his range to 1800 km or so on 222 MHz by working WB2WIH (EL96) and K9KNW (EL95) on 432 MHz at around 1850 km. W3XO/5 also made a 222 MHz contact with K5SW (EM25) to the northeast in Oklahoma.

K0VXM and W5LUA had alerted Buddy Morgan, WB4OMG (EL87), of the opening that morning, but unfortunately Buddy had only a 13-cm station running. So when he got home on the evening of the 12th, Buddy started calling CQ on 2304.1 CW. Tom Haddon, K5VH (EM00), answered his CQ and they completed the contact over a 1509 km path. The pair then switched to SSB and chatted for more than an hour as signals got as strong as 20 dB over S9—astounding! At 0325, Buddy worked NQ9Q (EM10) at 1453 km for another remarkable QSO.

2304 MHz DX Record

K5VH made one further 2304 MHz contact before calling it quits for the evening. At 1506, he hooked up with Rolf Marx, KB4DFO (EL89), over a 1553 km path for a new North American DX record for the band. Well done indeed. Tom used a Down East Microwave transverter with 1.2 W output, through 45 feet of $^{7}/_{8}$-inch Hardline and fed into a 34-inch dish.

The opening seemed to spread much further north and west by the following morning, based on 2-meter activity. W7ROD (EM63) in northern Alabama worked down to EM90 in northern Florida, west to EM34 in Arkansas and north into EM66 in Tennessee. David Counce, N5YLS (EM54) in northern Mississippi, worked as far south as EL95 in the Miami area, southwest to EM11 in Texas and northwest into EM17 in Kansas. K5SW (EM25) in Oklahoma reported contacts south to EL95 in Florida. WB4OMG was also at it again on 2304 MHz, adding W5LUA (EM13) at 1453 km and AA5C (also EM13) at 1442 km to the log.

More Tropospheric Openings

Other noteworthy tropospheric events over the southeast took place on January 2 and 19. W5UWB (EL17) reported a dozen 2-meter and a few 70-cm contacts to the northeast after 0255 on the 2nd. He worked as far as AG4V and N4JQQ (both EM55) in southwestern Tennessee. Distances were up to 1150 km. Jason Wilborn, KG4BMH (EM76), worked W5UWB on 2 meters the next morning, as did his neighbor K4AR. The 1500-km contact down to Texas provided a new state for Jason. The January 18 event supported 2-meter contacts from eastern Oklahoma to north Georgia and eastern Tennessee at distances up to 1100 km.

Skunked on 6 Meters

There is no other way to put it. January was disappointing for most 6-meter DXers around the world. This should have been the high point of the winter season, yet there were no openings between North America and Europe and few remarkable contacts elsewhere in the world. Here are the highlights, such as they were.

South America

Ed Rodriguez, WP4O, was favorably placed in Puerto Rico to take advantage of the high MUF north-south paths across the equator, continued to work PY, CX, LU and HK stations on several days during January. WP4O probably has the honor of making the first 6-meter DX contact of the new year as well, when he worked CX4II on January 1 at 0003. On January 8, he added CE0Z on Juan Fernandez Island, a nice catch any time. N5JHV worked several LUs on January 27, possibly on a sporadic-E link to a more southerly F-hop. W5OZI and N5XU reported Mexican stations at the same time. Meanwhile, the Brazilians were struggling even to work Spanish stations, as was so common a month or two previously.

The Pacific

Transpacific paths were a little more active, yet still down from the previous two months. Hatsuo Yoshida, JA1VOK, reported Japanese DXers worked BG7OH as well as 9M2, 9M6, DU, HL, V7, VK, VR2 and ZL prefixes during the first three days of the year. On the 5th, JS6CDB and 7J6CCU in the Ryukyus worked PY2NKY, PY2PA and others in Brazil. Mainland JA3, JA4 and JA6 stations found Brazilians on the 23rd. On January 26, several JA6s landed a real prize—XZ0A (NJ99), the expedition on Thahtay Kyun Island (Myanmar).

North Americans were not completely shut out from the Pacific. XE1/G0JHC (DL70) worked VK3 and ZL stations on January 3 and 6 while vacationing on the Mexican coast. K7ICW made a marginal contact with VK2DN on the 10th. Stephen Wheelock, YN1SW (EK61), worked ZL2AGI on the 14th. W1LP/mm (FJ09) found VKs on the 27th just before entering the Panama Canal from the Atlantic side. Finally, W5UWB in south Texas ran off a string of a dozen ZLs on the afternoon of January 29.

Aside from some widely scattered contacts from Hawaii into the Midwest on January 3, 6 and 9 (some of which may have been via sporadic E) and southern Europeans who heard the ZD8 beacon on several days, that is about it for January. Spring usually brings better conditions into the Pacific, so perhaps that activity is brightening your day as you read this.

Transcontinental

There were no transcontinental F-layer contacts during January, but there were some

on the afternoons of December 11, 18 and 19. These events followed a familiar pattern. Typically, 6 meters opened abruptly around 1700 for an hour or two, when eager stations quickly filled the band to 50.200 MHz and higher. Those in the Canadian Maritimes and Quebec then south to Maryland easily hooked up with stations from British Columbia and western Montana, south to Arizona and New Mexico.

SSB was the most popular mode for making transcontinental QSOs, because signals were usually strong, but QSB prone. The success of George Yazzolino, KC7HKP (CN85) in Oregon, provides an example of what was possible. On December 18 and 19, George worked many stations in Nova Scotia, Quebec, Maine, Massachusetts, Connecticut, New York and Pennsylvania with 100 W and a five-element Yagi, probably a typical station.

Even this much power was not necessary to get in on the fun. Mike Gutman, K2CMH (FN41) in Massachusetts, made several contacts into Oregon, Nevada and California running just 10 W from an FT-620B and a multiband ground-plane antenna. Several mobiles and at least one station running as little as 1 W into a small Yagi participated in these openings.

Transequatorial FAI on 144 MHz

WP4O reported that he and KP4EIT continued to work into South America on 144 MHz from Puerto Rico via transequatorial field-aligned irregularities (TE) during the month. The afternoons of January 10, 20, 23 and 29 seemed to be the most productive for making contacts into Argentina and Uruguay. These contacts were in the 6000-km range, typical for true TE contacts.

There are greater possibilities for TE. A few 222-MHz TE contacts have been made over similar paths and at least one claimed 432-MHz heard only. TE peaks around the equinoxes (that is about March 21 and September 21) and is more intense during the solar-cycle maximum. This could be the year for some extraordinary TE contacts.

Sporadic E

Sporadic E appeared on 6 meters somewhere across the country on January 1 through 7, 10, 12, 23 and 28, according to W1RMA, WB2AMU, K4MSG, K7ICW, N0LL and others. Most were the usual short-lived single-hop affairs, hardly worthy of special notice, but they still can enliven a mostly dead band. Other days were a bit more exciting.

The openings over January 3-4 were noteworthy for their duration (up to eight hours in some areas) and because there were many double-hop coast-to-coast contacts. W6OAL/0 made over 300 contacts in all US call areas, except 5 and 6, plus VE3 and VE4. K6YK (CM97) worked stations in the Midwest, but also hooked up with VE2DFO, VE2FGU, VE3KZ and VE3LBZ via double hop. W3EP (FN31) also found many midwestern stations and completed double-hop contacts with W7KQU (CN878), KG7WC (DN17) and W7SAZ (DN17) all on CW below 50.100 MHz.

Multiple 6-meter openings over the VHF Contest weekend, January 22-23, provided a needed jolt to jaded operators. Most of the country had at least some E-skip, although you had to be on your toes. Minnesota stations were surprised by a strong opening to the East Coast already in progress at 5:30 AM local time Sunday morning, for example. It lasted for at least 2 hours. New England enjoyed additional openings to the Midwest and to Florida and adjacent states. Florida operators worked into the Midwest at the same time. There were also plenty of reports of contacts between the West and Midwest as well. Did you miss the any of the action?

Aurora and Auroral E

Aurora appeared on at least three late afternoons in January, including one session during the VHF Contest. On the 11th, John Feltz, W9JN (EN54) in central Wisconsin, worked west to Minnesota and east to New York on 50 MHz. His coverage on 144 MHz was somewhat more restricted, with the southern-most contacts in EN51 (northern Illinois) and EN81 (northern Ohio).

The January 22 aurora began for stations that are more northern as early as 2000, but despite the high activity due to the contest, it seemed to take a long time before most operators were aware an aurora was in progress. Many stations reported unusually strong local power-line noise, due to the extreme cold and high winds. Despite the problems, WB2AMU (FN30) hooked up with W2AXX (FN12) on 144 MHz while running only 10 W and a portable Yagi.

Most contacts on 50 and 144 MHz seemed confined to northerly latitudes from coast to coast. Even so, there were some exceptions. Al Olcott, K7ICW (DN26) in southern Nevada, heard W0UC (EN44) in Wisconsin suddenly coming through on 6 meters with a distinct auroral buzz around 2317. Al eventually worked him and W9BLI. He also worked WA2BPE and KB2ZPP, both in western New York, but probably aided by sporadic E.

Russ Miller, W1RMA (FN65) in northern Maine, had a somewhat different experience. He had his antenna pointed northeast after 2130 and heard auroral sounding European TV video at 48.250 MHz, probably from Norway and Sweden. At the same time, he heard the VE8BY/b and Greenland beacons on 6 meters via aurora. There has been a good deal of speculation about the chances of actually working Europe on 6 meters via auroral E (the likely cause in this case). It has been done once before during a much stronger aurora, but signs like these are sure encouraging.

Finally, on January 28, New England stations worked into the Canadian Maritimes via 6-meter aurora for less than an hour after 0045, but this event did not seem to attract wider attention.

NOTES FROM ALL OVER

First 432 MHz EME QSO between Two-Yagi Stations

Ramiro Aceves, EA1ABZ, reported the first 432 MHz EME contact made between stations running two-Yagi arrays in his February "VHF-UHF-SHF: El mundo por encima de los 50 MHz" column in the Spanish *CQ* magazine. Honors go to EA3DXU and IK5QLO, who made this unusual contact on December 23 at 0530. The Moon was in an especially favorable position at the time, resulting in an unusually low path loss.

EA3DXU has been making 432 MHz EME contacts for more than six years with two 38-element Yagis and 1350 W. Josep has 114 initials to his credit, 35 DXCC countries and worked all continents. He also was part of the first 144 MHz EME QSO between stations running just two Yagis, completed with the remarkable PA0JMV in September 1988. IK5QLO used two 28-element Yagis and 1 kW on his end of this historic contact.

This and other news of 432 MHz and higher EME activities can be found on the online version of *432 and Above EME News*, edited by Allen Katz, K2UYH. Point your browser to **http://www.nitehawk.com/rasmit/em70cm.html**.

VHF/UHF/MICROWAVE NEWS

50 MHz US Firsts

There has been 6-meter activity from more than 300 DXCC countries some time during the past few decades. How many of these countries do you suppose have been worked from the continental 48 United States? The answer may be surprising—just 188 at last count. K1SIX (formerly WA1OUB) in New Hampshire leads individual honors with 133 DXCC countries. We still have a long way to go in comparison with the HF crowd.

A compilation of the first station in the continental 48 United States to work each DXCC country on 6 meters can be found at **http://user.itl.net/~equinox/50usa.html**, courtesy of Geoff Brown, GJ4ICD. The 50 MHz US Firsts list also appears in the February issue of *Six News*, the bimonthly magazine of the UK Six Metre Group. The list is constantly updated as new claimants come forward.

RMG Cumulative Contest

The newly formed Roadrunners Microwave Group is sponsoring a yearlong cumulative contest to promote activity on the bands above 222 MHz. The same station can be worked every day for additional points. Although the contest began on January 1, you can still go over your logs for the previous few months and count contacts you have already made. For details, see the RMG Web pages at **www.clarc.org/rmg/** or send an SASE to the RMG at PO Box 93175, Austin, TX 78709, for rules and scoring sheets.

DUBUS/REF Worldwide EME Contest 2000

The first weekend of the *DUBUS*/REF EME Contest—limited to 144 and 1296 MHz—was held March 18 and 19. The second leg, for 432 MHz, 2.3 GHz and higher runs the full UTC days of April 8 and 9. Exchange call signs and signal reports. The entry categories and scoring are a bit complicated, so if you plan to send in a log, check first with Joachim Kraft, DL8HCZ, at **joachim@kraft.net**. Even if you do not care to compete, this is a great weekend for operating off the Moon, as many stations are sure to be on the air.

FEEDBACK

There are some small corrections in the Alaska and Japan section of the Six Meter DX reports in February's column. G3FPQ worked JA5FFJ on November 11, rather than G3FPK. JA6VU made the first contact between Japan and the Dodecanese Islands (not Greece) when he worked SV5BYR on November 14. Finally, JA1VOK's contact with EY8MM on the same day was not a Japanese first with Tajikistan. JS6CDB had an earlier QSO with EY8MM on October 9. Thanks to JA1VOK and G3FPK for noticing these lapses. QST

Three Cool Kits

The QRP portion of the ham radio hobby has many facets. This month we'll review three rigs that you can build and enjoy. One question that quickly arises is, "Do I have to be an electronics technician or engineer to build a rig?" The answer is an emphatic "No!" Today's crop of QRP kits are very well documented and are, in my humble opinion, much better than the Heathkits of the 1950s, 60s and 70s.

Wilderness Radio

The NorCal-40A offered by Wilderness Radio, is a revised version of the first kit project offered by the Northern California QRP Club (NorCal). Designed by Wayne Burdick, N6KR, the NC-40 quickly became *the* portable QRP rig to own. The Wilderness rig is an improved version of the original kit and assembles quickly (about 10 hours for an average kit builder). Alignment is ultra simple. This rig offers a true superhet receiver with crystal filtering, AGC and RIT. Power output is about 2 W. Receive idle current is around 25-30 mA and key down current is about 350 mA, making this an ideal backpacking rig. Tuning is accomplished via a front panel mounted 100 kΩ potentiometer that varies the bias voltage on a varactor diode. Tuning is somewhat nonlinear and the normal tuning range is around 40-50 kHz. This can be expanded by methods explained in the manual. The price for the Wilderness NC-40A kit is $129 plus $5 shipping and handling. *Wilderness Radio, PO Box 734, Los Altos, CA 94023-0734; tel 650-494-3806;* **qrpbob@datatamers.com**; **http://www.fix.net/jparker/wild.html**.

The Wilderness Radio NorCal 40A offers a superhet receiver and 2 W output.

The popular Small Wonder Labs SW40+ transceiver.

Red Hot Radio's 5 W NC 20.

Small Wonder

Dave Benson, NN1G, of Small Wonder Labs (SWL) offers two versions of his extremely popular 40 meter monobander, the Small Wonder 40+. One is a standard analog version (the SW 40+) for $55 and the other is a direct digitally synthesized version (the DSW-40) at $90. Case and controls are options available from SWL ($40 + s/h). The SW 40+ is a treat to build and operate. It features a superhet receiver with IF crystal filtering, RIT can be added with an optional board from SWL, and power output is around 2 W using a 12-V supply. Current consumption is extremely low at about 20 mA on receive. The SW 40+ is so popular that the NorCal QRP Club devoted an entire issue of their quarterly newsletter, *QRPp*, to the detailed workings of the rig. Reprints are available for $12 from Quicksilver Printing, PO Box 757, Socorro, NM 87801. Ask for "Elmer 101." *Small Wonder Labs, 80 East Robbins Ave, Newington, CT 06111;* **dave@smallwonderlabs.com**; **http://www.smallwonderlabs.com**.

Red Hot Radio

Finally, Red Hot Radio's NorCal-20 is an outstanding example of taking the latest NorCal club kit and going commercial. Dave Fifield, AD6A, the original designer of the NC-20, decided to take the design and turn into a commercial venture and Red Hot Radio was born. Dave further refined the design of the 20-meter monobander to include an AGC modification, and improved Audible Frequency Annunciator (AFA) operation. This radio, unlike the previous two offerings, has an audio digital frequency readout and TiCK keyer as standard equipment and is capable of operating at a "QRP Full Gallon" of 5 W. Actually, it will put out between 0 and 5 watts, fully adjustable via an internally mounted trimpot.

The Red Hot NC-20 is a nice little kit and the red anodized aluminum case really makes it stand out in a crowd. Overall receiver performance is great. Minimum discernable signal (MDS) is around –135 dBm, which means it hears *very* well. Selectivity is excellent, owing to the five matched crystals used in the IF filter section. Current consumption is a bit more than the Wilderness NC-40A and the SWL SW-40+ (160 mA on receive and close to 1 A on transmit, using a 13.8-V source at an output of 5 watts). The higher receive current is directly related to the use of a JFET preamp and a TFM-2 double balanced mixer in the receiver front end. Price: $135 plus shipping and handling for an excellent kit. *Red Hot Radio, tel 408-390-6805; fax 800-881-6120;* **sales@redhotradio.com**; **http://www.redhotradio.com**.

I can heartily recommend all of these monoband radios for the beginning QRP kitbuilder. None require an intense knowledge of electronics and only the usual assortment of hand tools and minimal soldering equipment. The instructions are outstanding and so is the technical support from the manufacturers. All the builder has to do is read the instructions carefully and resist the temptation to hurry. Best of all, the prices of these monobanders are in keeping with modest budgets, enabling the frugal QRPer to build a rig at a fraction of the cost of purchasing a commercial transceiver. On a personal note, I have built two NorCal NC-40s, one SW 40+ and its digital cousin, the DSW 40 and all worked the first time!

Building the radio is only a portion of the enjoyment you'll receive. The pride and satisfaction of operating a homebuilt station is unbelievable. These rigs are equally at home in the shack or on the road. Add a small L-Match tuner, a simple wire antenna, battery, key or paddles, and headphones, and you have a very compact, easily transportable QRP station that can accompany you on family outings, camping and/or business trips. QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

New Exam Question Pools go into Effect April 15

The Amateur License Restructuring Report and Order, released December 30, 1999, takes effect on April 15, 2000. Because the new structure has only three license classes, there will be only three question pools. (The present [pre April 15] system has six license classes with five question pools.)

Given the short time frame it had to work with, the National Conference of VECs Question Pool Committee (QPC) found itself under a 116-day deadline to organize the content of five question pools into three, while still allowing publishers, educators, VECs and VEs ample time to prepare for administering tests based on the new question pools. Since the window of time necessary for editing, publishing and distributing study guides was measured in terms of months rather than days, it became evident that the QPC had to complete its work by the beginning of February. The best the QPC could do, for the time being, was to provide a workable Band-Aid. The QPC placed three new question pools into public domain in early February.

To create the new Element 2 Technician pool, questions from the current Technician (Element 3A) pool were moved over to the new pool. Also, questions from the Novice pool relating to VHF/UHF operation and Novice/Technician HF band operation, were moved into the new pool. The new Element 2 Technician question pool remains our VHF-and-above entry level test. Beginning April 15, Technician class exams must contain 35 questions drawn from this new question pool, 26 of which must be answered correctly to pass the exam.

To create the new Element 3 General question pool, nearly every question from the current (Element 3B) General group was brought to the new pool. Plus, to make up for the additional five exam questions (50 new pool questions total, to adhere to the FCC's 10×rule), additional questions on the same General syllabus were gleaned from unused material from the Novice pool. Beginning April 15, General exams must contain 35 questions drawn from this new question pool, 26 of which must be answered correctly to pass the exam.

To create the new Element 4 Amateur Extra question pool, many technical questions were drawn from the current (Element 4A) Advanced pool and combined with questions from the current (Element 4B) Amateur Extra question pool. The new Element 4 Amateur Extra question pool is our premier, all-privilege exam. Beginning April 15, Amateur Extra exams must contain 50 questions drawn from this new question pool, 37 of which must be answered correctly to pass the exam. The three new question pools can be found on the ARRLWeb at **http://www.arrl.org/arrlvec/pools.html**.

Question Pool Revisions Schedule

The three new pools (and any exam designs based on these question pools) will be valid (and then revised) on the following schedule:

Amateur Extra Element 4—Valid from 12:01 AM April 15, 2000 through midnight June 30, 2002

Technician Element 2—Valid from 12:01 AM April 15, 2000 through midnight June 30, 2003

General Element 3—Valid from 12:01 AM April 15, 2000 through midnight June 30, 2004

(This cycle is expected to repeat indefinitely.)

We expect the first revision cycle for the Amateur Extra pool to commence later in 2000 and to be completed by the end of 2001. The Technician and then General pool revisions will follow the Amateur Extra pool revision by one year and two years respectively.

Seeking Public Input (Your Input!) to the Question Pools Revision Process

Once the QPC call for public input is made, *your input* will be requested and invited. These revision cycles will be our opportunities for complete and comprehensive reviews of each of our new question pools.

The QPC received very little input from the amateur community over the past decade of question pool revisions. But, since public awareness appears to be now at an all-time high, the QPC looks forward to significant contributions for the upcoming pool revision cycles.

Don't miss out! This will be *your* chance to shape the future question pools and the knowledge base required of our future Technician, General and Amateur Extra licensees.

READY TO UPGRADE AT THE STROKE OF MIDNIGHT?

The FCC's new restructuring rules take effect at 12:01 AM April 15. At that time, persons seeking a new license or upgrade can qualify under the FCC's new licensing structure of three license classes and one 5-WPM Morse code exam.

FCC has told us that all applicants seeking an upgrade under the new rules must apply through a VE team to receive their desired upgrade. The VE team must have a completed NCVEC Form 605 for each applicant (this form is available from the VE team and can be completed at the test site). For persons who qualify for an upgrade, three qualified members of the VE team must sign the NCVEC Form 605 for the applicant. The VE team must complete and sign a Certificate of Successful Completion (CSCE) showing the new license class earned, and the team will collect a processing fee from the applicant ($6.65 for ARRL VEC exams during 2000).

Valid Forms of Examination Element Credit

At a test session, the VEs will review all credit documents presented by applicants. Such valid credit documents may include:

• A CSCE issued within the previous 365 days for Element Credit (credit as indicated). Some credit presented on/after April 15 will not be useful. For example, if an applicant is seeking a General to Amateur Extra upgrade, the applicant must have obtained Element 4A and Element 4B credit before April 15. (Element 4B credit alone is only valid if you have an Advanced license.)

• Proof of General written Element 3 test credit (persons who took a 50-question Technician/General written test) for Technicians who were licensed before March 21, 1987, can be verified if an applicant presents *any* of the following:

—Per FCC Rules, a Technician license issued before March 21, 1987, as indicated on the license. Applicants potentially could have taken the Element 3 written test up through midnight March 20, 1987, which would not have resulted in a license issuance until July 15, 1987. For ARRL VEC purposes, we are advising ARRL VE teams that a Technician license issued through July 15, 1987, is acceptable for General grandfather credit.

—An *original* Element 3 CSCE issued before March 21, 1987.

—An FCC-issued License Verification Letter (see items 5 and 6 at **http://www.arrl.org/news/restructuring/faq.html**) indicating that the applicant was licensed as a Technician prior to March 21, 1987. To request such a letter, write to FCC, ATTN: Amateur Section, 1270 Fairfield Rd, Gettysburg, PA 17325 (or fax 717-338-2696).

—An International Transcription Service (ITS) FCC Records Contractor extract/certi-

Bart Jahnke, W9JJ ♦ ARRL/VEC Manager

fication from FCC Fiche Records. There is a charge for this service. You can obtain contact information for ITS by calling 717-337-1433 (or visit **http://www.itsdocs.com/**).

—A 1987 edition, or earlier, *Radio Amateur Callbook* listing is acceptable as proof (be sure to include the year of publication reference, if not printed on the page). *Radio Amateur Callbook* will, for a $10 fee, provide a notarized "Proof of Licensing" document which will serve your credit-proof requirements. For more information contact: *Radio Amateur Callbook*, 575 Prospect St, Lakewood, NJ 08701; **103424.2142@compuserve.com**; tel 732-905-2961 (choose option 5).

—QRZ.COM has posted a copy from their archives of their very first CD ROM product on their Web page, as originally published in 1993. This data includes licensees from 1983 to 1993. A printout of such a listing from this CD ROM, showing a Technician license effective/begin date prior to 3/21/87, is acceptable. Their URL is: **http://www.qrz.com/search1993.html**

Any other reasonable form of verification, showing license class as Technician and the license ending date, along with a license beginning/effective date before 3/21/87, may be acceptable as well. Contact your local VE team to determine if some other form of credit proof is acceptable.

Advanced VEs Get More Administrative Privileges on April 15

Within the FCC's License Restructuring Report and Order, Advanced VEs gained additional VEC administrative privileges. Beginning April 15, VEs holding an FCC-granted license can administer Elements 1, 2 and 3 (5 WPM Morse and the Technician and General written tests). General VEs will continue to have authority to administer the Element 1 and 2 (5 WPM Morse and Technician written exams). Amateur Extra VE can administer all elements. Per FCC requirements, no VE may exercise new VE privileges resulting from an upgrade until the new higher-class license grant appears in the FCC's data base.

ULS REGISTRATION—EASIER THAN YOU THINK

It's easier than ever to send updates to the FCC, especially since you can do it on line at: **http://www.fcc.gov/wtb/uls**.

Of course, you must first register in ULS by following the instructions indicated with the "TIN/Call Sign Registration" tab. Once you're registered follow the instructions indicated in the "Connecting to ULS" tab (this involves configuring your PC and modem to dial in to the FCC's secure WAN via a toll-free number). With the modem connection established, you start your Web browser and take it from there. If this approach seems overly complicated, take heart. The FCC says that within a year they will launch *complete* ULS access via the Web.

If you wish to send updates by mail, you can still do so with FCC Form 605. Form 605 can be obtained by writing ARRL, 225 Main St, Newington, CT 06111. An SASE is appreciated. Form 605 also is available from the FCC via on the Web at: **http://www.fcc.gov/formpage.html**, or **ftp://ftp.fcc.gov/pub/Forms/Form605/** or by fax at 202-418-0177 (request Form 000605). The FCC Forms Distribution Center will accept orders by calling 800-418-3676.

Form 605 has a main form, plus a Schedule D with two parts. The main form is all that is needed for most updates, while Schedule D is required for systematic (next one up) or Vanity call sign changes only, beginning April 15. Other than for Vanity call sign requests, mail Form 605 to: FCC, 1270 Fairfield Rd, Gettysburg PA 17325-7245. This is a free FCC service. For Vanity call sign requests see the ARRLWeb at: **http://www.arrl.org/arrlvec/vanity.html**.

FORM 610 (RIP)

Effective February 16, 2000, FCC Form 610 ceased being accepted by FCC. A familiar document for decades, this form has been the mainstay for amateur license applications.

VE teams now use "NCVEC Form 605." It resembles the old Form 610, but it cannot be mailed to FCC—it is for VE and VEC use only. For FCC license changes, renewals or other direct interaction with FCC, "FCC Form 605" is used.

BRIEFS...

Too-Early License Renewals

Remember that license renewals can only be requested from FCC at *90 days or less* before the license expiration date, or up 2 two years *after* expiration. If you're only changing an address, indicate the application purpose as "AU". Do not indicate "RM" for Renewal and Modification, or the entire application will be dismissed for untimely renewal filing if you are not yet eligible for renewal.

Physician's Certification Morse Code Exemptions to End

Beginning April 15, 2000, Physician's Certifications for 13 or 20-WPM Morse code exemptions will go away as will the ARRL VE Policy limiting ARRL VEs to administering only those code elements which they themselves have passed (by default, every VE must have passed 5 WPM tests). Remember that all accommodations described on the back of the former Form 610, NCVEC Form 605 or on FCC Form 605, Schedule D, *are applicable and must be considered for handicapped/disabled persons needing accommodative consideration in order to pass the 5 WPM exam.*

NEW BOOKS

HAM PRICE GUIDE—SECOND EDITION

By Eugene Rippen, WB6SZS

Second edition. Copyright 1999 by Sound Values, PO Box 9, Auburn, CA 95603. Softcover, 8 1/2×11 inches, 82 pages. $11.95 plus $2 shipping within the United States, $4 elsewhere.

Reviewed by Steve Ford, WB8IMY
QST Managing Editor

◊ How much is that used transceiver? Sure looks like a bargain, doesn't it? Are you sure you're getting the best deal, though?

One way to hedge your bet is with Eugene Rippen's second edition of the *Ham Price Guide*. This handy reference is a compendium of what might be called "market data." In this case, it is a comprehensive survey of what hams have been paying for various types of gear from roughly 1993 through 1999. As the author points out in the introduction, *Ham Price Guide* is not intended to be a bible of prices. The market is fluid, moving up and down with demand and supply. The *Ham Price Guide* is designed to give you an snapshot view of equipment prices at particular points in time based on actual transactions. A seven-year spread might seem pretty loose, but the used-gear market doesn't fluctuate *that* much. The pricing data shown in the second edition is likely to be applicable for at least the next several years.

The *Ham Price Guide* is a valuable reference for vintage radio hunters. Not only does it provide prices, but also the condition of the equipment at time of purchase. I looked up the Hallicrafters S-40B—the first radio I ever owned. (No, I'm not that old! The rig was about 18 years old when I took possession of it.) Turning to the Hallicrafters listings I see about eight entries for the S-40B. According to the *Ham Price Guide* an S-40B in excellent condition sold for $157 less than a year ago. How about a Ten-Tec PM-3, my first HF transceiver? If I find one in good condition with the original manual, the *Ham Price Guide* says that I can expect to pay about $100 for it.

The *Ham Price Guide* includes pricing information on recent equipment as well, making the book useful for anyone who is prowling the flea-markets and classified ads for affordable, late-model gear. With this reference in hand you're less likely to be gouged into paying more than you should.

There are no photographs in the *Ham Price Guide*—just page after page of raw data for more than 3800 items. The book is well organized, though. You can find the information for any manufacturer very quickly. It is important to remember that the price information may not apply to radios sold through auction services such as Ebay. While the *Ham Price Guide* will at least provide a yardstick for most transactions, auctions have a way of spiraling prices into the stratosphere when bidding fever strikes. At that point the price will probably not track with the *Ham Price Guide* at all—or with reality in general!

Next New Book

Hamfests and Collecting

With the hamfest season starting, you need to do some planning if you want to start a collection. Attention to details will bring success.

Getting Started

I'm often asked, "How do I get started collecting and how much should I pay for something I know nothing about?" The easy answer is to start a collection by buying your first piece without spending too much. A better answer would be to follow this advice:

Plan to spend some time learning about old radios. Read *QST* and other radio classifieds to see the asking prices of equipment. Search the Internet for radio-collecting news groups.

Ask your friends if they know anyone who collects. Then visit someone who has a collection and listen to what they tell you. If asked, your new friend should gladly tell you how he found his first old radio. Maybe he'll tell you about the time when he was in the right place and found a favorite radio. During your visit, when you see something you like, ask what it's worth and where you could find something like it. Ask about other local collectors. I have found collectors to be very friendly. They really enjoy talking about their collections and are anxious to share information.

Find out if there are any clubs nearby for radio collectors. Meet as many collectors as you can by visiting a radio-collecting club. It probably won't be a ham radio club, but you will find hams there. Meeting and getting to know other collectors is very important. It's called networking and you need to do this.

Most collectors will have some radios, or other radio items, they no longer need or want. Collectors usually trade and sell things from time to time, and as time goes by, their interests change and they want to make room. This can be a good opportunity for you. Ask!

Browse through old magazines and books. Just as *QST* today reports on all the new products and modes of operation, the magazines and books from the '20s, '30s, '40s and '50s did the same thing. Reading the "ancient" advertisements and studying the photos can help you recognize good radios and accessories at a glance. This is very important at hamfests, where the collecting competition is sometimes fierce. The first one to pick up the radio often ends up owning it.

How Much Should I Spend?

Accept the fact right now that in the beginning you will probably pay too much from time to time. Everybody does. Even experienced collectors go over the top once in a while! (This may make you feel a little better.) Of course, it's always nice to find a bargain, but if you see something you really want, and the price is affordable, then buy it and enjoy. In time, your experience will improve your collecting savvy and negotiating. Several genuine bargains later on will make up for those early mistakes.

There is no hard-and-fast list for radio values. There just are too many factors involved, such as appearance, working condition, documentation and historic value (i.e. owned by somebody famous). The values of radios seem to change as often as the wind direction. This is where your experience and research pays off in knowing what to spend.

The value of collectable radios is on the rise. If you buy wisely, you are actually making an investment! The good thing about this kind of investment is that you can enjoy using it while its value appreciates. For additional collecting tips visit my Web page at **http://www.eht.com/oldradio/arrl/index.html**.

K2TQN's Old Radio Museum Schedule for April 2000.

I'm planning to take my mobile Ham Radio Museum to the Penn-Del Hamfest 2000, host to the ARRL Delaware State Convention on Sunday April 30, 8 AM-1 PM at the Nur Temple in New Castle, Delaware. Look for my call letters on my hat, and say hello.— *K2TQN* QST

Collector Profile

One of the great things about Amateur Radio is its diversity. Another is how patiently it will wait for you while other interests, like jobs and family, occupy your time. When you are ready to return, Amateur Radio gladly accepts you back into the fold.

Stephen Aug, W3DEF, discovered this fact first hand. His ham radio experience started in 1953 as K2EOF. Like many of us, his teen-age years were exciting as he discovered radio. In the first eight to ten years he owned (and still has) a National NC-125 receiver, a Shure 55S and a D-104 microphone and a Bud FCC-90 100-kHz frequency calibrator.

Next came a busy career as a business reporter and editor at the old *Washington Star*. Radio took a back seat as he continued as a business and economics correspondent at ABC News. When the "ABC Early Morning News" started in July 1982, he began his long morning career. For 6 years he also participated on the "Business World" show, anchoring it for its final year and a quarter.

"Since I retired in 1995, I've become a lot more active in ham radio," Steve said. "Most of my time is spent with older rigs." In 1990 he began to collect, starting with a Collins 51J-4 receiver and 312-A-1 speaker. In refurbishing his radios he found that he needed to re-learn what he knew about vacuum tubes. He received much help from his friends, he said.

Since then he has added a B&W 5100-B transmitter with a 51SB-B phasing SSB generator. This along with the 51J-4 is one of his favorite stations, where he enjoys AM as well as vintage SSB operation.

"Changing bands on the B&W takes almost five minutes. There are about 19 dials, knobs and switches that must be manipulated if you're operating sideband," he said. "Phasing out the carrier with those tiny pots can be very challenging, but it's still fun."

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

COMING CONVENTIONS

SOUTHEASTERN VHF CONFERENCE

April 14-15, Marietta (Atlanta), GA

The Southeastern VHF Conference, sponsored by the Southeastern VHF Society, will be held at the Marriott Hotel Northwest, Windy Hill Rd; Exit 110 off I-75. Features include VHF-UHF technical presentations, antenna gain measurements, noise figure measurements, auction, flea market, vendors, exhibits, VE sessions, banquet (Saturday night, special guest speaker ARRL 1st Vice President Joel Harrison, W5ZN). Talk-in on 145.47. Admission is $30 in advance, $35 at the door. Tables are $5 per day. Contact Dick Hanson, K5AND, 7540 Williamsburg Dr, Cumming, GA 30131, 770-844-7002, **k5and@ga.prestigue.net**; **http://www.svhfs.org/svhfs**.

INTERNATIONAL DX CONVENTION

April 14-16, Visalia, CA

The International DX Convention, sponsored by the Southern California DX Club, will be held at the Holiday Inn Plaza, 9000 W Airport Dr. Features include DX forums, vendors, banquet with DXpedition speakers. Admission is $60 in advance, $65 at the door. Contact Cathy Gardenias, N6DXC, 1873 N Dundee St, Highland, CA 92346, 909-862-0720; **wu6d@dreamsoft.com**; **http://www.scdxc.org**.

ARKANSAS STATE CONVENTION

April 21-22, Little Rock

The Arkansas State Convention, sponsored by the Arkansas Radio Emergency Services and 9 other clubs, will be held at the Expo Center, Exit 126 off I-30 in SW Little Rock, near the Pulaski County line. Doors are open Friday 4-8:30 PM, Saturday 8 AM to 4 PM. Features include flea market, computer and equipment dealers, vendors, tailgating, special exhibits and displays, forums, technical table (test your own equipment), contests, foxhunts, Wouff Hong ceremony, ARES/RACES, VE sessions, handicapped accessible. Talk-in on 145.13. Admission is $7. Tables are $30 (8-ft, dealers), $20 (flea market, electric power $5 per outlet). Contact Jim Blackmon, K5VZ, 1008 Pine St, Arkadelphia, AR 71923-4919, 870-246-6734 or 870-246-7833, fax 870-246-6736, **k5vz@ezclick.net**; **http://www.aristotle.net/~ares/hamfest/**.

DELAWARE STATE CONVENTION

April 30, New Castle

The Delaware State Convention, sponsored by the Penn-Del ARC, will be held at the Nur Temple on Rte 13, 1/4 mile N of the intersection of Rtes 13 and 40. Doors are open for setup 6 AM; public 8 AM to 1 PM. Features include vendors, tailgating ($10 per space; first-come, first-served basis), certified SKYWARN spotter training class, VE sessions, ARRL and club leaders forum, refreshments. Talk-in on 146.955, 224.22. Admission is $5, under 12 free. Tables are $15 (with electricity), $12 (without electricity), includes vendor admission ticket; by reservation only (send payment to Penn-Del Hamfest 2000, Box 1964, Boothwyn, PA 19061). Contact Hal Frantz, KA3TWG, 302-793-1080, **hfrantz@snip.net**; **http://www.magpage.com/penndel**.

LOUISIANA STATE CONVENTION

May 5-6, Baton Rouge

The Louisiana State Convention, sponsored by the Baton Rouge ARC, will be held at the Baker Municipal Auditorium, 3325 Groom Rd (Baker), approximately 6 miles N of Baton Rouge, just off Hwy 19. Doors are open Friday 5-8 PM, Saturday 8 AM to 4 PM. Features include flea market, tailgating (limited space available), forums (technical, ARRL, MARS), VE sessions (Saturday noon). Talk-in on 146.79. Admission is $4 in advance (until Apr 25), $5 at the door. Tables are $15. Contact Herb Ramey, W5LSU, Box 68, Greenwell Springs, LA 70739, 225-654-6087 or 800-256-3378, **w5lsu@worldnet.att.net**; **http://www.brarc.org**.

ALABAMA SECTION CONVENTION

May 6-7, Birmingham

The Alabama Section Convention, sponsored by the Birmingham ARC, will be held at the Zamora Temple, 3521 Ratliff Rd; I-459, Exit 27, follow signs; or Exit 135 off I-20. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 4 PM. Features include flea market (Ellis Dobbins, K4LI, 205-608-1866), commercial vendors (Eddie Oliver, KD4BWW, 205-956-9636), tailgating (Dan Morgan, KB4MDI, 205-822-5242), exhibitors, forums, VE sessions, banquet (Pam Hopson, KF4ANJ, 205-497-7293). Talk-in on 146.88. Admission is $5 (good for both days), under 12 free when accompanied by an adult. Tables are $30 (vendors), $20 (flea market). Contact Glenn Glass, KE4YZK, 205-681-5019, **ke4yzk@bellsouth.net**; **http://www.bro.net/barc/fest.html**.

March 24-25
Maine State, Lewiston*
West Gulf Division, Tulsa, OK*

March 25-26
Maryland State, Timonium*

April 9
North Carolina State, Raleigh*

May 13-14
Washington State, Yakima

May 27-28
Wyoming State, Casper

June 2-3
Georgia Section, Atlanta
Midwest/Dakota Division, South Sioux City, NE

June 2-4
Northwestern Division, Seaside, OR

June 9-10
Texas State, Arlington

June 10
Eastern Pennsylvania Section, Bloomsburg

*** See March *QST* for details.**

The ARRL National Convention: Dayton, OH, May 19-21

Be a part of Amateur Radio history! Join hams and League officials from across the country at the 2000 ARRL National Convention to be held at the Hara Arena, Dayton, OH, May 19-21. The event is sponsored by the Dayton Amateur Radio Association. This is one Hamvention you'll not want to miss! For convention information, call 937-276-6930; or write **info@hamvention.org**; or see **http://www.hamvention.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. QST

VHF/UHF CENTURY CLUB AWARDS

Bill Moore, NC1L
Century Club Manager

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators (indicated in *italics*) for each band listing. The numbers preceding the call signs indicate total grid squares claimed. The numbers following the call signs indicate the claimed endorsement levels. The totals shown are for credits given from December 11, 1999 to February 3, 2000.

The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on the Web at **http://www.arrl.org/awards/vucc/**. Please send an SASE if you cannot download the forms online. If you have questions relating to VUCC, send an e-mail to **vucc@arrl.org**.

50 MHz
100

1039	VE6PY
1040	KB9TLV
1041	KC8LGL
1042	KB0STN
1043	N9RG
1044	N1ZUK
1045	N3YPJ
1046	N3ZTZ
1047	WD8Q
1048	K8KFJ
1049	WB2WIH
1050	KF4LVF
G8BQX	425
N5MYH	150
VE6NTT	250
WB0ULX	250
KC7IJ	475
WA1ECF	325
W1WHL	425
WB2WIH	200
K2CS	225
N3KFV	200
K3HZO	325
W4WTA	500
KM4H	275
K5LOW	200

144 MHz
100

570	N0DQS
571	W1LP
572	W6OUF
N2WK	275

432 MHz
50

279	N6RMJ

902 MHz
25

28	K8TQK

1296
25

131	K8TQK
K3HZO	90
WW8M	85

5.7 GHz
5

42	K8DAZ

10 GHz
5

103	WA0QII/G

Satellite
100

94	KF8VX
VE6SWC	175
K5OE	250
WA5VKS	175
KC7QFS	350
KF8VX	225

QST

Gail Iannone ♦ Convention Program Manager

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 **April 1** to be listed in the **June** 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.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

†**Alabama (Albertville)—Apr 15,** 8 AM to 3 PM. *Spr:* Marshall County ARC. Albertville Recreation Center, 915 W McKinney Ave. VE sessions. *TI:* 147.2. *Adm:* $5. Tables: $8. Buddy Smith, KC4URL, 102 George Washington Dr, Boaz, AL 35957, 256-593-2516; **kc4url@hiwaay.net**.

Alabama (Birmingham)—May 6-7, Alabama Section Convention. See "Coming Conventions."

†**Alabama (Moulton)—Apr 29;** set up 7 AM; public 9 AM to 4 PM. *Spr:* Bankhead ARC. H. A. Alexander Park, 1 mile W of Moulton on Court St. VE sessions (promptly at 9:15 AM; bring original license, photo ID, CSCE, $7). *TI:* 146.96, 442.425. *Adm:* $4. Tables: $6 (Mike Slayton, 256-341-0073). Lee Creuzer, N8MHC, c/o Bankhead ARC, 215 County Rd 599, Moulton, AL 35650, 256-351-7916, **N8MHC1@CS.COM**; **http://www.n4idx.org**.

†**Arizona (Sierra Vista)—May 6;** set up 6 AM; public 7 AM to 4 PM. *Spr:* Cochise ARA. Green Acres Hqtrs and Antenna Farm, 2756 Moson Rd; from the intersection of Fry Blvd and State Hwys 90 and 92 (at the Target store), go E on Hwy 90 (an extension of Fry Blvd), 4 miles to Moson Rd, go S (right) on Moson Rd for 2 miles, Antenna Farm on right. VE sessions (9 AM), vendors, tailgating ($5), refreshments. *TI:* 146.76 (162.2 Hz), 147.02 (162.2 Hz), 449.525 (100 Hz), 146.52. *Adm:* $2 (includes parking). Tables: outside $5, inside $7. Dale Tongue, KA7IQV, 520-458-5051.

Arkansas (Bentonville)—Apr 29. Jess Weiberg, N0POC, 417-435-2332.

Arkansas (Little Rock)—Apr 21-22, Arkansas State Convention. See "Coming Conventions."

Arkansas (Siloam Springs)—May 6. Kathie Engelke, KD5EYX, 501-524-2969.

†**California (Fresno)—Apr 29**, 8 AM. *Spr:* Fresno ARC. Coombs Ranch, Ave 12 (Madera); from Hwy 99 exit E on Ave 12, proceed approximately 1 mile after crossing Hwy 41, on right. Swap tables, BBQ lunch. *TI:* 146.94. *Adm:* Free. Jim Haynes, W6PXM, 1781 Holland Ave, Clovis, CA 93611, 559-294-8390; **w6pxm@arrl.net**.

†**California (Sonoma)—Apr 29;** set up 7 AM; public 8 AM to noon. *Spr:* Valley of the Moon ARC. Sonoma Valley Veteran's Memorial Building, 126 First St W, 1 block N of the central Sonoma Plaza, Hwy 12. Electronics swapmeet ($10 per space), VE sessions (walk-ins, register 9 AM, exams 10 AM, all license elements), forums, operating QRP station, display of homebuilt equipment, beginner's DF hunt, refreshments. *TI:* 145.35 (88.5 Hz). *Adm:* Free. Darrell Jones, WD6BOR, 358 Patten St, Sonoma, CA 95476; 707-996-4494.

California (Visalia)—Apr 14-16, International DX Convention. See "Coming Conventions."

†**Colorado (Monument)—May 6,** 8 AM to 2 PM. *Spr:* Pikes Peak RA Assn. Lewis Palmer High School, 1300 E Higby; I-25 N, Exit 158 (Baptist Rd), right (E) on Baptist Rd for 50 ft, then N to Struthers Rd to Higby Rd, turn right (E) to school. Programs, operating stations, VE sessions. *TI:* 146.97 (100 Hz), 146.52. *Adm:* $4, under 18 free. Tables: $12 (for first table with one free admission), $10 each additional table. Robert Ryals, KI0GF, 3390 Blodgett Dr, Colorado Springs, CO 80919, 719-265-9950, **rryals@pcisys.net**; **http://www.qsl.net/ppraa/swapfest.htm**.

Delaware (New Castle)—Apr 30, Delaware State Convention. See "Coming Conventions."

†**Georgia (Calhoun)—Apr 22,** 8 AM to 2 PM. *Spr:* Cherokee Capital ARS. Sugar Valley Community Center; exit I-75 at Exit 320, travel W 4.2 miles to Hill City Rd, turn left, travel 1.3 miles, turn left, go .9 miles to hamfest. Tailgating, VE sessions, refreshments. *TI:* 145.23. *Adm:* $5. Tables: $5. James Howard, WQ4T, 171 Brian Dr SW, Calhoun, GA 30701, 706-625-0508; **kr4cg@nwga.com**.

Georgia (Marietta/Atlanta)—Apr 14-15, Southeastern VHF Conference. See "Coming Conventions."

†**Idaho (Idaho Falls)—Apr 22,** 8:30 AM. *Spr:* Eastern Idaho UHF Society. Elks Lodge, 640 E Elva St; Yellowstone Hwy N to Elva St, turn right (E) on Elva, lodge on right side of road. Hamfest and Computer Swapmeet, VE sessions (all license classes), two DX talks by Bill Frede, W7II. *TI:* 147.15, 443.0. *Adm:* advance $2, door $3. Tables: advance $5, door $7 (includes 1 admission). Jay Greenberg, WA4VRV, 2582 Granite Way, Idaho Falls, ID 83402, 208-524-1388 or 208-526-7033, **wa4vrv@srv.net**; **http://www.srv.net/~wa4vrv/hamfest.htm**.

†**Illinois (Arthur)—Apr 30,** 8 AM to 1 PM. *Spr:* Moultrie ARK. Moultrie/Douglas County Fairgrounds, SE edge of Arthur, S of Rte 133, behind high school. *TI:* 146.655, 444.275. *Adm:* $5, under 14 free. Tables: 8-ft $10 (paid in advance). Ralph Zancha, WC9V, c/o MARK, Box 91, Lovington, IL 61937, 217-543-2178 or 217-873-5287, **rzancha@one-eleven.net**.

†**Illinois (Galva)—Apr 30.** *Spr:* Area Amateur Radio Operators. Galva National Guard Armory, Morgan Rd; Exit 27, S 17 miles off I-80, 2nd street in city limits, turn right (W), go 1 block. Outdoor flea market, VE sessions. *TI:* 145.49 (88.5 Hz). *Adm:* advance $5 (2 stubs), door $5 (1 stub). Tables: 8-ft $10. Bill Anderson, WA9BA, 920 W Division St, Galva, IL 61434, 309-932-3023; **bill@inw.net**; **http://www.qsl.net/aaro/index.html**.

†**Illinois (Sandwich)—May 7;** set up 6 AM; public 8 AM to 1 PM. *Spr:* Kishwaukee ARC. Sandwich Fairgrounds, just N of Rte 34 intersection of Suydam and Gletty Rds. Vendors, free tailgating, overnight camping (electric hookup $10), refreshments. *TI:* 146.73, 146.52. *Adm:* advance $5 (double stub), door $6 (single stub). Tables: 8-ft $10. Bob Yurs, W9ICU, 1107 Commercial St, Sycamore, IL 60178, 815-895-3219, fax 815-895-7584, **w9icu@tbcnet.com**; **http://tbcnet.com/~jleonard/hamfest.htm**.

†**Illinois (Stickney)—Apr 29;** set up Friday 3-6 PM, Saturday 6 AM; public 8 AM to 2 PM. *Spr:* DuPage ARC. Hawthorne Race Course, 3500 S Cicero Ave. Hamfest/Computer Show, indoor commercial dealers, outdoor flea market, electronics, computers, ham equipment, free tailgating, VE sessions (9 AM to noon, all classes), handicapped accessible, free parking, refreshments. *TI:* 145.25. *Adm:* advance $5, door $6, under 12 free. Tables: $20. Ed Weinstein, WD9AYR, 7511 Walnut Ave, Woodridge, IL 60517, 630-985-9256, **darchamfest@aol.com**; **http://www.w9dup.org**.

†**Iowa (Des Moines)—Apr 29;** set up Friday 6-10 PM, Saturday 6:30-7:30 AM; public 8 AM to 1 PM. *Spr:* Des Moines RAA. Iowa State Fairgrounds; I-235 to University Ave to East 30th to Grand Ave, Fairgrounds main entrance. Vendors, free tailgating, forums, VE sessions (all classes). *TI:* 146.94. Duane Bower, WB0UCY, 207 SE Diehl Ave, Des Moines, IA 50315, 515-287-6542; **duaneab@uswest.net**.

†**Kentucky (Elizabethtown)—Mar 25,** 8 AM to 2 PM. *Spr:* Lincoln Trail ARC. Pritchard Center, 404 S Mulberry; Exit off I-65 to Hwy 62 W. New and used vendors, VE sessions, refreshments. *TI:* 146.98. *Adm:* advance $4, door $5. Tables: $7 (includes 1 chair). Archie Mack, AF4EB, 102 Primrose Ln, Radcliff, KY 40160, 270-351-6931, **amack1@prodigy.net**; **http://www.qsl.net/w4bej**.

†**Kentucky (Louisa)—May 6,** 9 AM to 3 PM. *Spr:* Big Sandy ARC. Louisa Middle School, Bulldog Ln; off US 23 to Rte 3, go to Rte 644, 1/2 mile on left, across from Three Rivers Hospital, by football field. ARES forum, SSTV demo, NOAA-WX, speakers (KY SM and ASM), refreshments. *TI:* 147.39. *Adm:* $2. Tables: $3. Fred Jones, WA4SWF, 511 N Lackey Ave, Louisa, KY 41230, 606-638-9049, **wa4swf@arrl.net**; **http://www.qsl.net/wa4swf/**.

†**Kentucky (Murray)—Apr 22,** 8 AM to 1 PM. *Spr:* Murray State University ARC. National Guard Armory, State Hwy 121 N; 1 mile N of Murray. VE sessions (10 AM). *TI:* 146.94. *Adm:* $5 (nonham spouses and children free with paid ham admission). Tables: advance, before Apr 15, $10 (first), $7 (second), $5 (each additional); door $12 (first), $9 (second), $7 (each additional). Billy Miller, KB9RPO, 2490 University Station, Murray, KY 42071-3301, 270-762-6433 or 618-244-1179, **billy.miller@murraystate.edu**; **http://www.mursuky.edu/clubs/msuarc/hamfest/ham-fest.htm**.

Louisiana (Baton Rouge)—May 5-6. Louisiana State Convention. See "Coming Conventions."

Maryland (Grasonville/Kent Island)—May 6. Ray Allen, W2KBR, 410-969-8042**.**

†**Maryland (Hagerstown)—May 7,** gates 6 AM, building 8 AM. *Spr:* Antietam Radio Assn. Hagerstown Community College Recreation Center; from I-70 take Exit 32B to Edgewood Dr, turn right at Home Federal Bank, college entrance is located approx 1.4 mi on left, follow signs. Hamfest/Computer Show, commercial vendors, paved tailgating ($5 per space plus admission), new and used computers and supplies, ATV seminar, ARRL forum, VE sessions (8:30 AM, 2nd floor of Recreation Center, walk-ins accepted; Greg Lanham, WA4VE, 540-772-4792, **kuan@visuallink.com**), refreshments. *TI:* 146.94, 147.09. *Adm:* $5, under 13 free. Tables: advance $10, door $15. Tina Jones, KB8ZQM, 1164 Halltown Rd, Harpers Ferry, WV 25425, 304-728-7769, fax 304-728-3024, **kb8zqm@intrepid.net**; **http://www.qsl.net/w3cwc**.

Massachusetts (Cambridge)—Apr 16. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Michigan (Cadillac)—May 6,** 8 AM to 2 PM. *Spr:* Wexaukee ARC. Cadillac Jr High School, 800 Chestnut; US 131 to Cadillac, turn W at Pine St, go 3 blocks to School. Net meetings, VE sessions. *TI:* 146.98. *Adm:* $5. Tables: $6 (8-ft). Alton McConnell, NU8L, 4189 48 Rd W, Cadillac, MI 49601, 231-862-3774; **amcconnell3@hotmail.com**.

†**Michigan (Grosse Pointe Woods)—Apr 16,** 8 AM to 2 PM. *Spr:* South Eastern Michigan ARA. Grosse Pointe North High School, 707 Vernier Rd, exit I-94 at Vernier Rd Exit, go E approximately 2 miles, between Mack Ave and Lakeshore Rd. Trunk sales ($10 per space plus admission; first-come, first-served), VE sessions (Donald Olszewski, WA8IZV, 810-294-1567; **donols@privide.net**), forums, handicapped parking, free parking, refreshments. *TI:* 146.74. *Adm:* advance $5, door $6. Tables: 8-ft $15. Jerry Rosner, N8FGK, Box 646, St Clair Shores, MI 48080-0646, 313-331-3336, **n8fgk@amsat.org**; **http://members.home.net/semara**.

†**Minnesota (Blaine)—Apr 15.** *Spr:* Robbinsdale ARC. National Sports Center, 1700 105th Ave NE;

†ARRL Hamfest

Hwy 65 N to 105th Ave; or 35 W to Exit 32, follow signs to National Sports Center. Flea market, VE sessions. *TI:* 147.0. *Adm:* advance $6, door $8. Tables: advance $18. Harriet Johanson, KB0UPG, 19000 Clearview Dr, Minnetonka, MN 55345, 612-474-7346 or 612-537-1722, **k0ltc@visi.com**; **http://www.visi.com/~k0ltc**.

Minnesota (Shakopee)—Apr 16. Dave Zellman, WB0YDF, 612-466-5852.

†**Missouri (Joplin)—Apr 15;** set up Friday 6-10 PM, Saturday 6-8 AM; public 8 AM to 3 PM. *Spr:* Joplin ARC. John Q. Hammons Trade Center, 3615 Range Line Rd; from I-44, Exit 8-B (Business US 71), right at first street, go 1/4 mile E, next door to Holiday Inn. Vendors, dealers, VE sessions (walk-ins welcomed). *TI:* 147.21. *Adm:* $5, under 12 free when accompanied by paying adult. Tables: private $10, commercial $20. Ray Brown, KB0STN, c/o JARC, Box 2983, Joplin, MO 64803-2938, 417-781-4967, **raybrown@ipa.net**; **http://www.joplin-arc.org**.

Nebraska (Omaha)—Apr 15. Todd LeMense, KK0DX, 402-397-7465.

New Hampshire (Henniker)—Mar 26. Jock Irvine, N1JI, 603-428-3476 (x256).

†**New Jersey (Hamilton Twp/Trenton)—Apr 9;** sellers 6:30 AM, buyers 8 AM. *Spr:* Delaware Valley Radio Assn. Tall Cedars of Lebanon picnic grove, Sawmill Rd; I-95 N to I-295 S, Exit 60A to I-195 E, Exit 2 to Yardville, S Broad St to end, approximately 3.7 miles, left at Yield onto Old York Rd, next right onto Sawmill Rd, site is 1.1 miles on right. Tailgating ($10 per space, includes 1 admission), ARRL table, free parking, refreshments. *TI:* 146.67. *Adm:* $6, nonham spouses and children free. Tables: covered space $15 (includes 1 table and 1 admission). Darryl Foyuth, N2JVP, c/o DVRA, Box 7024, W Trenton, NJ 08628, 609-882-2240, **dfoyuth@juno.com**; **http://www.slac.com/w2zq**.

New Mexico (Albuquerque)—Apr 29. Chuck Opdyke, KC5GA, 505-858-0306.

†**New York (Poughkeepsie)—Apr 30;** sellers 6 AM, buyers 8 AM to 2 PM. *Spr:* Mt Beacon ARC. John Jay High School, Rte 52 (Fishkill); Exit 15 off I-84, turn right on Lime Kiln Rd, left onto Rte 52; school is on left after passing Hudson Valley Research Park. Large indoor and outdoor location, computers, electronics, tailgating ($6 per space), VE sessions (all license classes), refreshments. *TI:* 146.97. *Adm:* $5, spouses and kids free. Tables: advance $10, door $12 ($4/spot discount if you bring your own table). Ken Akasofu, KL7JCQ, 8C Hudson Harbor Dr, Poughkeepsie, NY 12601, 914-485-9617, fax 914-485-2402, **kl7jcq@arrl.net**; **http://www.mbarc.org**.

†**New York (Yonkers)—May 7;** set up 7 AM; public 9 AM to 3 PM. *Spr:* Metro 70cm Network. Lincoln High School, Kneeland Ave; Exit 2 (N) NYS Thruway to Yonkers Ave, go W to St Johns Ave, left to Theresa Ave, right to school. Giant electronic indoor flea market, vendors, VE sessions, free parking, unlimited free coffee. *TI:* 146.91, 440.425 (156.7 Hz), 223.76 (67 Hz), 145.27 (79.7 Hz). *Adm:* $6, under 12 free. Tables: advance $19, door $25. Otto Supliski, WB2SLQ, 53 Hayward St, Yonkers, NY 10704, 914-969-1053; **wb2slq@juno.com**.

†**North Carolina (Morganton)—Apr 15,** 8 AM to 4 PM. *Spr:* Catawba Valley Hamfest Committee. Burke County Fairgrounds, Hwy 181 N. Catawba Valley Hamfest and Computer Fair, flea market, dealers (Larry Withrow, AF4HX, 828-738-8529; **af4hx@worldnet.att.net**), ARES, SKYWARN, packet (APRS) demo, free parking, refreshments. *TI:* 147.15, 146.745. *Adm:* advance $4, door $5. Tables: 1 table free with 10×10-ft space, additional tables $10 each. Tom Taylor, KC4QPR, Box 8003, Morganton, NC 28680-8003, 828-433-6205, **kc4qpr@vistatech.net**; **http://www.wp.cc.nc.us/~cvhamfest/**.

†**Ohio (Athens)—Apr 30,** 7 AM to 2 PM. *Spr:* Athens County ARA. Athens Recreation Center, 733 E State St; E on E State St, exit off US Rte 33, go 1/4 mile to signs indicating parking. Flea market, exhibits, commercial vendors, refreshments. *TI:* 145.15. *Adm:* $5, nonham spouses free. Tables: advance $8, door $10 (outdoor flea market free). John Cornwell, NC8V, 15100 Scatter Ridge Rd, Athens, OH 45701, 740-593-6474; **jcornwell@eurekanet.com**.; **http://www.seorf.ohiou.edu/~xx017/hamfest.html**.

Ontario (Ottawa/Stittsville)—May 6. John Barnhardt, VE3ZOV, 613-521-8910.

Oregon (Eugene)—May 6. Karl Fuller, K7ARL, 541-942-1624.

†**Pennsylvania (Washington)—Apr 30,** 8 AM to 3 PM. *Spr:* WACOM. County Fairgrounds, Arden Downs; from PA Turnpike go S on Rte 79 to Meadow Lands Exit, right to light, left to next light, right to stop sign, right to Fairgrounds. VE sessions. *TI:* 145.49. *Adm:* $3. Tables: $8. Dave DeMotte, N3IDH, 1696 E Maiden St, Washington, PA 15301, 724-228-8178; **n3idh@bellatlantic.net**.

†**Pennsylvania (Wrightstown/Bucks County)—May 7.** *Spr:* Warminster ARC. Middletown Grange Fairgrounds, Penns Park Rd; N on Rte 232 to Penns Park Rd. VE sessions. *TI:* 147.09. *Adm:* advance $6, door $7. Tables: advance $10, door $12. Roy Conners, K3TEN, 232 Barnsley Ave, Huntingdon Valley, PA 19006, 215-947-9373, fax 215-947-7237, **k3ten@arrl.net**; **http://www.voicenet.com/~k3dn**.

†**South Carolina (Greenville)—Apr 29,** 8 AM to 3 PM. *Spr:* Blue Ridge ARS. Spartanburg County Fairgrounds, 275 Bishop St (Spartanburg); I-85 to Exit 79, turn toward Spartanburg, after passing under Business I-85, turn right at 2nd light, then left at first light, Bishop St is approximately 1/2 mile on right, follow signs. Large outdoor tailgating area, indoor vendor area, dealers (John Chism, ND4N, 864-967-0001, **nd4n@arrl.net**), exhibitors, RV camping, VE sessions, plenty of parking. *TI:* 146.61. *Adm:* advance $4, door $5. Tables: $11, electricity $5, chair $1. Bob Watson, W4RGW, 501 Ferguson St, Clinton, SC 29325, 864-833-2204, **w4rgw@arrl.net**; **http://www.brars.org**.

†**South Carolina (Windsor)—Apr 29,** 9 AM to 4 PM. *Spr:* Salkehatchie ARS. Community Center; take Hwy 78 and when it forks, take right turn towards Aiken, site is a few miles. Tailgating ($5), BBQ plates with all the fixings ($5). *TI:* 147.03 (156.7 Hz). *Adm:* Free. Adam Hoffman, KG4BZH, Box 93, Bamberg, SC 29003, 803-245-4673, **kg4bzh@yahoo.com**; **http://www.qsl.net/kf4cvo**.

†**Texas (Abilene)—May 6-7;** Saturday 8 AM to 5 PM, Sunday 9 AM to 2 PM. *Spr:* Key City ARC. Abilene Civic Center, 1100 N 6th and Pine St; I-20 to Pine St Exit, S on Pine to the intersection of Pine and N 6th, Civic Center on NW corner. VE sessions, limited RV parking ($5 per night), foxhunt (Saturday night), on site T-hunts, handicapped accessible, free parking, refreshments. *TI:* 146.76. *Adm:* advance $7 (must be received by May 1), door $8. Tables: $6. Peggy Richard, KA4UPA, 1442 Lakeside Dr, Abilene, TX 79602, 915-672-8889; **ka4upa@arrl.net**.

Texas (Belton/Temple)—Apr 29. Mike LeFan, WA5EQQ, 254-773-3590.

Texas (Weatherford)—Mar 25. Elizabeth Hunkele, N5ONE, 817-594-1700.

†**Virginia (Chesapeake)—Apr 15;** set up 6:30-7:30 AM; public 8 AM to noon. *Spr:* Chesapeake AR Service. Civitan Acres, 2210 Cedar Rd; 2.3 miles E on Cedar Rd from US Rte 17; 1.5 miles W on Cedar Rd from US Rte 104. Ham Radio and Boat Anchor Tailgate ($5, includes admission; bring your own tables), acres of space, parking. *TI:* 146.61. *Adm:* $5. Sonny Hood, K4WYS, 2125 Arbutus Cir, Chesapeake, VA 23323, 757-487-0357, **wrhood@exis.net**; **http://www.qsl.net/cars**.

†**Wisconsin (Cedarburg)—May 6;** set up 6:30 AM; public 8 AM to 1 PM. *Spr:* Ozaukee RC. Circle-B Recreation Center, intersection of Hwy 60 and County I, 20 mi N of Milwaukee, W of Grafton. Swapfest, VE sessions (exams 9 AM), free parking, refreshments. *TI:* 146.97, 146.52. *Adm:* $4. Tables: $5 (4-ft, limited power available on request). Send SASE to Joe Holly, AA9HR, 1702 Holly Ln, Grafton, WI 53024, 262-377-2137, **aa9hr@execpc.com**; or Skip Douglas, 262-284-3271.

†**Wisconsin (Superior)—May 6, 10** AM to 2 PM. *Spr:* Arrowhead RAC. Multi-use Building, Head of the Lakes Fairgrounds; take I-35 (Duluth, MN) to US 2/Bong Bridge (goes to Superior, WI), left on Belknap, right on Tower, approximately 2 mi to Fairgrounds, turn left. VE sessions (11 AM). *TI:* 146.94, 147.0. *Adm:* $5. Jim Nielson, KB9RQD, 1115 N 18th St, Superior, WI 54880, 715-392-3697, **jnielson@bresnanlink.net**; or Bud Fisher, KB0SBL, 315 William St, Cloquet, MN 55720, 218-879-9284, **kb0sbl@cp8internet.com**.

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

WINDOWS LOGGING PROGRAM FROM DATAMATRIX

◊ Datamatrix announces the release of *ProLog2K*, a *Windows*-based Amateur Radio contact logging program.

Prolog2K will monitor and track your progress towards most of the major awards, such as DXCC, WAC, WAS,WAZ and IOTA, for nearly any mode—including PSK31. You can also custom design up to 16 additional award trackers.

The program supports CDROM call sign databases, including Call Book, Buckmaster, QRZ and SAM, and can place information from them into the logging form. *Prolog* can also pull in QSL routing data from an optional QSL Route Database that currently includes over 71,000 DX listings.

The new software will allow the creation of up to 36 separate logbooks—very handy for multi-operator families, special event logging, or for QSL manager applications for example.

PacketCluster spotting is fully supported using TNC or Internet connections—and can provide an audible alert when a DX spot arrives from a new prefix, zone or continent. With radio/computer interfacing, the band and mode data for logging will be automatically updated as you tune. Some radio control operations can also be accessed from within the program.

Extensive award progress tracking and reporting, QSL label generation and ADIF format file import and export capabilities are also featured.

System requirements for *ProLog2K* are quite minimal. It will run in a *Win 95/98/2000* or *NT* environment. A logbook containing 5000 contacts and awards files will typically occupy approximately 2 MB of hard disk space. The optional QSL Route Database requires about 13 MB of additional hard disk space. If you intend to run both rig control and a TNC-based packet connection simultaneously, you will need two dedicated serial ports.

Price: *ProLog2K*, $49; *ProLog2K* with QSL Route Database, $64. Shipping is additional. For more information contact Datamatrix, 5560 Jackson Loop NE, Rio Rancho, NM 87124; tel 800-373-6564 (orders); 505-892-5669; **prolog@rt66.com**; **http://www.qth.com/prolog**. QST

CONTEST CORRAL

Feedback

In the **1999 ARRL International DX Phone contest, W7FB** was listed incorrectly as W7FP.

In the **1999 IARU HF World Championships**, a corrupt log file caused the **VA7RR (VE7SZ, op)** score to be under-reported. The correct score was 2,303,070 points based on 2504 QSOs and 210 multipliers. This moves him from 10th place to a **2nd place** finish overall, and also makes him the top score among W/VE stations in the Phone Only category. **R1MV** should have been listed as a Multi-Multi Headquarters station, making **H20A** the first place Multi-Single World station.

In the **1999 September VHF QSO Party**, **KA1ZE** should have been reported in the Western PA section and **N2GKM/R** shown in the Atlantic division. This makes KA1ZE the Atlantic division Single Op winner and **N2MH** the Hudson division rover winner. This also moves **K1UHF** into **First Place** as Single Op New England division.

W1AW Qualifying Runs are 9AM EST Tuesday, April 4, and 4 PM EST Wednesday, April 19. The K6YR **West Coast Qualifying Run** will be at 9 PM PST on Wednesday, April 5. Check the W1AW schedule for details.

April

1-2

EA RTTY Contest, sponsored by Union de Radioaficionados Espanoles, from 1600Z Apr 1 until 1600Z Apr 2. 80 40 20 15 10 meters, single op all band and single band and multiop all band. Send RST and CQ Zone (EA stations send RST and province prefix). Everyone works everyone. Score 1 pt/ QSO on 20, 15 and 10 meters within your own continent; 2 pts/QSO on 20, 15 and 10 meters outside your continent; 3 pts/QSO on 80 and 40 meters within own continent; and 6 pts/QSO on 80 & 40 meters outside your continent. Contacts within your own DXCC country are valid for multipliers, but not for points. Final score is QSO points × DXCC countries (including EA, EA6, EA8, EA9) and EA provinces worked per band. Awards. Send logs by June 30 to EA RTTY Contest Manager, Antonio Alcolado, EA1MV, PO Box 240, E-09400 Aranda de Duero, Burgos, Spain; **alcolado@redestb.es**.

SP DX Contest, sponsored by the Polski Zwiasek Krotkofalowcow (PZK), 1500Z Apr 1 to 1500Z Apr 2. Phone and CW, 160 80 40 20 15 10 meters. Single operator, all band or single band, mixed mode, phone only or CW only; multioperator (multiband, mixed mode only). Non-Polish stations send a RST and 3-digit QSO number. Polish stations send RST plus two-letter province designator. Work stations once per band and mode. Count 3 pts/SP-station QSO. Multipliers are provinces (49 max). Final score is QSO points × multipliers. Awards. Mail entries by Apr 30 to PZK, SPDX Contest Committee, PO Box 320, 00-950 Warszawa, Poland; **spdxc-logs@writeme.com**; **http://dendro.sggw.waw.pl/sp5zcc/spdxc/spdxc.htm**.

500th Anniversary of Brazil Discovery Contest, sponsored by Rede dos Emissores Portugueses, 0000Z April 1 to 2400Z April 2, 80 40 20 15 10 meters. SSB only. Exchange signal report and district for Portuguese stations; signal report and state for Brazilian stations; signal report and serial number starting at 001 for everyone else. Count 3 points for each Brazilian or Portuguese station. Multipliers are the total numbers of different districts or states on each band. Final score is total QSO points x total multipliers. Awards. Send logs by May 31 to: Rede dos Emissores Portugueses, c/p Awards and Contest Manager, PO Box 2483, 1112 Lisboa, Portugal.

7-9

Japan International DX Contest, CW. High-band portion (20-10 meters). See January 2000 *QST*, p 100.

QRP ARCI Spring QSO Party, CW, sponsored by QRP ARC International, from 1200Z Apr 8 until 2400Z Apr 9. Single band, all band, high band (20 15 10 6 meters) or low band (160 80 40 meters). Operate 24 hours max. Work stations once per band. Send signal report, state/province/DXCC country and ARCI number (if member), or power output (if nonmember). 1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.128 MHz. Score 5 pts/ QSO with ARCI member, 2 pts/QSO with nonmember on same continent and 4 pts/QSO for nonmember, different continent. Final score is QSO points x states/provinces/DXCC countries x power multiplier (0-250 mW, × 15; 250 mW to 1 W, × 10; 1-5 W output × 7; < 5 W × 1). Team competition. Awards. Mail entry (SASE for results) to QRP ARCI Contest Manager, Randy Foltz, K7TQ, 809 Leith St, Moscow, ID 83843; **rfoltz@turbonet.com**; **http://www.qrparci.org/**.

His Majesty the King of Spain Contest, sponsored by Union de Radioaficionados Espanoles, 1800Z Apr 8 to 1800Z Apr 9, Single operator, multioperator and SWL. Phone and CW are separate contests and require separate logs. 80 40 20 15 10 meters. Exchange RST and serial number, Spanish stations send RST and province. Count one point per QSO. Non-Spanish stations only work Spanish stations; Spanish stations work everyone. Multipliers are Spanish provinces on each band. Final score is total QSO points × total multipliers. Awards. Send logs by May 14 to URE Contest Manager, PO Box 220, 28080 Madrid, Spain; **ure@ure.es**.

10

VHF/UHF Spring Sprints, sponsored by the East Tennessee DX Association, 144 MHz, 7 PM to 11 PM local time on Mon, Apr 10. (Other Spring Sprint dates are 222 MHz on Tue, Apr 18; 432 MHz on Wed, Apr 26; 902 MHz/1296 MHz/2304 MHz on Sat, May 6; and 50 MHz on Sat-Sun, 2300Z, May 13 to 0300Z May 14.) The 902 MHz, 1296 MHz, and 2304 MHz Sprints will run simultaneously on Sat, May 8, 6 AM to 1 PM local time; you may work any five consecutive hours during this time period. The 902, 1296 and 2304 MHz Sprints are separate, but run concurrently. The usual VHF/UHF rules apply. Exchange grid-square locations (see Apr 1994 *QST*, p 87). Signal reports are optional. Score 1 pt per valid QSO. Final score is QSO pts × grid squares. Contests are separate; there is no accumulation of scores. The official entry forms, found in the *1998 ARRL Contest Yearbook*, are recommended. Logs must indicate time, call sign and complete exchange for each valid QSO. Multipliers must be clearly marked in the log. Submit separate log and summary sheets for each Sprint entered. Awards. Mail entries to: East Tennessee DX Assn, 1620 Hidden Hills Dr, Clinton, TN 37716.

15-17

The TARA PSK31 Rumble, sponsored by the Troy ARA. 0000 through 2400Z, Apr 15, PSK31 only. 80, 40, 20, 15, 10 and 6 meters. Work stations once per band. Exchange name, state/province; DX send DXCC prefix. Operate 1 of 5 categories: *Normal*, 100 W max; *Great*, 20 W max; *Super*, 5 W max; *Novice* or *SWL*. Final score is QSOs × (W + VE + JA + VK call areas + 1 point per DXCC entity including your own). Multipliers count once per band. To be valid, scores must be received via our online score submission form found at **http://www.qsl.net/wm2u/score.html**. Logs must be available for review if requested. Entries must be received by 30 April 2000. Please read rules for exact contest frequencies and other information on the Web at **http://www.qsl.net/wm2u/rumble.html** or **http://www.n2ty.org**.

Michigan QSO Party, sponsored by the Mad River Radio Club, from 1600Z April 15 until 0400Z April 16. Stations may operate the full 12 hours. Phone and CW. 80 40 20 15 10 meters. Single op, multiop and mobile; only one transmitted signal at a time. Work stations once per band and mode. MI-to-MI QSOs allowed. Work portables and mobiles again as they change county, state or province. Exchange QSO number and QTH (county for MI stations, state/province/DXCC country for others). CW—3.545 7.045 14.045 21.045 28.045; phone—3.850 7.225 14.250 21.300 28.450. Count 1 pt per phone QSO and 2 pts per CW QSO. Count multipliers once per mode. Multipliers are MI counties for all entries, plus states and provinces for MI entries. Power multipliers: ×5 < 5 W; ×2 100 W; ×1 >100 W. Final score = QSO points × power multiplier × total mults. Awards. Mail logs no later than 30 days after the contest to Mad River Radio Club, c/o Dave Pruett, 2727 Harris Road, Ypsilanti, MI 48198; **mqp@contesting.com**; **http://www.qsl.net/mrrc/mqp.html**.

DXYL-NAYL Contest, CW, sponsored by the YLRL, from 1400Z Apr 15 until 0200Z Apr 17 (phone contest is Apr 22-24). YLs only. Send RS(T), QSO number and section/province/DXCC entity. W/VE YLs work DX YLs, and vice versa. KL7 and KH6 count as DX. Work stations once per band. Score 1 pt/QSO. Multipliers are sections/ provinces/DXCC countries (they count only once). Stations running <150 W output (phone: 300W PEP) multiply score by 1.5. Final score is points × multipliers × power multiplier. Awards. Send logs within 30 days to Phyllis Shanks, W2GLB/7, 1345 W Escarpa, Mesa, AZ 85201-3853; **pshanks1@juno.com**; **http://www.qsl.net/~ylrl/ylcontests.html**.

EA QRP Contest, CW, sponsored by the EA QRP Club. Three contest periods, 20 meters April 16 1700-2000Z, 80 meters April 16 2000-2300Z and 40 meters April 17 0700-1300Z. EA stations send RST and provincial license plate letter/s. Non-EA stations send RST only. Count 1 point per QSO; 2 points for contacts with QRPp stations. Multipliers are Spanish provinces and DXCC countries. Final score is total QSO points × total multipliers worked. Awards. Send logs to: Angel Garcia Garcia, EA4CM, C/Jose Arcones Gil no.70, 5-2, 28017 Madrid, Spain.

18

222 MHz Spring Sprint. See April 10.

22-24

Six Meter Sprint, sponsored by Six Club, 2300Z Apr 22 to 0400Z Apr 23. Six meters only. Exchange grid square. Count 1 point for each QSO in your country and 2 points for QSOs outside your country. Final score is total QSO points × total number of grid squares worked. Awards. Send logs before May 27 to Six Club, PO Box 307, Hatfield, AR 71945; **sixclub@6mt.com**; **http://6mt.com/contest.htm**.

DXYL-NAYL Contest, phone, see April 15-16

Low Power Spring Sprint, sponsored by the Slovak ARA, 1400Z-2000Z Mon Apr 24. CW only, 160 80 40 20 15 and 10 meters on IARU recommended contest band segments. Single op only: single band, three bands, all bands. Exchange RST, Maidenhead grid square and power category (A = <1 W; C = <5 W; Q = <25 W; X = <50 W; Y = <100 W). Count 3 pts/QSO with own continent, 9 pts/QSO with other continents and 18 pts/QSO with OM stations. Multipliers are grid squares plus and prefixes (WPX rules) worked per band. Final score is QSO pts × multipliers. Send entries within 30 days to SS Contest, Radioclub OM3KFV, PO Box 129, 036 01 Martin 1, Slovakia.

QRP to the Field, sponsored by the NorCal QRP Club, 1600Z to 2400Z Apr 22. CW HF QRP only (5 W max), 160 80 40 20 15 10 meters. Exchange RST and state/province/country (SPC). This year's theme is "Run to the Borders." Stations operating from an SPC border get an extra multiplier for each SPC intersecting at their exact location. For example, KI6DS operates from the

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

CA-AZ border, getting a ×2 "border operator" multiplier. He must exchange a signal report with each state (eg. 579 CA, 579 AZ). Stations working KI6DS would get SPC multiplier credit for each state, as well as QSO pts for each separate signal report received. Scoring: Count 5 pts/QSO. Multipliers: SPC total per band; for border operators, the number of SPCs intersecting at your position; and location (home ×2, field ×4; field = battery power and temporary antennas). Final score = QSO pts × SPC total × location × border operator multiplier. Awards. Send logs by June 1 to Joe Gervais, AB7TT, PO Box 322, Peoria, AZ 85380-0322; **vole@primenet.com**; **http://www.fix.net/~jparker/norcal.html**.

26

432 MHz Spring Sprint, see April 10.

29-30

Florida QSO Party, sponsored by the Florida Contest Group, 1600Z Apr 29 to 0159Z Apr 30 and 1200Z-2159Z Apr 30. Twenty hours total time. 40 20 15 and 10 meters. Categories: single op, mobile (single op or multiop), Novice/Tech (mixed mode, phone only, CW only); multi-single and multi-multi (mixed mode only; max 1 signal per band). Three power classes for all categories: QRP (<5 W), low power (<150 W) and high power (>150 W). Exchange signal report and state/province (DX stations send entity); Florida stations send county. Work stations once per band and mode. Work Florida mobile stations again as they change county. Count 1 pt per phone QSO, 2 pts per CW QSO. Multipliers: for Florida stations, 50 states; Canadian areas (MAR, NL, VE2-VE8, YT); DXCC countries (except W, VE, KH6, KL7). All others count Florida counties (67). Count multipliers once per mode. Final score: Multiply QSO points by total multipliers by the power multiplier (<5 W, × 3; <150 W, × 2; >150 W, × 1). Logs must be postmarked by May 30. Send your entry to Florida QSO Party, c/o Ron Wetjen, WD4AHZ, 5362 Castleman Dr, Sarasota, FL 34232; **fqp@qsl.net**; **http://www.qsl.net/fqp/**.

Helvetia Contest, sponsored by USKA (Switzerland), 1300Z Apr 29 to 1300Z Apr 30. 160 80 40 20 15 and 10 meters (CW only on 160 meters). Mixed mode only, single op or multi-single. Work stations once per band. Send RS(T) and serial number. HB stations will also add Canton prefix. Abbreviations of the 26 cantons: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH. Count 3 pts/QSO with HB stations. Multipliers are Cantons worked per band (max 26 per band). Awards. Send logs by May 31 to Nick Zinsstag, HB9DDZ, Rimattstrasse 7, CH-5084 Rheinsulz, Switzerland.

Nebraska QSO Party, sponsored by the Nebraska QSO Party Group, from 1700Z Apr 29 until 1700Z Apr 30. Single op, multi-single, mobile, and Novice/Tech. Send RS(T) and state/province/DXCC country (NE stations send county). Work stations once per band and mode. CW—1.805 and 60 kHz up from band edge; phone—1.865, 3.860, 7.260, 14.260, 21.360, 28.360 146.46; Novice—28.380 and 10 kHz up from band edge. Score 1 pt per phone, 2 points per CW QSO. NE mobiles may add 50 QSO pts for each county operated from; NE portables may add 100 QSO pts for each county operated from (excluding county of residence). Work mobiles/portables again as they change county. Final score is QSO points × NE counties (max 93); NE stations multiply by states (50), provinces (8) and DXCC countries (max 35) for a possible maximum of 93. Club Competition (3 entries min). Awards. Send logs by May 31 to Nebraska QSO Party, POB 375, Elkhorn, NE 68022-0375; **http://www.qsl.net/hdxa/neqso/neqso.htm**.

Ontario QSO Party, sponsored by the Ontario DX Association, 1800Z Apr 29 to 1800Z Apr 30. Phone and CW, 160 80 40 20 15 10 meters and all VHF/UHF bands (no repeater QSOs and keep 146.52 MHz clear). Categories: Single operator low power (<150 W on HF and <50 W on VHF/UHF); single operator high power; single operator, single band; mobile; HF QRP (<5 W); VHF/UHF FM QRP (<5 W); multioperator; CW, SSB or mixed mode. Exchange signal report state/province/DXCC country. Ontario stations exchange signal report and county/district/regional municipality. Work Ontario stations only (Ontario stations work everyone). Work mobile and portable stations again as they change county/district/regional municipalities. Work stations once per band. Count 1 pt/QSO, 10 pts (each band) for working VE3ODX and VA3RAC. Multipliers are Ontario county/district/regional municipalities (for Ontario stations: county/district/regional municipalities, and state/province/DXCC countries). Final score is total QSO points × total multipliers worked (max 48). Awards. Send logs by May 31 to Ontario DX Association, Box 161, Stn A, Willowdale, ON M2N 5S8 Canada; **ve3sre@rac.ca**; **http://www.odxa.on.ca/oqrprules.html**

County Hunters Contest, phone, sponsored by the Mobile Amateur Radio Awards Club (CW competition is May 6-7). 80 40 20 15 10 meters. Exchange signal report, county and state. Canadian stations send signal report and province, DX stations send signal report and country. Count 1 point for US fixed station; 5 points for DX (including Canada); 15 points for mobile stations. Work stations once per band, except work mobiles in each new county. Mobiles on county lines count for only one QSO, but you can count a multiplier for each county. Awards. Send logs by May 29 to: Alan Fischer, K8CW, 259 W. Cook Rd, Mansfield, OH 44907.

North American High Speed Meteor Scatter (HSMS) Contest, sponsored by the Western States Weak Signal Society. HSCW only, 0000Z April 29 to 2400Z May 7. Make as many contacts as possible using HSCW (99 WPM and above) on the amateur bands above 50 MHz. Operate up to 48 hours during the contest period. Single op limited (5 kW ERP and less); unlimited (ERP greater than 5 kW); multiband or 2 meters only. Multipliers are 4-digit grid squares per band. On 6 meters count 1 point/QSO, on 2 meters 3 points/QSO, on 1.25 meters 9 points/QSO and on 70 cm 9 points/QSO. Random QSOs count double on 2 meters and up. Score is total of QSO points times the total multiplier. Send logs by May 30 to WSWSS HSCS Contest, c/o Steve Harrison K0XP, 37 Plainfield Ave, Shrewsbury, MA 01545; **hscw@contesting.com**; **http://www.qsl.net/n7stu/hscw.html**. QST

SPECIAL EVENTS

Wausau, WI: Wisconsin Valley Radio Association, W9M, 1500Z **Apr 1** to 0300Z **Apr 2**, to celebrate Marathon County's 150th birthday and 65 years of WVRA. 14.250 21.325 28.375. Certificate. Wisconsin Valley Radio Association, P O Box 363, Wausau, WI 54402-0363.

Port St. Lucie, FL: Port St. Lucie Amateur Radio Club, K4PSL, 0000Z **Apr 1** to 0000Z **Apr 16**, to commemorate the discovery of Florida by Ponce de Leon in April 1513. 14.015 14.250 21.250 28.350. Certificate. Dr Maurice I. Sasson, 8598 Florence Dr, Port St Lucie, FL 34983.

Green Valley, AZ: Green Valley Amateur Radio Club, N7GV, 1800Z Apr 8 to 2100Z **Apr 9**, 2000, honoring the 9th anniversary of the closing of all Titan 2 missile sites. 7.272 14.272 21.372 28.372. Certificate. GVARC, 601 N La Canada, Green Valley, AZ 85614.

Piscataway, NJ: Piscataway Amateur Radio Club, K2VOA, 0000Z **Apr 8** to 2400Z **Apr 9**, from Voice of America relay station WBOU. 7.245 14.245 21.345 28.445. Certificate. Piscataway Amateur Radio Club, PO Box 1233, Piscataway, NJ 08854-1233.

Gig Harbor, WA: Peninsula Amateur Radio Emergency Team, KA7EOC, 1400Z **Apr 8** to 0200Z **Apr 9**, during the annual Gig Harbor Health and Safety Expo. 14.040 14.280 28.380 146.560. Certificate. Mark Yordy, KC7BBO, 8914 149th St NW, Gig Harbor, WA 98329.

Pine Bluff, AR: Pine Bluff Amateur Radio Club, K5DAK, 1600 to 2200Z **Apr 8**, celebrating the third annual Railroad-a-Rama and 819 Steam Engine. 14.250. Certificate. PBARC, PO Box 1402, Pine Bluff, AR 71613.

Fort Wayne, IN: Mizpah Shrine Temple Radio Unit, W9FEZ, 1200Z **Apr 8** to 0500Z **Apr 9**, commemorating the 90th anniversary of Mizpah Shrine Temple. 7.250 14.250. Certificate. Gary Reece, WB9UYT, 5126 Ann Hackley Rd, Fort Wayne, IN 46835-1410.

East Stroudsburg, PA: Eastern Pennsylvania Amateur Radio Assn, N3IS, 1300Z to 1700Z **Apr 9**, during the MS Walk 2000 at East Stroudsburg University. 7.235 147.045. QSL. Jim Jordan/KB3CRG, 238 Becca Ln, Stroudsburg, PA 18360-9448.

Ames, IA: Cyclone Amateur Radio Club of Iowa State University, W0YI, 1300 to 2300Z **Apr 15**, during the Iowa State University VEISHEA 2000 Celebration. 7.240 14.240 21.325 147.375. QSL. Cyclone Amateur Radio Club, Iowa State University, Friley Hall Box 7275, Ames, IA 50012.

Vieques, PR: Cadena El Conquistador, NP3P, 1300Z **Apr 15** to 1700Z **Apr 16**, during the 23nd Vieques Cultural Festival at Fort Count Mirasol—IOTA 99. 14.300 21.350 28.350. Certificate. Cadena El Conquistador, NP3P, PO Box 161, Fajardo, PR 00738.

Belleville, MI: Stu Rockafellow ARS and Yankee Air Museum, N8D, 1200Z **Apr 15** to 2100Z **Apr 16**, Jimmy Doolittle WWII B-25 raid anniversary. 7.270 14.270 28.370 146.565. Certificate. Dave Langston, KB8RAP, c/o Maritz, 1000 Town Center, Suite 1200, Southfield, MI 48075.

Blacksburg, VA: Virginia Tech Amateur Radio Association, K4KDJ, 1400Z **Apr 28** to 0200Z **Apr 30**, for the Virginia Tech Alumni Net. All stations welcome. 14.260 7.260 7.040 28.460. Certificate. VTARA, 347 Squires Student Centre, VPI&SU, Blacksburg, VA 24061.

Bedford, NH: US National Marconi Museum, W1FGM, 2300Z **Apr 28** to 2359Z **Apr 29** for International Marconi Day. 14.275, 3.920, 29.300. QSL. W1FGM, 18 N. Amherst Rd, Bedford, NH 03110.

Fort Monmouth, NJ: QCWA Marconi Chapter 138, WA2GM, 0000 to 2359Z **Apr 29**, for International Marconi Day. 7.025 7.250 14.025 14.250. QSL. Bob Buus, W2OD, 8 Donner Street, Holmdel, NJ 07733.

Wall, NJ: Ocean/Monmouth ARC, N2MO/IMD, 0000 to 2359 **Apr 29**, for International Marconi Day. General class portions of HF phone and CW bands. QSL. OMARC, PO Box 267, Oakhurst, NJ 07755.

Edmond, OK: Edmond Amateur Radio Society, W5W, 1500 to 2000Z **Apr 29**, celebrating the arrival of the traveling Vietnam Wall in Edmond. 7.289 14.289 28.055 28.489. Certificate. EARS, PO Box 48, Edmond, OK 73083.

Mason, MI: Central Michigan Amateur Radio Club, W8MAA, 1500 to 2100Z **Apr 29**, celebrating 50 years of ARRL affiliation. 14.250 145.390. Certificate. Ken Faiver, W8HNI, PO Box 80406, Lansing, MI 48908.

Mt.Clemens, MI: Utica Shelby Emergency Communications Assoc, W8A, 1100 to 1700Z **Apr 30**, during the 30th annual March of Dimes Walk America. 7.250 14.250 28.450. Certificate. USECA, PO Box 1222, Sterling Heights, MI 48311-1222.

Manitowoc, WI: Mancorad Radio Club, W9DK, 1400Z **Apr 29** to 2000Z **Apr 30**, for the USS *Cobia* Submarine Memorial Radio Reactivation. 7.243 14.243 21.343 28.343. QSL. Fred Neuenfeldt, W6BSF, 4932 S. 10th St, Manitowoc, WI 54220.

US International Police Association Radio Club, various calls, 0000Z **Apr 30** to 2359Z **May 14**, during the US IPAEC Annual Celebration. 3.850 14.240 21.410 28.355. Robert Faulkner, US IPARC Awards Chairman, 15733 Rancho Ramon Dr, Tracy, CA 95376.

You can submit your special event information online at **http://www.arrl.org/contests/spevform.html**. Submissions may be mailed to George Fremin III, K5TR, at the address shown on this page; faxed to ARRL HQ at 860-594-0259; or e-mailed to **events@arrl.org**. QST

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

Asia Leads Amateur Radio Growth

After a decline the previous year, information supplied by IARU member-societies during 1999 shows a rebound in the number of Amateur Radio licenses worldwide. Asia led the way with substantial increases in several countries. As of December 1999, statistics compiled by the IARU International Secretariat reflected a total of 2,784,000 amateur stations licensed worldwide. The number of licensed operators is somewhat larger, but these figures are less meaningful because some countries issue lifetime operator licenses and the records are not purged when operators die or become permanently inactive for some other reason.

Japan remains the country with the largest number of radio amateurs with 1,296,059 stations. In Region 3 it is now followed by the Republic of Korea with 51,172 stations and Thailand with 50,988 stations (mostly licensed to operate only on VHF). The next largest Region 3 country is probably Indonesia, but the most recent information that is available is from 1997; it shows 28,173 stations. Taiwan has shown impressive growth recently and now has 24,373 amateur stations. India, China, and Malaysia are among the countries also reporting recent growth. Region 3 has slightly more than half of the world's amateur population with 1,491,000 licensed stations.

Next in order by population is Region 2 with 843,000 licensed stations, a drop of 4,000 from the previous year. Of these, 81% are in the United States. US and Canadian licenses were up slightly during the year but the general trend in the rest of the region, to our south, is downward. Some officials of IARU member-societies in Latin America report declining interest in Amateur Radio as telephone and other personal communications services improve.

The smallest region in terms of the number of amateur licensees is Region 1, which may surprise those who have observed the high levels of Amateur Radio activity in Europe. The number of amateur stations reported by Region 1 member-societies grew by 15,000 between 1998 and 1999, to 451,000. Most of this increase is attributable to a single country, Ukraine, which had not reported since 1993. Region 1 countries reporting significant growth in 1999 include the Czech Republic and Hungary. The United Kingdom reported a small decline. Up-to-date information has not been received from some of the larger countries in Region 1, which makes comparisons difficult.

Less encouraging are the reported numbers of members of national organizations. While Japan has more licensed amateurs than the United States, the ARRL is somewhat larger than the Japan Amateur Radio League. ARRL membership remained essentially flat during the year while JARL membership continued a decline that began several years ago. Reported membership of the member-societies by region declined from 224,000 to 215,000 in Region 1, from 191,000 to 187,000 in Region 2, and from 204,000 to 198,000 in Region 3. These figures include unlicensed individuals. When only licensed members are counted the three regions are virtually identical: Region 1 has 187,000, Region 2 has 180,000, and Region 3 has 185,000.

A summary of the statistics compiled by the IARU is available at the IARU Web site at: **http://www.iaru.org/statussummary-99.html**.

UK TO ALLOW AMATEUR RADIO-INTERNET LINKS

The Radiocommunications Agency in the United Kingdom has announced that interconnection between Amateur Radio and the Internet is now allowed. The action, first announced in October 1999 and implemented in late January, followed consultation with the Radio Society of Great Britain and a number of interested individuals. David Hendon, the Agency's Chief Executive, made the announcement in response to requests from the Amateur Radio community to be permitted to link their radio equipment through the Internet. The RA said it recognized the need to encourage young people to become involved in Amateur Radio as "a valuable training ground for future careers in radio and electronics" and expressed hopes that its decision would "open up whole new avenues into Amateur Radio." Connection of ham equipment to nonamateur networks in the UK will require written permission from the Secretary of State.

A further clarification was issued by the RA on February 10: "It was never our intention to prevent individuals from having equipment which is connected both to the amateur service and non-amateur networks such as the public switched telephone network. The point of the Gazette Notice was to prevent the automatic transfer of information between amateur radio and other networks except with specific written permission from the Agency. This will allow us to develop an understanding of licensees' requirements while considering how we handle this facility in the future."

IARU, ARRL BUSY AT ITU MEETINGS

IARU and ARRL representatives have been kept busy attending recent meetings of various ITU bodies.

Hans-Joachim Brandt, DJ1ZB, represented the IARU at a meeting of ITU-R Task Group 1/5 in Bangalore, India, January 6-14. Task Group 1/5 is attempting to find a mutually acceptable solution to the problem of interference to services such as radioastronomy from unwanted emissions from satellite and other services. ARRL Technical Relations Manager Paul Rinaldo, W4RI, was a member of the US delegation and was asked to serve as chairman of one of the principal drafting groups. The technical issues being dealt with in TG 1/5 are quite difficult, and it has been a challenge to keep unintended consequences from affecting the Amateur-Satellite Service. Peter Chadwick, G3RZP, who has been attending meetings of TG 1/5 as a member of the UK delegation, has been particularly helpful in this regard.

IARU President Larry Price, W4RA, spent the week of January 17 in Geneva attending a meeting of the Radiocommunication Advisory Group. The RAG advises the Director of the ITU Radiocommunication Bureau. Paul Rinaldo, W4RI, attended as a member of the US delegation.

Ken Pulfer, VE3PU, represented the IARU at meetings of ITU-R Working Parties 7C and 7D in Orlando, January 24-28. ARRL Technical Relations Specialist Walt Ireland, WB7CSL, attended as a member of the US delegation. WP 7C has been studying the issue of sharing between proposed satellite borne Synthetic Aperture Radar (SAR) and other services, including the Amateur and Amateur-Satellite Services, in the band 420-470 MHz. Not surprisingly, the proponents of SARs and the representatives of the incumbent services have been unable to agree that sharing is feasible. Extensive technical input has been provided by the IARU. It is expected that the work will continue in a new Working Party, 7E. WP 7D has been dealing with reallocation issues in the frequency range 71 to 275 GHz; no new issues that might cause concern were raised in Orlando.

IARU Vice President David Wardlaw, VK3ADW, attended a meeting of the Asia-Pacific Telecommunity Conference Preparatory Group for WRC-2000 held in Tokyo, January 31-February 4. The purpose of the meeting was for administrations in the Asia-Pacific area to identify common positions and proposals they can take to the World Radio-communication Conference in Istanbul, May 8-June 2. An IARU position paper on WRC-2000 issues was referred to during the discussion of every WRC-2000 agenda item on which the IARU had offered comment, and the IARU positions were supported. The IARU also submitted a paper outlining the need for an international call sign series for multi-government projects such as the International Space Station. It was agreed that the APT would write to the ITU Secretary General asking that consideration be given to the allocation of a single call sign series which can be drawn on for specific international usage. QST

YL NEWS

A Conversation with Kay Craigie, WT3P

There are quite a few women in Amateur Radio who have held various offices in the ARRL, but no woman had risen above division director until last January when Kay Craigie, WT3P, Atlantic division director, was elected ARRL second Vice President. In a recent interview, Kay talked about some of her experiences in Amateur Radio and her goals in her new position…

Kay, you've been elected to second vice president of the ARRL. What was your first reaction when you found out you'd won?

I felt very happy and honored that the directors had expressed their confidence in my abilities.

To my knowledge you are the first women to hold this office. Has being female had any advantages or disadvantages in your Amateur Radio career?

Although several YLs have been ARRL directors, I am the first YL to be elected an officer of the League. But that point never came up until after the elections were over! That is as it should be. Gender should not be a factor because it's irrelevant to whether a person can do the job. I've never felt that being a YL was either an advantage or a disadvantage in my work with local radio clubs and the ARRL. In my experience, most hams treat people as individuals. They'll give you a chance to show what you can do and prove what kind of person you are. The most important YL advantage I have experienced is that a higher-pitched voice breaks through pile-ups better. Also, the lines are not as long in the ladies' restrooms at hamfests!

Many women will be interested in how you got started in Amateur Radio. Could you explain a little of your personal background and beginnings in the hobby?

My husband, Carter Craigie, N3AO, became licensed a little over a year before I did. I got into ham radio mostly out of jealousy of the fun he was having working DX and getting a lot of QSL cards. I was a computer hobbyist at the time and put off getting a ham license while I learned to write programs. A local ham named Jerry White, WB3FPU, taught me how to repair my computer when the timing system blew out. Electronics didn't seem so mysterious after that. The local hams were, and are, friendly people and I wanted to be one of them. So I asked Bob Haase, W3SA, to give me the Novice test, and I passed. As soon as possible I upgraded to General and had my Advanced before the year was out. A few years later I upgraded to Amateur Extra. Learning the code wasn't hard because I had been a musician as a young person and sound patterns are sound patterns. However, in school I was a liberal arts major who avoided science and math courses. One of ham radio's contributions to my life was the discovery that I could learn much more about science and technology than I ever supposed I could. Now, I look back and wish I had paid attention when my father tried to interest me in electronics when I was a kid. My father, who's now a Silent Key, finally got his ham license about the time I got mine. My daughter, Jenny, is licensed as KA3WVD, so at one time we were a three-generation ham radio family.

What aspects of the hobby do you enjoy most?

On the air I enjoy contesting, DXing, and award hunting. Like any other ARRL official with plenty of responsibilities, I run the risk of having ham radio turn into just another desk job. I make sure that doesn't happen. I enjoy being active on the air, and it keeps me in touch with the real world of being a ham. I also enjoy local radio club work. I've edited the Mid-Atlantic ARC's newsletter for 17 years and held various club offices. I also belong to the Frankford Radio Club, a DX contest club. They say I'm the first YL member of Frankford to score over a million points in a contest. In recent years, I've become interested in VHF award hunting, too.

What are your goals as ARRL second Vice President?

With license restructuring we are entering a period of extraordinary challenge and opportunity for ham radio and the League. My goal is to work with President Haynie and the other officers to carry out the policies adopted by the Board to meet the challenges and take advantage of the opportunities. I want to see the ARRL's financial situation become stronger, so we have the resources to serve our members better, expand our volunteer and educational programs and advocate for ham radio more effectively.

Do you have any words of advice to YLs who are just getting into the hobby?

To new YL hams, in fact to any new hams, my advice is this: The best way to feel included is to get involved. Join a local radio club. Join ARES/RACES. Join the ARRL, then get busy! Be active on the air. Do public service events. Work at the club hamfest. Sign up for a committee. Operate at Field Day. Apply for an ARRL Field Organization appointment. Run for office. The greatest benefits of ham radio come into our lives when we are willing to give something back as well as enjoy the fun. When our kids see their parents involved in service along with the fun part of ham radio, it sets a good example of values.

What do you think are the major challenges facing Amateur Radio, and the YL community in particular, in the next few years?

The biggest challenge is keeping the faith. From the beginning of Amateur Radio in the days of Hiram Percy Maxim, there have always been other entities that wanted to grab "our" spectrum. There have always been other forms of communication and other avocations competing for people's attention. Today it's wireless phones, video games, and the Internet; decades ago it was wire-line phones, broadcast radio, movies and TV. Challenges and obstacles are nothing new. Our predecessors had the courage and spirit to deal with what came up in their day. We must have the same kind of belief in the value of ham radio and the same kind of positive, confident attitude towards the future. If we hams don't believe in ham radio, who will?

One of the changes in ham radio is increasing diversity. More YLs are becoming hams. More people from a variety of backgrounds and occupations are becoming hams. I think that makes us stronger as a radio service. America is a nation of immigrants that has become great in large measure because we are not all alike. Now this is happening for ham radio, and we will be the better for it in the long run.

K1TQY, SILENT KEY

A well-known YL, Dawn Cummings, K1TQY, President of WRONE, the Women Radio Operators of New England, became a Silent Key in early February. According to Anne Manna, WB1ARU, YLRL District 1 Chairman, "Dawn was a very active ham, especially in the traffic nets. She was very outgoing and would spend hours on crafts (knit, plastic canvas, crochet, etc) to give to others. She also earned some money from her work, but donated much of it to charities." QST

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ hamyl@aol.com

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

N1EV, Evelyn R. Gross, Norwalk, CT
W1FVY, Carl T. Milner, Block Island, RI
*W1FYR, Alan C. Merrill, Gilsum, NH
W1GCX, Leigh Alexander, Sidney, ME
WA1OEC, William F. Sherlock, North Andover, MA
*W1RDC, Walter R. Walczak, Holyoke, MA
*N1RM, Douglas A. Blakeslee, Verona, WI
W1SAI, Morris Allen, Hull, MA
*W1UKR, Eunice B. Gordon, Homosassa, FL
KN1X, Thomas J. Scanzillo, Monroe, CT
N1YDB, Margaret M. Kelleher, Newburyport, MA
N1ZKF, John E. Schmeltzer IV, Greenwich, CT
W2ABM, Roy M. Dahlhaus, Elmira, NY
WA2AEA, Leslie E. Schmarder, Elizabethtown, NY
N2AKS, Gordon J. Newell, New Hartford, NY
W2BSL, Frank Jacobs, Orangevale, CA
*KB2CO, Joseph J. Desher, New Providence, NJ
W2EBF, Donald H. Drennan, Wooster, OH
N2GG, Gerald L. Gervais, Moira, NY
KB2GKR, Jose R. Maldonado, Bronx, NY
W2GW, George W. Wright, Toms River, NJ
N2JSZ, Alfred J. Bowers, Rochester, NY
KA2JUG, Millard F. Timm, New Monmouth, NJ
WA2KDK, Kevin D. Slucker, Beverly Hills, CA
W2KN, Harold Robins, New York, NY
K2KZL, William M. Bush, Jamesville, NY
WA2WAK, Paul G. Friedman, Tupper Lake, NY
K2ZOD, Donald E. Smith, Auburn, NY
K3BXU, Charles J. Hart, Bethesda, MD
WA3DYV, Robert H. Stracener, Rockville, MD
K3GUG, Robert S. Emch, Bethesda, MD
N3IQF, Linda M. Schools, Bethel, PA
*WA3TVG, Edward R. Briner, Acme, PA
KA3VLU, Eric N. Casiano, Philadelphia, PA
W3YBV, Clarence E. Pendleton, Landover Hills, MD
K4AEL, Angela E. Loner, Blairsville, GA
K4AQO, Cecil D. Cliburn, Fort Walton Beach, FL
AD4BE, Albert J. Monteiro, Pensacola, FL
KM4C, Harry C. Wheeldon, South Carrollton, KY
W4CYU, Robert Hecksher, Fort Myers, FL
KF4CZO, T. K. Wilson, Albertville, AL
KD4DJC, John D. Steele, Ashland, KY
KE4DWC, Virgil N. Davis, Harriman, TN
K4GBN, Roy T. Horton, Memphis, TN
K4GFK, Harry W. Lawson, Jupiter, FL
WB4GNX, David K. Hughes, Prospect, TN
N4HZR, James W. Armstrong, Ocala, FL
WB4NCL, Bud B. Shoup, Port Charlotte, FL
KB4NVA, Chester W. Rossiter, Daytona Beach, FL
K4OM, Joseph E. Perkinson, Rossville, GA
K4VJI, Wyatt S. Bishop, Sarasota, FL
KD4YCK, Leo K. West, Lexington, KY
*K4YI, James A. Smith, Columbus, GA
K4YWS, Alonzo E. Oliver, Hoover, AL
*N5AJW, Michael D. Heimlich, Dallas, TX
K5DCM, Ross E. Phillips, Sargent, TX
W5EAW, Harold W. Isenhower, Albuquerque, NM
W5EXY, Hanno E. Kanz, New Braunfels, TX
KA5FPH, Vernon D. Aulgur, Hugo, OK
WA5FXQ, Ralph W. Schimmel, Houston, TX
KB5GST, Raymond Petrie, New Braunfels, TX
WB5KMN, E. T. Bangert, Waco, TX
WB5MPU, Larry E. Papke, Arcadia, FL
W5RMY, Edward Mileshosky, Albuquerque, NM
KC5WQD, Markham T. Cline, Sulphur Springs, TX
K5WXY, James A. Harmon, Huntsville, AL
N5XJT, Walter Smith, New Braunfels, TX
W5YQZ, Henry P. Dingus, Spring, TX
W6BA, William A. Adams, Twentynine Palms, CA
W6BCC, Kenneth R. Crosher, Santa Rosa, CA
K6CL, Edward F. Munsell, Culver City, CA
WD6CXO, Roger F. Wolcott, Huntington Beach, CA
*K6EJF, John S. Tanner, San Jose, CA
WB6EZR, Edward J. Dettweiler, Reedley, CA
KD6JDN, Warren H. Wetherall, Banning, CA
KE6JQL, Carl B. Brummund, San Diego, CA
N6KQX, Sue Knox, Long Beach, CA
WA6L, Frank Le Port, Redwood Valley, CA
WA6MDQ, Russell Sterling, Weed, CA
WA6MDT, Russell C. Porter, Corona, CA
WB6MHE, E. H. Satchell, Greeneville, TN
W6MHI, Eugene Baron, La Canada, CA
W6NPN, Bruce K. French, Los Angeles, CA
W6PCG, Donald W. Blancher, Northridge, CA
*W6SMD, Fred Hansen, Rancho Palos Verdes, CA
W6UVM, Herman J. Hoechstetter, Hartsville, SC
WB6VPG, James Schwabenland, Visalia, CA
KD6W, Frank H. Beardsley, Redding, CA
W6WXU, S. A. Sullivan, Sonoma, CA
KM6Z, Ed W. Marler, Roseville, CA
KL7AHH, Benjamin J. Hilderbrand, Puyallup, WA
KC7EQW, Myra G. Thompson, Post Angeles, WA
K7HRL, Charles R. Morris, Seattle, WA
WA7JXL, George W. Statler, Walla Walla, WA
AL7KR, Harold W. Stevenson, Sequim, WA
WK7L, Edward R. Balaker, Sun City West, AZ
*KE7MJ, Harold A. Rogers, Dayton, NV
W7OOF, Keith F. Thomas, San Francisco, CA
WA7SKH, Thomas Beverley, Bountiful, UT
W7UMZ, S. Patrick Donahue, Portland, OR
K7VUA, Edward W. Robinson, Auburn, WA
N8APE, Lyle O. Behner, Lagrange, OH
WA8DEZ, Donald Jackson, Elyria, OH
WA8DFE, Merle L. Williams, Miamisburg, OH
K8EJB, Joe E. Novak, Tow, TX
WA8GBA, Theodore C. Bell, North Canton, OH
K8GEJ, Raymond O. Sanford, Holly, MI
K8GPD, Robert A. Galloup, Battle Creek, MI
W8JLA, H. S. Whitehead, Milford, OH
K8KVA, Karl F. Osborne, Elyria, OH
W8LGO, Richard L. Voeller, Columbus, OH
K8LYY, Charles M. Dewilde, Monroe, MI
W8NGO, E. P. Mac Kenzie, Newton, NC
KE8O, Walter H. Rike, Port Richey, FL
W8VRV, William Winters, Montague, MI
WB8WAV, Gordon B. Ingram, Cincinnati, OH
N8XAJ, James C. Bauer, Escanaba, MI
W8YFB, William A. Wildenhein, Elyria, OH
KA9FDC, Walter S. Kozol, Griffith, IN
WB9KKW, Nelson J. Cole, Belvidere, IL
W9KU, Warren L. Schlaugat, Tucson, AZ
W9NKK, Douglas W. Kluge, Milwaukee, WI
W9SYI, David J. Gatton, Conyers, GA
WA9UXM, Dan Wiese, Green Bay, WI
N9UYS, Robert A. Craigin, Hobart, IN
W9XH, John Offerdahl, Mt Horeb, WI
KB0AIL, William P. Unker, Milbank, SD
*K0BLH, George C. Stephens, Boulder, CO
KB0CDS, Don H. Campbell, Columbia, MO
*W0CHJ, Clarence S. Schultz, Junction City, KS
W0PKD, Joe W. Addison, Salina, KS
N0WJX, Mervin Kirkpatrick, Utica, NE
DL2HZM, Hartmut Mueller, Weissenfels, Germany
DK8XJ, Reinhard Sieb, Deutsch-Evern, Germany
ES7RE, Tiit Praks, Viljandi, Estonia

*Life Member, ARRL

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

STRAYS

FRIENDSHIP FORCE

◊ The "Friendship Force International", a professional exchange home-stay organization, is sponsoring an Amateur Radio trip to Moscow. This journey will be a "ham adventure" of a lifetime as the group tours the city and visits hundreds of Russian amateurs. If you're interested, contact Guy Shields, W4GBU, via e-mail at: **w4gbu@mindspring.com**. For more information about the program, go to: **http://w4gbu.home.mindspring.com/russia.htm**.

QST CONGRATULATES WA9CCQ

◊ Raymond Stair, W9CEJ (left), president of the Six Meter Club of Chicago, presents the 1999 Six Meter Club Ham of the Year award to Karl Weisshapel, WA9CCQ (right), for outstanding service and dedication to Amateur Radio and the Six Meter Club of Chicago.

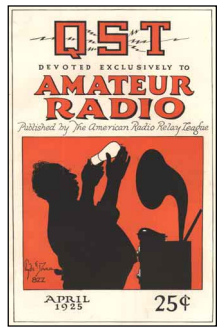
BLUEGRASS PRIDE!

◊ Members of the Gateway Amateur Radio Club in Mt Sterling, Kentucky pose with their new ARRL Affiliated Club certifi-cate. The certificate was presented by Todd Schrader, KF4WFZ, ARRL Affiliated Club Coordinator, at the club's January 25 meeting.

Next Stray

75, 50 AND 25 YEARS AGO

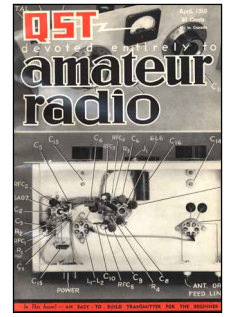
April 1925



◊ The cover, by Clyde Darr, 8ZZ, shows a ham holding a tube up to the light for a visual inspection. The editorial, "This Interference Business," is a bit impatient with the current situation of hams causing *increasing* amounts of interference to broadcast listeners at a time when the state of the art of transmitting has advanced so far.

The lead article, "The Reflection of Short Waves," by John Reinartz, 1XAM, presents "an article of the first importance in radio affairs…. We consider this article one of the most important contributions made to radio literature." In it, Reinartz describes the conclusions drawn from extensive radio tests, with diagrams showing how radio waves are reflected from "the Heaviside layer" to reach intercontinental distances. R. R. Batcher discusses "The Design of the Grebe Synchrophase," the latest Grebe receiver, which uses "binocular coils." The article "Navy Picks Schnell for Test" reports that "The Traffic Manager accompanies the Fleet to Australia on Summer Cruise with short wave set signing NRRL. Handy of 1XAH becomes Acting [Traffic Manager]." W. F. Hoffman, 9EK, describes "A Reliable 3 to 5 Meter Sending Set." Glenn Browning presents information on building "The Regenaformer," a receiver that can cover 15 to 200 meters. "The Eclipse Tests" tells the results of radio tests made during the recent solar eclipse, including the joint A.R.R.L.—Scientific American tests. "Fair Warning!" reprints a letter recently received by HQ from the US Department of Commerce's Bureau of Navigation, wherein interference is addressed. The letter says that "If the amateurs can so construct their transmitters as not to produce interference during the silent hours and fail to do so they will of course not be permitted to use their stations during this period if interference results…." The letter concludes with "Please advise the Bureau promptly what action you are taking." Oh-oh, fellows, it's time to clean up our act!

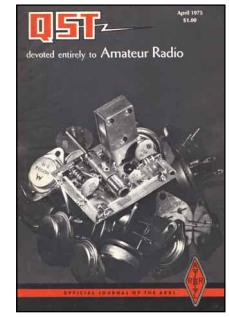
April 1950



◊ The cover photo shows the underside view of "A Two-Stage Transmitter for the Beginner," described in this issue. The editorial, "League Control," explains, once again, the organization of the A.R.R.L.

George Lippert, W8YHR, discusses "A 'Constant-Modulation' 'Phone System," which offers "lowered modulation-power requirements and high over-all efficiency." Don Mix, W1TS, provides the cover article, "A Two-Stage Transmitter for the Beginner." Cary Isley, W3OCZ, writes about "Coupling Unbalanced to Balanced Lines." George Grammer, W1DF, presents Part III of "Eliminating TV with Low-Pass Filters." Lew McCoy, W1ICP, writes of the "Results—Ten-Meter WAS Contest." By Goodman, W1DX, tells how to adjust transmitter keying in "Key Clicks and Receiver Bandwidths." Part I of the "16th Sweepstakes Contest" presents the CW results, with 952 entrants, 82 of whom scored over 100,000 points—a record! W4FU had the top score of 185,400 points. Ed Tilton, W1HDQ, continues with "A 2-Meter Station for the Novice"—this month's Part III covers the modulator, power supply and control unit. The inimitable and always thought-provoking Larson E. Rapp, WIOU, writes of "50 Years of Progress—A Report on Amateur Radio," with special reference to the New Philosophy of Integers as it applies to RST reports.

April 1975



◊ The cover photo shows the completed oscillator stage that's in this month's article in the series "Learning to Work with Semiconductors." The editorial presents a thumbnail history of the IARU in "IARU Fiftieth Anniversary."

Jerry Sevick, W2FMI, tells about "Simple RF Bridges." Under the "Beginner and Novice" banner, John Ellison, W0ERZ, describes "A Ten-Meter Swiss Quad—Missouri Style." Doug DeMaw, W1CER, and Jay Rusgrove, WA1LNQ, tell about transmitter design in Part I of "Learning to Work with Semiconductors." Howard Batie, W7BBX, describes his backpack rig, "The Ultramountaineer." Alek Trahn, KL0OGE, describes, in detail, "The Lossless Radiator." [Written in the days when KL call signs used only the number 7, the reader immediately senses that this is a *very special* article—Ed.] Katashi Nose, KH6IJ, describes "A 160-Meter Receiving Loop." A "Stray" shows Ed Handy, W1BDI, receiving his ARRL 50-year plaque. In "Happenings," Dick Baldwin, W1RU, is introduced as the new General Manager of ARRL and the Editor of *QST*. —*Al Brogdon, W1AB* QST

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, 7½, 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. 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.

2000 IARU HF World Championship Rules

By Dan Henderson, N1ND
Contest Branch Manager

1. Eligibility: All licensed amateurs worldwide.

2. Object: To contact as many other amateurs, especially IARU member society HQ stations, around the world as possible using the 160, 80, 40, 20, 15 and 10 meter bands.

3. Date and Contest Period: The second full weekend of July**, beginning 1200 UTC Saturday and ending 1200 UTC Sunday (July 8-9, 2000)**. Both Single and Multi operator stations may operate the entire 24-hour period.

4. Entry Categories:

4.1. Single Operator

4.1.1. Categories

4.1.1.1. Phone only

4.1.1.2. CW only

4.1.1.3. Mixed mode

4.1.2. One person performs all operating and logging functions.

4.1.3. Use of spotting nets or packet is not permitted.

4.1.4. All operators must observe the amateur radio regulations of their country at all times.

4.1.5. Single operator stations are allowed only one transmitted signal at any given time.

4.2. Multi Operator, Single Transmitter, Mixed Mode only

4.2.1. Must remain on a band and mode for at least 10 minutes before changing bands or modes.

4.2.2. Only one transmitted signal is allowed at any given time.

4.2.2.1. Exception: Only IARU member society HQ stations may operate simultaneously on more than one band, with one transmitter on each band and mode.

4.2.2.2. Only one HQ station callsign per member society per frequency band is permitted

4.2.3. All operators must observe the amateur radio regulations of their country at all times.

5. Contest Exchange:

5.1. IARU member society HQ stations send signal report and official IARU member society abbreviation. IARU club station NU1AW counts as a HQ station. Members of the IARU Administrative Council and the three IARU regional Executive committees send "AC," "R1," "R2," and "R3" as appropriate.

5.2. All others send signal report and ITU zone.

5.3 A complete exchange must be logged for each valid QSO.

6. Valid Contact:

6.1. The same station may be worked once per mode per band for QSO credit.

6.1.1. Mixed-mode entries may work a station once per mode per band.

6.2. **A station may only be worked for credit in the portion of the band that is generally accepted for the mode used.**

6.2.1. On any band, a station may be worked once on phone (in the phone segment) and once on CW (in the CW segment).

6.2.2. Cross mode, cross band and repeater contacts are not valid QSOs.

6.3 Where contest-preferred segments are incorporated in regional band plans, participants should observe them.

6.4 **The use of non-amateur radio means of communications (eg, telephone or the Internet) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of these rules.**

6.5 **Active use of packet (i.e. "please come work me" or other self-spotting techniques) is inconsistent with the spirit and intent of these rules.**

7. QSO Points:

7.1. Contacts within your own ITU zone, as well as QSOs with any IARU member society HQ stations, count one point.

7.1.1. **Contacts with a station in the same ITU zone but on a different continent count one point**.

7.2. Contacts within your continent (but different ITU zone) count three points.

7.3. Contacts with a different continent and IARU zone count five points.

8. Multipliers: The total number of ITU zones plus IARU member society HQ stations worked on each band (not mode.) IARU officials represent a maximum of four multipliers per band (AC, R1, R2 and R3)

8.1. IARU member society HQ stations and officials do not count for zone multipliers.

9. Scoring: The total number of QSO points times the total number of multipliers worked.

10. Reporting:

10.1. **Entries must be postmarked or emailed no later than 30 days after the end of the contest (August 8, 2000).** No late entries can be accepted. Entries that are received after mid-October, 2000, even if mailed in time, may not be received in time to be included in the official results.

Prefix, Continent and ITU Zone

1A0	EU	28	8P	NA	11	CT	EU	37	FY	SA	12	LA-LN	EU	18	T33	OC	65	VP2	NA	11
1S	AS	50	8Q	AS,AF	41	CT3	AF	36	G-GX, M-MX	EU	27	LO-LW	SA	14, 16	T5	AF	48	VP5	NA	11
3A	EU	27	8R	SA	12	CU	EU	36	H4	OC	51	LX	EU	27	T7	EU	28	VP8(F)	SA	16
3B6-9	AF	53	9A	EU	28	CV-CX	SA	14	HA, HG	EU	28	LY	EU	29	T9	EU	28	VP8	SA	73
3C	AF	47	9G	AF	46	CY	NA	09	HB, HE	EU	28	LZ	EU	28	TA-TC	EU/AS	39	VP9	NA	11
3C0	AF	52	9H	EU	28	D2, 3	AF	52	HC, HD	SA	12	OA-OC	SA	12	TF	EU	17	VQ9	AF	41
3D2	OC	56	9I-9J	AF	53	D4	AF	46	HH	NA	11	OD	AS	39	TG, TD	NA	11	VR6	OC	63
3D2(R)	OC	56	9K	AS	39	D6	AF	53	HI	NA	11	OE	EU	28	TI, TE	NA	11	VS6, VR2	AS	44
3D2(C)	OC	56	9L	AF	46	DA-DL	EU	28	HJ-HK	SA	12	OF-OI	EU	18	TJ	AF	47	VU	AS	41, 49
3DA	AF	57	9M2, 4	AS	54	DU-DZ	OC	50	HK0(M)	NA	12	OH0	EU	18	TK	EU	28	XA-XI	NA	10
3V	AF	37	9M6, 8	OC	54	E3	AF	48	HK0	NA	11	OJ0	EU	18	TL	AF	47	XA4-XI4	NA	10
3W, XV	AS	49	9N	AS	42	E4	AS	39	HL, DS	AS	44	OK-OL	EU	28	TN	AF	52	XT	AF	46
3X	AF	46	9Q-9T	AF	52	EA-EH	EU	37	HO-HP	NA	11	OM	EU	28	TR	AF	52	XU	AS	49
3Y	AF	67	9U	AF	52	EA6-EH6	EU	37	HQ-HR	NA	11	ON-OT	EU	27	TT	AF	47	XW	AS	49
3Y(P)	AN	72	9V	AS	54	EA8-EH8	AF	36	HS, E2	AS	49	OX	NA	5, 75	TU	AF	46	XX9	AS	44
R1MV	EU	29	9X	AF	52	EA9-EH9	AF	37	HV	EU	28	OY	EU	18	TY	AF	46	XY-XZ	AS	49
R1FJ(FJL)	EU	75	9Y-9Z	SA	11	EI-EJ	EU	27	HZ	AS	39	OZ	EU	18	TZ	AF	46	YA	AS	40
4K	AS	29	A2	AF	57	EK	AS	29	I,IS0,IM0	EU	28	P2	OC	51	RA-RZ, UA-UI	EU/AS	19-26, 29-35, 75	YB-YH	OC	51, 54
4L	AS	29	A3	OC	62	EL	AF	46	J2	AF	48	P4	SA	11				YI	AS	39
4P-4S	AS	41	A4	AS	39	EP-EQ	AS	40	J3	NA	11	PA-PI	EU	27				YJ	OC	56
4U(ITU)	EU	28	A5	AS	41	ER	EU	29	J5	AF	46	PJ2, 4, 9	SA	11	UJ-UM	AS	30	YK	AS	39
4U(UN)	NA	08	A6	AS	39	ES	EU	29	J6-8	NA	11	PJ5,6,7,8	NA	11	UN-UQ	AS	30, 31	YL	EU	29
4X, 4Z	AS	39	A7	AS	39	ET	AF	48	JA-JS, 7K-N	AS	45	PP-PY	SA	12,13, 15	UR-UZ,EM-EO	EU	29	YN	NA	11
5A	AF	38	A9	AS	39	EU, EV, EW	EU	29	JD(Minami)	OC	90							YO-YR	EU	28
5B	AS	39	AP-AS	AS	41	EX	AS	30, 31	JD (Ogasawara)	AS	45	PY0	SA	13	V2-4	NA	11	YS	NA	11
5H-5I	AF	53	BV	AS	44	EY	AS	30	JT-JV	AS	32, 33	PY0(T)	SA	15	V5	AF	57	YT, YU, YZ	EU	28
5N-5O	AF	46	BY, BZ, BT	AS	33, 42, 43, 44	EZ	AS	30	JW	EU	18	PZ	SA	12	V6-7	OC	65	YV-YY	SA	12
5R-5S	AF	53				F	EU	27	JX	EU	18	S0	AF	37	V8	OC	54	YV0	NA	11
5T	AF	46	C2	OC	65	FG	NA	11	JY	AS	39	S2	AS	41	VE,VA,VO, VY	NA	2-4, 9, 75	Z2	AF	53
5U	AF	46	C3	EU	27	FJ, FS	NA	11	K,W,N, AA-AK	NA	6, 7, 8	S5	EU	28	VK	OC	55, 58, 59	Z3	EU	28
5V	AF	46	C5	AF	46	FH	AF	53	KG4	NA	11	S7	AF	53				ZA	EU	28
5W	OC	62	C6	NA	11	FK	OC	56	KH0	OC	64	S9	AF	47				ZB	EU	37
5X	AF	48	C8-9	AF	53	FM	NA	11	KH1	OC	61, 62	SA-SM	EU	18	VK(LHI)	OC	60	ZC4	AS	39
5Y-5Z	AF	48	CA-CE	SA	14, 16	FO (Clip)	NA	10	KH2	OC	64	SN-SR	EU	28	VK9(W)	OC	55	ZD7-9	AF	66
6V-6W	AF	46	CE0A	SA	63	FO	OC	63	KH3-7	OC	61	ST	AF	47, 48	VK9(X)	OC	54	ZF	NA	11
6Y	NA	11	CE0X	SA	14	FP	NA	09	KH8	OC	62	SU	AF	38	VK9(C, K)	OC	54	ZK1-3	OC	62
7O	AS	39	CE0Z	SA	14	FR	AF	53	KH9	OC	65	SV-SZ, J4	EU	28	VK9(M)	OC	56	ZL-ZM	OC	60
7P	AF	57	CM, CO	NA	11	FT8W	AF	68	KL	NA	1, 2	T2	OC	65	VK9(N)	OC	60	ZP	SA	14
7Q	AF	53	CN	AF	37	FT8X	AF	68	KP1-5	NA	11	T30	OC	65	VK0(H)	AF	68	ZR-ZU	AF	57
7T-7Y	AF	37	CP	SA	12, 14	FT8Z	AF	68				T31	OC	62	VK0(M)	OC	60	ZS8	AF	57
						FW	OC	62				T32	OC	61, 63						

10.2. **For 2000, the Cabrillo file format is preferred for electronic entries, but any previously acceptable ASCII text format will be accepted. Spreadsheet or program document files (example: Excel, Word) do not meet file format requirements.**

10.2.1. **The Cabrillo file format and specifications may be found at the http://www.kkn.net/~trey/cabrillo/ or in the November 1999 issue of *QST* magazine**.

10.2.2. Any entry which has been generated using a computer (either during the contest or after the contest) must be submitted either as an attachment to an email or on a 3.5-inch diskette.

10.2.3. Electronic files must use the entrant's callsign as the file name.

10.2.4. **The log file must be a chronological list of QSOs as made, not separated by band or mode.**

10.2.5. Entries sent as attachments to email must be sent to **IARUHF@iaru.org**.

10.2.6. Entries sent on diskette should be mailed to: IARU HF Championship, IARU International Secretariat, Box 310905, Newington, CT 06111.

10.2.6.1. Diskettes must be clearly labeled with the station call sign, contest name, entry class and date.

10.2.7. Electronic entries may be sent by anonymous FTP to: **ftp.arrl.org/logs/**

10.3. Paper logs must clearly indicate for each contact: band, mode, date, time (in UTC) callsigns, complete exchanges sent and received, multipliers and QSO points.

10.3.1. Multipliers should be marked in the paper log only the first time they are worked on each band.

10.3.2. Paper logs with more than 500 QSO's must include dupe sheets.

10.3.3. **All contacts in paper logs must be in chronological order, not separated by bands.**

10.4. All paper entries must include an official summary sheet or reasonable facsimile thereof with complete contest information.

11. Awards:

11.1. A certificate will be awarded to the high scoring entry in each category in each US state, each ITU zone and each DXCC country.

11.2. A certificate will be awarded to the highest scoring IARU member society HQ station.

11.3. Achievement level awards will be issued to those making at least 250 QSOs or having a multiplier total of 50 or more.

11.4 Additional awards may be made at the discretion of each country's IARU member society.

12. Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his/her licensing authority, and by the decisions of the ARRL Awards Committee, acting for the IARU International Secretariat.

13. Disqualification: Any entry may be disqualified if the overall score is reduced by more than 2%. Score reductions do not include correction of arithmetic errors. Any entry may be disqualified if more than 2% of duplicate QSOs are left in the log. **A three-QSO reduction will be assessed for each duplicate QSO found during log checking or for miscopied callsigns.**

14. For contest information, contact **n1nd@iaru.org** or IARU HF Contest Information, PO Box 310905, Newington, CT 06111.

14.1. Contest forms may be downloaded at: **http://www.iaru.org/contest.html**. QST

NEW BOOKS

A RADAR HISTORY OF WORLD WAR II

By Louis Brown

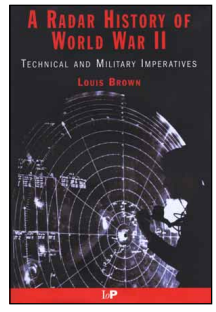
*First edition. Copyright 1999 by Institute of Physics Publishing, Dirac House Temple Black, Bristol, BS1 6BE England; tel 0117-929-7481; **http://bookmark.iop.org/**. Hardcover, 6 × 9 inches, 584 pages. $38.*

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

◊ Don't let the title of this book intimidate you (or the name of the publishing house, for that matter). *A Radar History of World War II* is a fascinating read.

Author Louis Brown begins with a taut description of the perils faced by German Vice Admiral Gunther Lutjens as he uses one of the first primitive naval radars to avoid the Royal Navy (and a fleet of icebergs) in the waters between Greenland and Iceland. Brown provides other historical examples as well, all written in a style that echoes of Tom Clancy.

From the first chapter Brown follows the explosive development of radar as hostilities erupt in Europe. He does this without bombarding you with equations and diagrams. Instead, Brown keeps the pace moving smartly, giving relevant technical details but not allowing arcane information to derail the narrative.



A good historical text is almost guaranteed to torpedo at least a few of your comfortable assumptions. I found myself taken aback by Brown's exposure of the huge gaps in my knowledge of radar and how it had been used during the war. I knew, for example, that English coastal radar stations had played an important role in warning of Luftwaffe attacks. What I didn't know was that by the end of the war radar was in the air as well—even aboard some types of fighter aircraft. Radar was also directing both German and British antiaircraft batteries on the ground. Both sides even resorted to elaborate radar jamming.

Brown's delivery is wry and opinionated, which is part of what makes *A Radar History of World War II* such a pleasure to read. Tesla fans beware: Brown credits Tesla with at least conceiving the idea of radar, but then states that Nikola squandered the idea as he "descended into self delusion." Ouch!

Brown's dry wit is evident throughout. At one point he describes the failed attempts of the Soviets to develop radar in the early days of the war…

"Whoever wishes to learn how governments fail in the duties of protecting their peoples from disaster should study the history of the Soviet Union; whoever wishes to learn how competent engineers can best be thwarted in their efforts to provide weapons vital for defense should study the history of Soviet radar."

Brown discusses radar applications not only in Europe, but in the battle for the Pacific as well. In one chapter he describes how a radar-savvy American battleship commander used the new detection device to catch a Japanese flotilla utterly by surprise in the dead of night.

A Radar History of World War II is illustrated with excellent black and white photography. Of course, there are multitudes of radar antenna, installation and operator images. One interesting photo in particular shows exactly how the first radar worked. Rather than the customary radar "beam" sweeping around a circle (known as a plan position indicator), the earliest radar used something that looked more like a standard oscilloscope or spectrum analyzer display. A large vertical spike on the left-hand side of the screen indicated the transmitter pulse while the distant target echoes appeared as smaller spikes farther to the right.

A Radar History of World War II is definitely intended as a scholarly work, probably with college students in mind. The book is thoroughly footnoted and indexed. Even so, Brown's writing broadens the appeal of *A Radar History of World War II* to include anyone with some technical knowledge and an interest in understanding how this remarkable radio technology played a crucial role in human history. QST

STRAYS

DAYTON QRP BANQUET

◊ Tickets are on sale for the 2000 Dayton QRP Banquet. This festive dinner will be held Friday, May 19, 2000, at 7:00 PM at the Days Inn Dayton South in Miamisburg, Ohio. The cost is $25 per person. The banquet speaker is QRP Hall of Famer and Norcal/Wilderness/Elecraft designer Wayne Burdick, N6KR. To register for the banquet, send a check or money order in the amount of $25 (per ticket), payable to QRP ARCI to:

Scott Rosenfeld, N7JI
766 Brookside Dr
Eugene, OR 97405-4931

Please include an SASE so that the tickets can be mailed to you.

FEEDBACK

◊ Please refer to Charlie Cheney, K1LDZ, "The QRSer: A CW Operating Aid," *QST*, Mar 2000, p 36, endnote 4. Strike the text "Price: $27.50" at the end of the note. The prices given earlier in the in the footnote are correct.

Disregard the text on page 36 referring to the below-board installation of D2. Current PC-boards have provisions for mounting D2. QST

By Dan Henderson, N1ND

Straight Key Night 2000

As the clock counted down to Y2K, this was a night to remember!

In this day of "modern technology" it is sometimes hard to remember when life was a bit less complicated. Labor saving devices have certainly reduced the "workload" for society. I don't know many who would give up their dishwashers, washing machines or power lawn mowers to revert back to scrubbing dishes by hand, cranking clothes through wringers, or spending hours pushing old spinning blade mowers across acres of yard.

"High Tech" permeates ham radio as well. When you inventory the typical ham shack today, you will find pretty much the same laundry list of equipment. An HF transceiver, VHF/UHF equipment, books, antenna switches and the ever-present personal computer (for performing a myriad of duties from logging and operating packet to whiling away a few hours playing *Freecell* while trying to bust the latest DX pileup)—all standard.

But in many shacks, at least on New Year's, a strange piece of gear will appear. Hundreds of operators put aside those newfangled electronic gadgets and reach into their secret storage places and pull out odd contraptions. Some will be simple; others more complex. But all are the same in basic principle: two conductors insulated from each other but with the ability to be pressed together to complete a circuit and cause a "Continuous Wave" of radio energy to be released from the transmitter. On this day many operators are seemingly transported back in time and participate in what we know as Straight Key Night (SKN).

A Special Celebration

SKN 2000 took on a special meaning. Whether you viewed January 1, 2000 as the start of the last year of the second millennium or the first day of the third millennium, hams with a passion for CW and an appreciation for the nostalgic took to the airways and completed thousands of QSOs. An examination of the logs showed several hundred different callsigns of operators who participated.

If one considers good CW as a "symphony for the ears" then the bands were alive with stirring melodies. Fifty-seven different "maestros" were nominated by their peers for having the "best fist" in SKN 2000. After the chorus of suggestions subsided, **John Riles, WA3WNK**, of Duquesne, Pennsylvania emerged as the "Best Fist." Quite an accomplishment when you consider a jury of your peers is always tough.

W6AQ/KH6 pounded brass as the surf gently pounded the beach at his Hawaii home during Straight Key Night 2000.

It was equally difficult for the orchestra of operators to select the "best score" (Most Interesting QSO) of the 24 hour event. Forty-three "composers" were recommended by their peers in this category. In another very close contest, three operators emerged tied for the honor in the eyes of the other operators. Congratulations to **Brian Roberts, K9VKY,** of Fombell, Pennsylvania; **John Hall, W5ETK,** of Dallas, Texas and **Carl Volker, NW3H,** of Mohrsville, Pennsylvania for participating in the top-ranked "Most Interesting QSO."

Artisans who can "turn out" a large volume of good work are to be admired. In that vein, special kudos go out to **Margaret Putnam, WP2T**, of Elgin, Illinois who produced 56 quality QSOs during the 24 hours of SKN. This is quite a feat, considering that the normal SKN QSO is more than a quick signal report, name and QTH exchange. Runners-up in this were **Ronald Clark, K3SEW** of Northumberland, Pennsylvania; **Robert Sechler, K3PX**, of Middle Island, New York and **Charles Nevel, W3KSO**, of Pocono Summit, Pennsylvania. They all completed over 30 QSOs during SKN.

The time of Arthur Clarke's landmark book *2001 A Space Odyssey* looms before us as we look ahead to the next annual gathering of Brass Pounders. We're not certain if the contacts of the 21st Century and the 3rd Millennium will be a space odyssey. But modern technology will make contacts with shuttle astronauts or the inhabitants of the international space station commonplace soon. Perhaps contact with extraterrestrials may be on the horizon. But we are certain that at 0000 UTC on January 1, 2001 anyone interested will be able to venture nostalgically back to the simpler times via the harmony of sounds on the air during SKN 2001.

Soap Box

The *only* radio event I look forward to more than SKN is Field Day. SKN's casual operating style and ragchew QSOing has far more appeal than other contests. (N8KC)… K5HPF told me he had made Y2K changes to his rig. All 1999-Ω resistors were changed to 2 kΩ for the occasion. (KG4DUF)… A real nostalgia trip when working stations running vintage gear (NQ4Q)… Nice to see many of the ops firing up the 'boat anchors' for this event (VE7SL)… Stations were using a lot more of the band segment. Not so crowded. SKN is definitely kick-back, low-stress CW (W6SGJ)… Had to reduce SKN activity this year because of involvement in Y2K net. Looking forward to next year's SKN and working more stations (W0HXL)… No Y2K bugs here. Just a sore arm after all the dits and dahs were hammered out on my old Speed-X key (WA0VQY)…. The shack smelled of hot wax and heated mildew from the HRO-5 and a variety of Heathkit transceivers where added to the day's effort (K9VKY)… When everyone is fast asleep, I put on my headphones and talk to the world on CW—something I can't do on SSB for fear of waking the household (WA2ELW)… I used 10 different straight keys during the event, changing every few QSOs. Each was connected to the transceiver via a 1/4-inch plug via an antique cast brass/bronze jack with "Thos. A. Edison, Inc" inscribed in the casting (K3PX)… During the QSO with LA7SKN, civic authorities here began a New Year's fireworks display. Air bursts and loud! Be alert. Sometimes the best filter is between your ears (K9LCK)… My brother W4AGI and father W5KL and I have worked SKN for over 25 years. I doubt if many "ham" families can equal that (W4YE) [Both sons now hold call signs previously held by Dad—*Ed*]… I am not aware of any other event which honors operators of the past who have enriched this hobby, which I recently adopted (KC0FMA)… Had no Y2K problems here in Dallas, but I had my 2 kW gas-powered generator ready just in case. I wasn't going to miss SKN! (W5ETK)… One of my QSOs was with Fairbanks, Alaska where the temperature was –53° F. At that time here in Honolulu it was 80° F. I wonder if that 133° temperature spread is an SKN record? (W6AQ/KH6) QST

SECTION NEWS

The ARRL Field Organization Forum

Field Organization Abbreviations

ACC	Affiliated Club Coordinator
ARES	Amateur Radio Emergency Service
ASM	Assistant Section Manager
BM	Bulletin Manager
BPL	Brass Pounders League
DEC	District Emergency Coordinator
DXFR	DX Field Representative
EC	Emergency Coordinator
LGL	Local Government Liaison
NCS	Net Control Station
NM	Net Manager
NTS	National Traffic System
OBS	Official Bulletin Station
OES	Official Emergency Station
ORS	Official Relay Station
OO	Official Observer
OOC	Official Observer Coordinator
PBBS	Packet Bulletin Board Station
PIC	Public Information Coordinator
PIO	Public Information Officer
PSHR	Public Service Honor Roll
SGL	State Government Liaison
SEC	Section Emergency Coordinator
SM	Section Manager
STM	Section Traffic Manager
TCC	Transcontinental Corps
TA	Technical Advisor
TC	Technical Coordinator
TS	Technical Specialist
VC	Volunteer Counsel
VCE	Volunteer Consulting Engineer
VE	Volunteer Examiner

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Many thanks to those who participated in the Delaware QSO party. It's important to continue to let folks know that there is indeed Amateur Radio activity in Delaware. Thanks also to the FSARC for again sponsoring the event. When April 16 rolls around many of you will be gaining additional privileges. To those that are gaining 80 meter phone privileges for the first time, I would like to invite you to join the Delaware Traffic Net and the Delaware Emergency Phone Nets. The Delaware Traffic Net meets daily Monday through Friday at 1830 local time on 3.905 MHz. The Delaware Emergency Phone Net meets on Saturday at 1800 local time, also on 3.905 MHz. Both nets are affiliated with the National Traffic System. They also will provide an excellent opportunity to meet some of your fellow Delaware hams. Traffic (Jan) DTN QNI 196 QTC 13 in 21 sess.; DEPN QNI 48 QTC 1 in 5 session. K3JL 42, WB0JJX 2. 73, Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Maslin. OOC: Alan Maslin, N3EA. PIC: E. Max Peters, KI6NJ. STM: Paul Craig, N3YSI. TC: Cully Phillips, N3HTZ. SGL: Allen Breiner, W3ZRQ. ASMs: KB3CFV, N3YSI, WB2YGA, K3TX, N3KYZ, WB3FQY, W3KOD. Sorry for the short report. My thanks to all who sent cards and made telephone calls during my open-heart surgery and recuperation. We're looking forward to Spring. Traffic (January): N3YSI 371, N3EFW 207, K3EAB 148, W3IPX 121, N3HK 120, W3KOD 61, W3UAQ 52, K3TX 49, W3JKX 40, N3SW 36, KA3LVP 19, N3AT 18, W3DP 14, K3CKO 14, W3NNL 12, N3AO 10, W3ZQN 7, W3BNR 6, N8JSO 6, KA3KMH 6, W3ROO 5, N3KYZ 5, KB3CKD 5, N3AS 5, K3ARR 4, W3DAB 3, KB3CVO 2, KB3BBR 2.

MARYLAND/DC: SM, Bill Howard, WB3V— MDC Section Web homepage **www.erols.com/wb3v/mdc/**. ANAR EC N3QXW reports 38 members, 4 ANAR ARES Net sessions on 147.805 with liaison to EPA, NCAC, MEPN, WVA, BTN, and MDD. The EC attended Y2K & Winter Storm preparation meetings at the EOC, and ARES/RACES members staffed EOC radio room from 0800 on 12/31, to 0200 1/1/00. FRED EC N8AAY reports 10 members and 5 Fredrick County ARES net sessions on 147.06. CARO RO NV3V has the new call W3FA. PRGE EC WI3N reports activity during the recent snowstorm. He was requested by PRGE EM director to place personnel at the EOC. He contacted Jim, KD3JA from CMARC, and GMRA for permission to use the GMRA repeaters 146.61 and 146.88 for ARES activities. The Laurel Amateur Radio Club had 9 members helping the Laurel Regional Hospital with its 4wd program. They set up net control at the hospital station on 147.54 simplex and monitored 146.61 so WI3N could be in contact with the EOC. Members rode along with 4wd volunteers, some of whom did not have cell phones. The station was secured at 1900 per request of the hospital. At the request of Kay Graham, we supplied one operator for the EOC station from 1000 - 1400 on 26 January. We had an operator standing by to ride with a 4wd if needed. CARR EC N3JIA reports 64 members and 4 net sessions on 145.410 with liaison to MEPN, MDD, and MSN by KE3FL, and liaison to BTN, WVPN, DTN, MEPN, Central Net, and Western Net by KG6TU. OES reports received from KE3FL WX3F N3JIA N3TOT and N3SOK. I was very pleased to see ARRL standup for the spread spectrum regulations. As a member of the original ARRL AD HOC committee on spread spectrum I have a continuing interest. I'm getting the shack setup for psk31 on 20M, see you there. 73 - Bill Howard WB3V - and with the nets: Net/NM /QND/QTC/QNI: MSN/KC3Y/31/48/375, MEPN/N3WKE/31/54/656, MDD/WJ3K/65/276/857, MDD Top Brass: KJ3E 294, AA3SB 174, K3JL 177, BTN AA3LN, 31/46/396, SMN/KE3OX/no report. Tfc: KK3F 594, KJ3E 328, N3QA 257, AA3SB 138, AA3GV 134, W3YVQ 91, WB4FDT 80, N3WKE 67, N3DE 55, N3WK 45, W3CB 44, KO4A 40, KC3Y 38, KB3AMO 37, WJ3K 31, K3CSX 28, N3KGM 22, WA1QAA 16, W3YD 16, N3ZKP 14, W3VK 11, N3EGF 11, W3FZT 8, WA3WRT 6, KE3FL 2, KD3JK 1, Dec: KE3FL 4. PSHR: KK3F 218, KJ3E 171, K3CSX 150, AA3GV 139, N3WKE 136, W3YVQ 133, AA3SB 130, KO4A 130, N3WK 121, WA1QAA 119, KD3JK 117, W3VK 116, N3ZKP 101, KC3Y 100, W3CB 96, KB3AMO 92, KE3FL 82, DEC KE3FL 72.

NORTHERN NEW YORK: SM, Chuck Orem, KD2AJ—Web: **http://www.northnet.org/nnyham**. ASMs: KD2AJ, WB2KLD, N2ZMS, WA2RLW. ACC: WZ2T. BM: KA2JXI. OOC: N2MX. PIC: N2SZK. SEC: KF2GC. STM: N2ZGN. TC: N2JKG. On February 15 I attended a Ham Radio breakfast meeting at Clarkson University, Potsdam NY in St Lawrence County. There were about 50 attending from Essex, Clinton, Franklin and St Lawrence counties. The meeting was very interesting and met a lot of old friends and met a number of new amateurs. After breakfast we went on to Canton NY and had the opportunity to tour the St Lawrence County OC and the RACES station. A great job has been accomplished in St Lawrence County for Emergency Services. The CVARC has downgraded their hamfest on April 29 to a ham radio flea market and computer show. The event will still be April 29 at the St Peters School in Plattsburgh, and can be held indoors in the event of bad weather. They seem to be having trouble getting vendors to travel so far north. 73, KD2AJ.

SOUTHERN NEW JERSEY: SM: Jean Priestley, KA2YKN (@K2AA) **e-mail: ka2ykn@arrl.org**—ASM: W2BE K2WB W2OB N2OO. SEC: N2SRO. STM: WB2UVB. ACC: KB2ADL. SGL: W2CAM. OOC: K2PSC. PIC: N2YAJ. TC: W2EKB. TS: W2PAU, W2BE, WB2MNF, KD4HZW, WB3IJB, N2QNX, N2XFM, WA2NBL, AA2BN. I'm pleased to announce that Kay Craigie, WT3P, is now 2nd Vice President at ARRL. Kay is highly qualified and has the best teacher, Hugh Turnbull. We extend congratulations to Bernie Fuller, N3EFN, on moving up to Atlantic Div Director. Although I'll miss working with Kay, I look forward to working with Bernie. You will have an opportunity to meet Bernie at the "Hamfest by the Shore" in August. SNJ is proud of John Dilks, K2TQN. John's passion for old radios and his traveling display are very well known in the Amateur community. He is now writing a monthly column for *QST* on old radios. Well done, John. We look forward to your column. January stats: WA2CUW 108, WB2UVB 98, AA2AV 73, K2UL 72, KB2RTZ 71, K2UL-4 69, N2VQA 24, KA2CQX 19, N2WXF 17, N2WFN 12, W2AZ 12, KB2VYZ 8, WX2NJ 6, N2ZMI 6, KC2FWC , KB2YJD 3, NN2Y KC2AZO 2, KB2VSR KB2YBM KB2ETU. 1. QNI rpts: Jersey Phone Net 203 NJ Net Early 240 NJ Net Late 215 NJ Morning 207 NJ Slow Net 169 Jersey Shore Amateur Radio Soc Net 447 SJVN 351.

WESTERN NEW YORK: SM, Scott Bauer, W2LC — Congratulations to Bill, W2MTA, on 20 years of fine service to the ARRL & WNY as SCM and SM. BARA hosted Bill & Betty for a fine send-off into SM retirement. Bill, please accept a big THANK YOU from everyone in WNY! I am honored that Bill chose me to succeed him as SM. Trivia: Who ran against W2MTA for SCM 20 years ago? Hamfests: March 25, Drumlins at Newark; May 6, Owego; June 2-4 Rochester, Atlantic Division Convention. Remember to send hamfest info early. Congratulations to: ARAST for a fine Y2K effort at the Chemung County EMO. Really impressed EMO Dir Michael Smith, nice web page too; and Yates ARC for doing a code practice prior to the start of their monthly meeting, nice idea! Welcome to Jack, W2QYT, new Cayuga Cty EC, and Jeff, KC2EOT, new ORS. Have club or section news? I want to hear from you! How about that Kid's Day on Jan 1? See Dec QST. Lots of kids talking on the radio, many licensed kids too! How about KB0VVT an Extra at age 8! Thanks Boring ARC for starting a great event. See you in the June event.

Net	*NM*	*Sess*	*QNI*	*QSP*
BRVSN	WB2OFU	31	252	3
CNYTN	WA2PUU	31	354	56
NYPHONE	N2LTC	31	223	309
NYS/E	WB2QIX	31	425	214
NYS/M	KA2GJV	31	255	91
NYSPTEN	KD2V	31	367	50
OCTEN/E	KA2ZNZ	31	1692	190
OCTEN/L	KA2ZNZ	31	639	178
OMEN	K2DYB	2	14	1
WDN/E	N2JRS	31	659	118
WDN/M	KB2VVD	31	632	85

Net	*NM*	*Sess*	*QNI*	*QSP*
VHFTHIN	N2JRS	1	20	0
CHN	W2EAG	31	204	42
EBN	WB2IJZ	22	461	0
NYPON	N2YJZ	31	365	176
NYS/L	W2YGW	31	285	205
NYSCN	W2MTA	5	24	4
OARC	N2KPR	4	40	5
STTHN	N2WDS	9	44	9
WDN/L	KB2UQZ	31	542	32
STAR	N2NCB	31	426	20

Traffic (Jan 2000), * indicates PSHR, #indicates BPL: N2LTC#* 842, KA2ZNZ* 475, W2MTA* 371, KA2GJV* 320, KF1L* 269, WB2IJH* 249, NN2H* 211, WI2G* 201, W2PII* 121, WB2QIX* 117, W2FR* 113, N2KPR* 76, K2GTS* 73, KB2VVD* 72, KG2D* 65, AA2ED* 63, AF2K* 62, NY2V* 50, KA2DBD* 50, N2CCN* 47, KB2UQZ* 44, KC2EOT* 41, N2WDS* 34, K2DN* 23, KB2ETO* 22, W2LC* 17, NY2CQ* 15, KB2WII* 13, W2RH 10. Digital; Stn Rx/Tx: K2DN 0/0, KA2GJV 39/5, N2LTC, 189/133, NY2V 1/3. If you don't see your net/call, that's because I didn't get your report. Send reports promptly at the end of each month. A station appointment application form is now on-line. Link thru WNY Web Page at **http://www.dreamscape.com/phaedrus/WNY/** or my home page at **http://pw2.netcom.com/~w2lc/w2lchome.htm**. Thanks to N2IKR for maintaining the WNY Section Web Page. Net Managers take note: April brings relaxed requirements for HF operation. Start recruiting for those VHF/Section Net slots.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE—ASM-ARES: WB3KGT. ACC: open. SEC: N3SRJ. ASM-Packet: KE3ED. ASM-Youth & Education: KE3EE. OOC: KB3A. 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. I would like to congratulate Kay Craigie, WT3P, on her election to the position as second vice president of the ARRL. With this, Bernie Fuller, N3EFN, has become the director of the Atlantic Division. Replacing Bernie is Bill Edgar, N3LLR, as the Vice Director. Congratulations to these fine gentlemen as well. I have had the privilege to work with both Bernie and Bill as an assistant, and I appreciate the confidence they have in appointing me to fill the remainder of Bill's term as Section Manager. I am looking forward to representing the amateurs of this section and welcome input from individuals or clubs. As we move into the nicer weather of spring and summer, our thoughts turn to activities of hamfests, contests, club picnics and the big event of Field Day. I look forward to seeing many of you at the various activities at which I will be attending. As in the past, I will be visiting various field day sites in the section, so if your group is interested in having me stop by , please send me the information regarding your activities. I will be establishing my route in mid June. If you would like me to speak at a club meeting or other event, let me know for scheduling. There are many field appointments available and if you would like to volunteer for one, please get in touch with me and I will advise you of the opportunities. Introduce someone to the wonderful world of Amateur Radio. 73 John Rodgers, N3MSE, WPA-SM, **n3mse@arrl.org**

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. DEC-S/W: KB9AIL. The new officers of the DuPage ARC are Pres N9NWA, VP N9HRT, Sec WB9UGX, Trea N9URU. The club is planning a special event station in May for Armed Forces Day. Arne Harris, producer and director of sports for TV station WGN was the featured speaker at the Metro ARC. He discussed the technical aspects of TV sports production and shared some anecdotes from over the years. The new officers of the Sangamon Valley RC are Pres KA9HLZ, VP KB9RQZ, Sec KB9PCC, Trea KB9BIV. Saline Co ARES EC WB9SKB reports the Saline County ARES/RACES group worked in conjunction with Williamson County ARES to provide backup communications for AmerenCIPS for the local area during the start of the new year. ARES members attended meetings at Williamson County and local meetings in Saline County. Jacksonville ARS had a good turn out for their first two fox hunts. KA0SNL, Area Coordinator for AMSAT, was the featured speaker at the JARS annual dinner. Technical Coordinator N9RF is often asked to solve interference problems. In his latest report he states that listening to the interfering signal and using an oscilloscope that is synchronized to 60 Hz to look at the receiver audio can supply some clues. "If the pattern remains stable," the TC said, "it is caused by the power grid. If the pattern moves slowly, it is usually due to a TV set or cable. If little or no sync can be established it is due to atmospherics." The Schaumburg ARC is discussing the advantages of using their corporate status to save money on group purchases. Since many radio clubs in the section are incorporated, this may allow cost savings for them as well. It's something to keep in mind. SARC held ham classes at the Schaumburg Fitness Club in January and February. The club also had a field trip to a Chicago Wolves Hockey game at the Allstate Arena. The new officers of the Peoria Area ARC are Pres N9MSG, VP N9ZBE, Sec KB9PUW, Trea KB9NW. The Suburban Technical Amateur Radio System (STARS) elected a slate of officers recently and the winners are: Pres WW9WW, VP WB9JGG, Sec KB9RGI, Trea WB9LRK. January traffic: WB9TVD-35, W9HLX-35, N9DT 34, NC9T 22, KA9IMX 8, W9FIF-7. ISN de WB9TVD QNI-267, QTC-72, Sessions-31. Ninth region C4 report for Dec—traffic 357 sessions 62 time 455 min average 5.75 rate .784 percent rep 95%—ILN K9CNP KF9ME NS9F. Ninth Region C4 report for Jan——traffic 217 sessions 62 time 390 min average 3.5 rate .556 percent rep 90%—QNI—ILN K9CNP KF9ME NS9F. 9RN report for January de KF4UBX: 62 sessions held, total traffic 153, average per session 2.46, rate of traffic 4.66, total percentage section represented during month 88%. W9VEY Memorial Net report de K9AXS not available.

INDIANA: SM, Peggy Coulter, W9JUJ—Sympathy extended to the families and friends of Silent Keys: Nov 18, 99 WA9DTW, Garfield L. Walker, Mishawaka; 1/8, W9HMS, James Hatfield, Fort Wayne; 1/16, WA9ERN, Norman H. Smith, Muncie; 1/21, W9BC, Lambert B. Howard, Evansville and 2/3, N9RP, Joseph R. (Dick) Perry, Middletown. They will be missed. Thanks to the following ECs having submitted their 1999 annual report.N9KQO, WB9NCE, N9LRO, KG9LX, N9ADS, WD9BKA, WB9UNL,and N9YNF. If your EC isn't listed

Continued on page 116.

Steve Ewald, WV1X ♦ Assistant Field Services Manager

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.

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

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

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

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, K5EHP, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Peri, KC4CQS, Mgr.
Doraville, 1 mi. no. of I-285

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

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

12 Store Buying Power!

Anaheim's Manufacturers Day! March 25th
CELEBRATE ANAHEIM'S GRAND RE-OPENING
with Special Pricing that day only at All Locations!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Call For Spring Specials!

KENWOOD

APRS, TNC Features Built In!

NEW!

TH-D7A 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

Call Now For Low Pricing!

VC-H1

Visual Communicator

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

Call For Low Price!

5w High Power Also Avail.

TH-22AT

- Ultra Compact
- 2M HT, 5W optional
- 40 memories
- Encode Built-In

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

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.

Great Low Price

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

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

NEW!

TS-50S HF Trans.

- 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

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

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!

12 Store Buying Power!

Anaheim's Manufacturers Day!
March 25th
CELEBRATE ANAHEIM'S GRAND RE-OPENING
with Special Pricing that day only at All Locations

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

ICOM HF ...THE LEGACY CONTINUES!

$150 COUPON with purchase of IC-706MKIIG
$180 COUPON with purchase of AH4 and IC-706MKIIG
$200 COUPON with purchase of AT180 and IC-706MKIIG

IC-706MKIIG

Proven Performance Mobile or Base

- All mode HF/6M/2M/70cm
- 100W HF/6M, 50W/2M, 20W/440 MHz

The IC-706MKIIG coupon offers may not be used together in any combination

IC-2100H 2M Mobile Transceiver

- Cool dual display
- 55 watts
- CTCSS encode/decode
- Backlit remote control mic
- Mil spec 810, C/D/E for shock & vibration

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/1.2GHz
- Ni-MH battery standard
- AM, FM, WFM
- "Joy-stick", multi-function switch
- CTCSS encode/decode
- RIT and VXO for 1200 MHz

FULL COLOR LCD DISPLAY
Computer Programable, Win 95,98®

IC-2800H Dual Band Mobile

$30 COUPON

Mounting Kit Included

- 2M/440MHz
- Band scope
- 3" TFT LCD disp
- NTSC video input
- CTCSS encode/decode
- Selectable RF attenuator
- 232 alphnumeric memories

NEW!

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

Come See the ICOM Funmobile March 25th to Celebrate HRO ANAHEIM RE-OPENING!

IC-T22A 5W, 2M Handheld

$30 COUPON

Shirt-Pocket Size Offers Fun on the Run!

- 4.0 - 16 V DC input
- 80 memory channels
- VHF with air band receive
- Auto repeater function
- Backlit display
- Die cast aluminum
- Alphanumeric

$40 COUPON

IC-T7H 6W, Dual Band Transceiver

Dual Bands at a Single Band Price!

- Easy operation!
- 2M/440 MHz
- 70 memories
- Great audio
- CTCSS encode/decode
- Auto repeater

IC-207H Dual Band Mobile

$65 COUPON

- 2M/440 MHz
- Wide band rx (includes airband)
- 9600 BPS packet ready
- 45W VHF (2M), 35W UHF (440 MHz)

IC-746 All Mode 160M-2M

$300 COUPON

- 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

IC-Q7A Dual Band Transceiver

$25 COUPON

- 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
- Multiple scan modes including band, VFO, priority, program

$70 COUPON

IC-T8A 5W Tri-Band Transceiver

FREE Alkaline Battery Case!

- 6M/2M/440MHz
- Easy intuitive operation
- 123 memories
- 5W @ 13.5 V
- Alphanumeric with optional software

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

ICOM®

**Cellular blocked, unblocked OK to FCC approved users. Coupons: Check with HRO dealer for details/restrictions. ++Coupon prices run 1-17-00 through 3-31-00.
*All IC-706MKIIG offers good until 3-31-00 © 2000 ICOM America, Inc. AM-4370 APR.ver1 (2.00) The ICOM logo is a registered trademark of ICOM, Inc.

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.

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

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

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

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John N5EHP, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Peri, KC4CQS, Mgr.
Doraville, 1 mi. no. of I-285

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

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

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.

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

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

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

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, K5EHP, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Peri, KC4CQS, Mgr.
Doraville, 1 mi. no. of I-285

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

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

12 Store Buying Power!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Anaheim's Manufacturers Day! March 25th
CELEBRATE ANAHEIM'S GRAND RE-OPENING
with Special Pricing that day only at All Locations!

Call For Spring Specials!

YAESU

FT-840
- 100W • 12V DC • DDS
- Gen. Cov. Rx, 100 mem.
- Optional Ext. Auto • Tuners Available

Call Now For Our Low Pricing!

New Lower Price!

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

NEW!

Call Now For Low 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 Intro Pricing! NEW!

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
- 220 mems, opt. barometer unit
- Alpha Numeric Display
- CTCSS/DCS built-in
- Li-Ion Battery

Call For Low Intro Price!

VX-1R
2M/440 Sub-Mini HT
- 290 Memory Channels
- .5W output
- Receives 76-999mHz plus AM BCB (Cell Band Blocked)
- Lithium Ion Battery

Call For Your 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!

New 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!

NEW!

Call for Your Intro. Low Price!

Free FM-1! Limited time only

FT-920 HF+6M Transceiver
- 100w 160-6M, 12VDC
- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
- Computer controllable, CAT System

New Low Price!

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/op

NEW!

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!

12 Store Buying Power!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Anaheim's Manufacturers Day! March 25th
CELEBRATE ANAHEIM'S GRAND RE-OPENING
with Special Pricing that day only at All Locations!

HRO 12-Store Buying Power Working For You!!

ALINCO

DR-605TQ 2M/440 Dual Band Mobile

- 50W 2M, 35W 440
- Built-in Duplexer
- 9600 Baud ready
- 50 Memory chanels
- RX Range 136-174mHz/420-470mHz
- CTCSS built in

NEW!

Call For Low Pricing!

HRO Intro Price $599.95

DX-77EQ HF Transceiver

- 100W SSB, CW, FM, 40w AM
- 100 memories • Dual VFO • Speech Processor
- IF shift • CTCSS for 10M FM
- Gen Cov Rx 150kHz-30mHz
- Ham Band TX 160-10M
- CW filter + keyer optional
- Hand mic included • 13.8V DC

NEW!

DJ-S41T/DJ-S11T

440 Tiny HT 2Mtr Tiny HT

- 340 mw
- 21 memories
- Uses 3 "AA" Batteries
- Encode built-in
- Pivot antenna
- Less than 5" high and 2 1/4" wide (DJ-S41T)

(DJ-S41T shown)

DJ-C5T

- 2M/440 Tx + Rx
- Extended Rx VHF/UHF
- Built-in Enc./Dec.
- 300 MW Tx output
- 50 Mems. + Scanning
- Built-in Lithium-Ion battery
- Complete w/fast charger

Call for Low Price!

DX-70TH HF Transceiver

- 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

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!

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

CN-101 1.8-150MHz 1.5KW

CN-103 140-525MHz 200W

- Economy Lighted Bench Meter
- Large Cross Needle Display
- Accurate DAIWA Engineering

CA-UHV

40M-70cm Mobile Antenna

40/*20/*17/15/10/6/2M/70cm
* optional coils

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.

MSG-1000C
Length: 39 inches
Max Pwr: 150W
Conn: PL-259

MSG-1100C
Length: 43 inches
Max Pwr: 150w
Conn: PL-259

NEW!

MH-510

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!

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.

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

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

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

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, K5EHP, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Peri, KC4CQS, Mgr.
Doraville, 1 mi. no. of I-285

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

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

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.

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

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

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

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, K5EHP, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Peri, KC4CQS, Mgr.
Doraville, 1 mi. no. of I-285

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

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

12 Store Buying Power!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Anaheim's Manufacturers Day!
March 25th
CELEBRATE ANAHEIM'S GRAND RE-OPENING
with Special Pricing that day only at All Locations!

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!

NEW!

Call Now For Special Pricing!

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

ADI

AT-201HP 2M Handheld

- 40 memories + CALL channel
- Wide receive 130-180 MHz
- Built-in CTCSS enc./dec.
- Full-sized, backlit keypad
- 5 watts RF output

$50. MFG Coupon exp. 33-31-2000

$40. MFG Coupon exp. 3-31-2000

AT-600HP 2M/440 Handheld

- Wide receive from 100-174, 340-480, and 850-985 MHz (cellular blocked)
- Dual receive • 200 memory channels
- 6 character alphanumeric display
- Crosband repeat • Auto repeater shift
- CTCSS enc./dec. • CTCSS tone scan

$40. MFG Coupon AR-447 UHF exp. 3-31-2000

AR-147 Plus

2M mobile

- 3 select. pwr. settings (5/10/60w)
- 80 memories plus a CALL channel
- Built-in CTCSS/DCS encode/decode
- Wide receive cov. 130-171 MHz

Special Low Price!

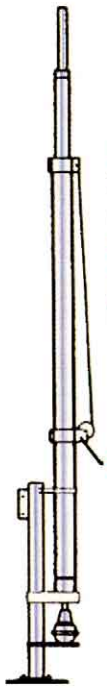
concepts

VHF/UHF Solid State Amplifiers

Contemporary design, quality and a 1 year warranty on parts and labor. 1 year on the RF Final transistors.Most amplifiers have GaAsFET receive pre-amps and high SWR shutdown protection

US TOWER

Call Now For Springtime Package Deals



Shown with Optional Rotor Base

MA-40

40' Tubular Tower

REG. $809
SALE $679.95

MA-550

55' Tubular Tower
Handles 10 sq.ft. at 50mph
Pleases neighbors with tubular streamlined look

Reg.$1369
SALE $1069.95

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!

SALE $1399.95

Buy From HRO, World's Largest U.S. Tower Dealer

All US Towers shipped truck collect.

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

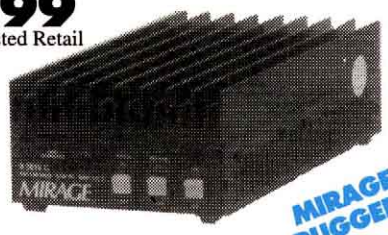
Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!

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 . . .

B-5016-G
$299
Suggested Retail



MIRAGE RUGGED!

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*

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.

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

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

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/10 W 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/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail

Power Curve -- typical B-310-G output power							
Watts Out	*25*	*50*	*75*	*95*	*100*	*100+*	*100+*
Watts In	*¼*	*½*	*1*	*2*	*4*	*6*	*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 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+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*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

MIRAGE RUGGED!

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	*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/35W 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.

70cm 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. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

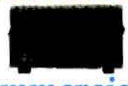
KP-1

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 160 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 andForward/ 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: 601-323-8287 Fax: 601-323-6551

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

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

ask him why? Thanks to K8LEN, KO9D and K9ZBM for their dedication as NCS on ICN. MARC, South Bend presented the Ham of the Year award to Eldon Haden, KA9SUF, also certificates were presented to Hal Brueseke, KA9MXW, and Patricia Haden, KA9SUG, for their outstanding services to their club. Some other interesting awards were presented to Kay K9CLM who received a Y2K compliant laptop computer (etch-a-sketch) no batteries or AC power required so she can take notes even if her computer fails. The CW expert Keith WA9S received a MasterMind game to help further develop his code skills. George WB9SCC received a Busy Bee trophy as a reminder of all his activities and Earl KA9EKA was presented two bananas in keeping with a tradition from previous years when there was nothing else to give him. Congratulations to the Indpls Radio Club receiving a certificate for 75 years continuous affiliation with ARRL.I have mentioned this several times, please send me your club's Amateur of the Year nomination for the IRCC Amateur of the Year award. My address is on page 12. Send it now before you forget it. NMs ITN/W9ZY, QIN/N9PF, ICN/K8LEN, WN/AB9AA, VHF/N9ZZD.

Net	Freq	Time/Daily/UTC	QNI	QTC	QTR	Sess
ITN	3910	330/2130/2300	2904	447	1514	93
QIN	3656	1430/0000	no report			
ICN	3705	2315	154	34	524	30
IWN	3910	1310	2173	–	310	31
IWN VHF Bloomington			503	–	465	31
IWN VHF Kokomo			662	–	155	31
IWN VHF Northeast			1040	–	620	31
Hoosier VHF nets (11 nets)			640	55	930	40

D9RN Total QTC 153 in 62 sessions IN represented. 95 % by WB9QPA, W9UEM, KB9NPU, and K9GBR. 9RN Total QTC 217 in 62 sessions IN represented by K9PUI, KO9D, N9PF, WA9QCF, AA9HN, WB9UYU and W9FC. Tfc: W9FC 263, W9ZY 112, WB9QPA 90, N9ZZD 75, K9GBR 70, KO9D 58, W9UEM 56, AB9AA 43, N9WNH 37, W9JUJ, KA9EIV 32, KB9NPU 26, K9PUI 22, KA9QWC 15, AA9HN 15, W9BRW 14, W9EHY 11, K8LEN 10, K9RPZ 8, AB9A 6, WB9NCE 3, K9OUP 1, K9DIY 1.

WISCONSIN: SM, Don Michalski, W9IXG—BWN 3985 0600 W9RCW. BEN 3985 1200 KE9VU. WSBN 3985 1715 WB9WHQ. WNN 3723 1800 KB9OCZ. WSSN 3645 1830 N9BDL. WIN-E 3662 1900 WB9ICH. WIN-L 3662 2200 W9UW. It is with deep regret that I inform you of the following Silent Keys: Bob Stockfish, AA9EF. Bob, age 47, was a member of the Washington County ARC. Also, John Scarvaci, W9GIL, passed away at age 86. John was a life member of MRAC and member of QCWA. MRAC reports that Sam Saffro, K9OXH, age 95, and Jerry Melotik, KC9EV, age 57, are Silent Keys. Daniel, W9NXE, is now net control for the WSBN on Sundays. Join the WSBN and consider becoming a net control. Contact our STM, K9LGU, for more info and visit the WNA site: **www.wna.eboard.com** for photos and tips for traffic handling. Good news from 9RN land-KF4UBX reports 100% representation by Wisconsin hams! Keep it up and more help is needed to pass traffic! Coming soon to the section Web site, **www.w9ixg.eboard.com**, a list of all section Technical Specialists and their areas of technical expertise. Members will be able to contact a TS to answer specific questions. Use this service! Also, our SGL, AD9X, Jim Lackore, has posted current government legislation news as it relates to Amateur Radio in Wisconsin. This is the time of year to think about providing ham support for the various public service events in your community. Get involved in the early planning stages so you can help insure that communications will be fully integrated and not just an afterthought. Remember, that these events can be used as training for emergency communications. Get your new club members involved and tag them up with an experienced operator! 73, Don. **w9ixg@arrl.org** Tfc: W9RCW 933, K9JPS 777, W9YPY 609, W9IHW 553, K9GU 537, WZ7V 469, N9TVT 392, W9CBE 172, K9FHI 137, N9KHD 102, N9CK 91, AG9G 80, N9BDL 77, W9UW 71, K9LGU 61, KE9VU 60, W9YCV 47, KG9B 43, KB9ROB 40, W9BHL 37, KA9FVX 34, KN9P 34, AA9BB 33, WB9ICH 33, KB9QPM 32, WD9FLJ 21, N9JIY 8, W9ODV 7, W9PVD 3.

DAKOTA DIVISION

MINNESOTA: SM, Randy Wendel, N0FKU—By the time you read this, the Minnesota ARRL Section and NTS Net will have vacated 3870. Look for us at 5:30 PM on 3860. Don't forget the 23rd year of the Rochester Hamfest to be held Sat April 8 at the Olmsted Co fairgrounds at 8 AM. Check Web site **http://www.members.aol.com/rarchams** for additional info. Of the many hamfests that are held each year, this is one you want to attend. This writing comes after-the-fact, but the MN state Dept. of Emerg Mgmt was in process of putting a group of radio operators together who could staff the state EOC in St Paul during any emergency event that would utilize radio comms via the Amateur Radio service. Because of the timeline involved, I'm late and unable to solicit any volunteers via this news column, but I have done so via the ARES reflector thru the ARES ECs. I will pass along any news regarding the DEM, though the ARES groups will have already received it via their ECs As far as I can tell, every ARES EC has e-mail and we also have the ARES HF Net held weekly, so we have good means of communicating both ways among each other. Gary and XYL Gladys, along with ARES DECs Ed LaPlante and Russ Marsolek, helped out with John Beargrease comms in early Feb. Lastly, I'm slowly trying to add more info of interest to my web site, so check it out if you can: **http:/www.pclink.com/rwendel**.

Net	Freq	Time	QNI/QTC/Sess	MGR
MSPN/E	3860	5:30 P		W0WVO
MSPN/N	3860	12 P	524/138/31	WA0TFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	283/83/31	W 00HPD
MSN/2	3605	10 P	163/37/31	K0PIZ
PAW	3925	9A-5P	3030/97/91	KA0IZA

Tfc: WO0A, KB0AII, W0TFC, W0LAW, W0GRW, K0PIZ, KB0OHI, W0HPD, KN9U, W3FAF, K0WPK, K0PSH, KA0IZA, KB0AIJ, K0OGI, WD0GUF, N0JP.

NORTH DAKOTA: SM, Bill Kurtti, WC0M— Make your plans

Patcomm's New PC-16000A HF Transceiver

List Price $ 1,749.00

Patcomm is proud to announce **"The New PC-16000A HF Transceiver"** with advanced operational features. This **100 Watt Output** Multi-Mode HF Transceiver boasts **General Coverage Receive**, **CW & RTTY Modem** with built-in Keyboard Interface, built-in **Iambic CW Keyer**, **Collins Mechanical Filters**, QRM reducing **IF Shift**, Brick Wall **DSP** Filtering with **Auto-Notch & Denoiser**, **VOGAD & RF Clipping** for surperb SSB audio quality and **VST** (Variable Speed Tuning) for ultra slow or fast tuning speeds. Here is a rig which is easy to use and has **Solid Performance** built in.

patcomm corporation

Phone: (631) 862-6511 Fax: (631) 862-6529
Website: www.qth.com/patcomm E-mail: patcomm1@aol.com
7 Flowerfield Suite M100 St. James, NY 11780

Call or Vist our Dealers:
B&H Sales - Derby, KS
(316) 788-4225
C&J Radio -Snellville,GA
(770) 979-4077
Burk Electronics - LaGrange, IL
(708) 482-9310

ARW -Youngstown,OH
Orders: 1 800-807-1220
Info: 1 330-759-1220
Hirsch Sales - Buffalo,NY
(716) 632-1189

JCRE International
Woodland Park, CO
(719) 687-5600
Sound North - Int'l Falls, MN
(218) 283-9290

For International Inquiries:
Patcomm International
Zoetermeer, The Netherelands
+31 (0)79 361 72 04
Factory Representitive:
Peter Bergman - Brainard, MN
(218) 829-6286

Designed & Manufactured in the U.S.A.

Patcomm's Rugged PC-9000 HF+6 Transceiver

Patcomm's **HF+6 Meter Transceiver** has **Big Rig Performance** in a compact, rugged and very portable package. This rigs **40 Watt output** packs plenty of punch. Built-in features such as **VOGAD & RF Clipping** provide big radio punch on SSB. A Variable **SCAF Filter** is used within the **AGC** loop to provide superb receiver selectivity. An **Iambic Keyer** and built-in **CW Keyboard** interface are provided for CW. This is one very easy to handle rig with **FUN** built in.

*20 Watts nominal on 6 Meters

The PC-9000 HF+6 Transceiver
Optional FM Adapter Available
List Price $799.00

Coming Soon: The RX-16000A HF General Coverage Receiver

The same solid performing receiver as in the PC-16000A including Collins Mechanical Filters, DSP, IF Shift plus the CW & RTTY Decoder Built-in. This is a **"World Class Receiver"**

GET CONNECTED!

The personal computer revolution has introduced many new HF digital operating modes. Inexpensive software and hardware make it easy to get started, and this new handbook helps amateurs of all skill levels make sense of this alphabet soup of choices.

Chapters cover:

- Building an HF digital station (hardware recommendations and simple construction projects)
- RTTY
- PSK31 (the *hot* new HF digital mode!)
- PACTOR (including PACTOR II)
- Clover
- G-TOR
- Hellschreiber (the "visual" HF digital mode)
- The HF/Internet E-mail Connection
- HF Digital Contesting

This book offers something for all digital communications enthusiasts. Loads of practical operating advice — valuable reference information!

ARRL
email: pubsales@arrl.org
http://www.arrl.org/

ARRL's HF Digital Handbook
ARRL Order No. 7652—**$15***
*Shipping US $4 (UPS)/International $5.50

Toll-Free 1-888-277-5289
Phone 860-594-0355
fax 860-594-0303

Order Toll-Free **1-888-277-5289**
04/2000

now to attend the Peace Garden Hamfest July 7 to 9 at the Peace Gardens located on the ND MB border on hwy USA 281. Lots of fun for the entire family Children's & Ladies events, transmitter hurts, contests, meetings & flea market for the Hams plus a lot more. Sorry to report that WD0CPX is a Silent Key, Vern was a radio operator in the south Pacific in WW2 he liked to tell the story how during the big typhoon in Okanwawa the wind was so strong to walk you had to have your back to the wind & lean into it then push yourself forward with your feet. Year 2000 came with no problem into ND but the Dickinson Hams & yours truly were ready with they YK2 survival kits just in case. Was great to see WA0HUD making a fast recovery from his operation last fall. Net: Sess/QNI/QTC/ Mgr: Goose River, 1895 kc 8:30 AM Sun: 5/74 /0/ KE0XT. DATA 3937 kc 6:30 PM daily: 31/742/16 KE0XT. WX Nets 3937 kc 8:30 AM, 12:30 PM: 54/1197/43/KE0XT. Storm Net 3937 kc, continuous as needed during storms.

SOUTH DAKOTA: SM, Roland Cory, W0YMB—NU0F, Frank Shaw, of Rapid City, has received an appointment as Assistant ARRL Director for South Dakota. New Huron ARC officers are WA0TDK pres; K0OH vp; WB0ULX sec/treas; and KI0BV activities. Hub ARC at Aberdeen has installed a complete station at the Brown Co emergency management office. They will have a test session on May 6. Watertown will have a test session on April 29. Huron ARC are planning license classes for fall. Sioux Empire ARC, Sioux Falls, will have a convention on September 30th. The SD Novice Net participation has increased and also the NE S Dak Two Meter net has shown a large increase. The license restructure has caused VE exams to spring up all over the state so people who want a certificate to upgrade after April 17 will be able to with only 5 wpm code. Traffic reported for January was 541.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org —This month, I enjoyed visiting the Stone County ARC meeting. We exchanged a lot of interesting information and had very good turnout and a very good meal. Among the items discussed were the new license structure, Field Day, public relations, and the repeater linking system now in place there. See **http://sun1.hu.edu/~hamradio/repeaters.htm** scroll down to Stone County and follow the links. I attended the hamfest in Memphis this last weekend and enjoyed the large turnout. It was nice to see the multi-club event turn out so well. The ARRL forum was well attended and the guest speakers (Rick Roderick, K5UR and Joel Harrison, W5ZN) answered many questions and presented a lot of information about the new license structure and the new DXCC checking system. Over the last few weeks I have had a large increase in interest in new licenses. Don't miss this opportunity to promote our hobby with the new licenses structure and the sun spot cycle improving 10 meters for beginners. Arkansas section traffic and net reports for January 2000. Tfc: K5BOC 142, K7ZQR 72, KC5TMU 49, W9YCE 18, KA5MGL 14, KF5PN 4, KC5UEW 4, AB5ZU 4, KA5RRK 2. Nets : ARN 162, AMN 28, APN 19, OZK 17.

LOUISIANA: SM, Lionel A "Al" Oubre, K5DPG, e-mail **k5dpg@arrl.org**—ASM: KB5CX, K5MC. ACC: KA5IJU. BM: K5ARH. SEC: N5MYH. OOC: WB5CXJ. STM: KG5GE. NM LTN: WB5ZED, NM LCW W4DLZ. As we approach the spring season, we must be mindful of the serious weather conditions that prevail at this time of the year. Tornado watches and warnings abound. Closely following this is the hurricane season. A reminder to all of the emergency frequencies used in LA, MS and STX. Official traffic: 3873 kHz nights (7285 kHz days) and H&W Traffic 3935 kHz nights (7290 kHz days). Hopefully we will not need emergency nets, but are realists and know that we must be prepared. Club officers for 2000: AARA: Pr NG5T, VP N5RLM, Sec K5DPG, Tr K5ARH. Upcoming hamfests AARA-Rayne March 11-12, Baton Rouge May 5-6. Shreveport July 22. Go out and support your area hamfest events. Louisiana Section Net Schedule: LTN 6:30 PM 3910 kHz nightly WB5ZED Mgr; LCW 6:45 PM 3673 kHz nightly W4DLZ Mgr. Reports for January: LTN QNI 362 QTC 72 in 31 sessions. LCW QNI 193 QTC 49 in 26 sessions. PSHR: WA5WBZ 73, K5WOD 106, KG5GE 109, K5DPG 141, K5MC 150, K5IQZ 191, WB5ZED 244. Tfc: K5WOD 10, WA5WBZ 16, KG5GE 32, K5DPG 34, K5MC 145, K5IQZ 217, WB5ZED 428.

MISSISSIPPI: SM, Malcolm Keown, W5XX—STM: KD5P. NM: N5JCG, KB5W, KI5UK, K5XU, KB5WJJ, N5YNY. Mississippi Hams enjoyed an informative VIP Tour through the MFJ Plant in Starkville on January 15. Thanks to Martin and his staff for the great hospitality. Check out the new Mississippi Section Web Page at **www.arrlmiss.org** which was constructed by K5IBM. A major effort is being made to keep information current on the Web Page including dates for VE tests, club meetings, hamfests, etc. Send update info to **w5xx@arrl.org** or **k5ibm@arrl.net**. The Attala County ARES Net activated during the January ice storm. KD5IZN was able to report an accident on I-55 via repeater which considerably speeded up the emergency response. The Jackson Hamfest was another success with over 1200 hams in attendance. Thanks to AB5WF and the Jackson ARC for hosting a very enjoyable weekend. EC Reports: KB5DZJ, WB5OCD, KC5TYL, KB5ZEA. How about the MSPN and PBRA QNI? New Records. Wow! Net Reports: sessions/QNI/QTC. MSPN 31/3265/89, MTN 31/169/59, MSN 31/984/10, PBRA 32/1224/22, Jackson Co ARES/RACES 31/598/28, MSSN 22/118/2, Hancock Co ARES 15/184/8, MAEN 5/94/0, Stone Co ARES 5/66/0, MBHN 4/27/0, Lowndes Co 4/63/0, JARCEN 4/90/1. PSHR: N5XGI 181, N5JCG 142, KB5W 142, K5VV 129, K5DMC 118, W5XX 85. Traffic: KB5W 327, N5XGI 137, K5DMC 81. N5JCG 70, K5VV 44, W5XX 7.

TENNESSEE: SM, O. D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. . PIC: KE4CES. OOC: AD4LO. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. . Milo, WB4DYJ, who directs the activities of the CW nets, is back to just about full speed after heart surgery. He was unable to publish a CW Net Bulletin just before the December holidays. The CW net meets M-S on 3635 kHz at 7:00 PM with the following NCSs: M- Jim, N4PU; T-Milo, WB4DYJ; W-Andy, W4SQE; Th- Jean, W4TYU. F- Jim, N4PU. S- Jan, KF4GQN and a rag chew session on Sunday. The slow speed training net meets on 3682 kHz + or - QRM at 7:30 PM with the following NCSs at the helm: M- Jan, KF4GQN; T- Marvin, AF4BD; W- is vacant; Th- Milo, WB4DYJ; f- Paul, W4NPL; S- Jan, KF4GQN. All

Deals are Popping Up All Over

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

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 (612) 786•4475 • FAX (612) 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

ICOM

Call for Coupons

IC-2100H

New IC-706G*
*Now with DSP and 440 MHz included

IC-207H
2M/440 MHz mobile

IC-756

IC-756-PRO

IC-T7A/HP
Dual Band HT

IC-T81A
6m
2m
440MHz &
1.2GHz

IC-Q7A

IC-T8A

IC-821H

IC-T22A

IC-746

IC-2800
NEW!

IC-W32A

Scanners/Receivers

NEW R-2

R-8500

IC-R75

R-10

Free Frequency database on PCR-1000

YAESU

Call for May Specials

FT-2600M

FT-1000D

FRG-100

FT-920

BEST VALUE

FT-100
All Mode HF/6m/2m/440 MHz

2M/440 Mini Dualbander Transceiver

FT-90R

FT-51R
Dualbander

FT-847

NEW

VX-5R
Mini Tri-Bander

VR-500
All Mode

VX-1R
Dual Band Handheld

ROTORS

FT-10R

NEW LOW PRICE

2 Meter Mini Handheld

Dual Band Mobile

TRUE DUAL BAND

FT-8100R

FT-50R
Dual Band HT

FT-1000MP

2M Mobile
FT-3000M

KENWOOD

Compact 2 Meter Mobile

TM-261A

TH-79AAKSS

TM-V7
with tone encode and tone decode

TH-G71A
Dual Band HT

TM-D700A Data Communicator

TS-570D & TS-570S w/6m
HF Transceiver with DSP

VC-H1

ALINCO
AMATEUR RADIO'S VALUE LEADER™

DR140TQ
TH-D7A
DATA COMMUNICATOR
FM Dual Bander

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 DISCOVER VISA

interested are welcome to participate in the net activities. ARC elects new officers: Kathy, KE4UYU-pres, Melinda, KE4DXN-VP, Tommy, KD4TJO- Sec. bob, KF4NDH- Treas. Tom, K4TTA-Dir of Training. Freddy, KF4ZGJ Dir of Programs, Mike, KG4BVK- Dir of Meetings & Special Events, Ken, K4DIT- Dir of Publications, Ben, KU4AU- Past Pres., Bill, WA4MJM- Repeater Trustee, Joan NK4PM- VE Liaison. Notice that the Pres and VP are YLs. DARC had two winners of "The Ham of the Year Award." They were Joan, KN4PM, and Tommy, KD4TJO. "The Newcomer of the Year Award" went to Freddy, KF4ZGJ, and "The Marconi Award" went to David, KD4NOQ. Paul Wilson, W4HHK, a pioneer in Amateur Radio research in the TN Section became a Silent Key on Nov 29, 1999. NARC elects new officers for the year 2000: Jim, K4INI- Pres, Jim, KF4OAL-VP, Chuck, N5JUD-Sec, Frank, WB4DXW- Treas. DRN-5 rpt: 62 sess, 539 msg, TN rpt 62% by W4OGG, KE4GYR & K4WWQ. Net sess/QTC/QNI: TMPN 31/35/2332; TCWN 26/44/228; TEMPN 21/49/650; TEPN 25/70/2974; TSCWN 26/9/150. Tfc: N4PU 202, W4SQE 128, WB4DYJ 101, WA4HKU 58, W4SYE 26, KA5KDB 17, WD4JJ 14, KI4V 12, WA4GLS 6, KD4BAM 4.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM: Tom Lykins, K4LID. SGL: Bill Burger, WB4KY. SEC: Ron Dodson, KA4MAP. STM: John Farler, K4AVX. PIC: Steve McCallum, W2ZBY. ACC: Todd Schrader, KF4WFZA. TC: Scotty Thompson, KI4AT. BM: Ernie Pridemore, KC4IVG. Severe storm season is fast approaching. Most ARES/SKYWARN groups should already have scheduled severe weather spotter classes. If not they need to contact the nearest NWS office. Hamfests season is just around the corner. The new question pools are ready and available on the ARRL Web page. I have not heard anything concerning the Cincinnati Hamfest, I heard that the Etown Hamfest will be held on March 25, 2000, April 23, 2000 is the Murray State Univ Fest. The Louisa, KY Hamfest will be held on May 6, 2000. The Northern KY Hamfest will be held on June 11, 2000. The Centeral KY Hamfest will be held on August 6, 2000, and last the Greater Louisville Hamfest will be held on September 9, 2000. It is with deep regret that we mention that Jim Erskine, WA4AUR, became a SK on January 31, 2000. Tom Lykins, K4LID, is requesting input on combining the KY traffic nets under one name. The times and days of the net would remain the same as know. Send comments to **k4lid@arrl.net**. Net QNI/QTC/Sess/Mgr: KRN 785/21/21/N4AFP; MKPN 1271/26/31/K4LID; KTN 1172/43/31/K4LID; KYCW 370/55/30/K4AVX; TSTMN 505/26/31/KG4EAB; CARN 303/27/27/AD4EI. Tfc: N4CQR 4, K4AVX 57, N4GD 32, K4YKI 17, KO4OL 34, KF4RBK 76.

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: John LaRock, K8XD (**k8xd@voyager.net**). TC: Dave Smith (**DSmith@smithassoc.com**). Youth Activities: Carl Hillaker (**carln8zdw2@juno.com**). BM: Thomas Durfee, Jr.WI8W (**wi8w@arrl.net**). Congratulations to the newly elected officers of the Saginaw Valley Amateur Radio Association for the year 2000. They are President: Steve Block KC8BTE, Vice President: Robert Jerome N8PTI, Treasurer: Judy Weirauch KC8BYI, Secretary: James Harvey, KC8LBH. I regret to report that Our State Government Liaison, Ed Hude, WA8QJE, has resigned due to an increasing workload. Please join me in thanking Ed for his seven years of service and dedication to this assignment. Ed will continue as Local Government Liaison and Technical Specialist, two appointments he has held for a number of years. Thanks Ed. Taking over as SGL is John LaRock, K8XD, of Lansing. John brings with him a wealth of experience as a past ASM. This is a most important position within the Section and requires monitoring of our State Legislators, as well as local legislators through the Local Government Liaison Program, to insure that no legislation is passed that would be detrimental to our service. If you would like to get involved in this effort within your home community please get in touch with John at the address above. Did you know that your ARRL Special Service Club can get 2 weeks of fame in the ARRL Spotlight for exemplary Special Service Clubs? A new club will be featured every second week on the ARRL Website. Send your SSC information to **dmiller@arrl.org**, including e-mail and Web page addresses. 73, Dick. Please support the following Section Traffic Nets: January 2000 NTS Net Reports.

Net	*QNI*	*QTC*	*Sess*	*NM*	*Freq*	*Time*	*Day*
QMN	657	251	68	WB8SIW	3.663	6:30&10 PM	Daily
MACS	232	55	31	W8RNQ	3.953	11 AM	Daily (1 PM Sun)
MITN	478	162	31	N8FPN	3.952	7 PM	Daily
UPN	1270	42	35	AA8SN	3.921	5 PM	Daily (Noon Sun)
GLETN	630	89	31	VE3SCY	3.932	9 PM	Daily
SEMTN	357	67	31	WI8K	146.640	10:15 PM	Daily
WSSBN	849	48	31	K8JRE	3.935	7 PM	Daily
ARAHH	39	0	4	K8LAT	145.130	8 PM	Wed
D8 ARES	39	0	4	VE3EUI	3.932	7:30 PM	Friday
VHF Nets	283	7	31	KB8ZYY	Various		

Traffic reports for January 2000: WB8SIW 212, KB8ZYY 170, WX8Y 163, K8GA 148, K8LJG 126, N8FPN 111, N8JGS 56, AA8SN 51, W8RNQ 50, AA8PI 49, WI8K 46, K8ZJU 45, K3UWO 34, K8UPE 30, N8OSC 27, WR8F 26, WA8DHB 24, W8YIQ 19, K8AI 15, KC8GMT 14, KI8GR 7, KB8EIW 7, N8EXS 2.

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—Remember next month the ARRL National Convention is in our backyard. If you've never been to the Dayton Hamvention, this is the year. Many clubs throughout the Ohio have organized bus tours to Hamvention but time for reservations is getting short....Interested in Fox Hunting and Direction Finding? Write to Dick Arnett, WB4SUV, or Bob Frey, **wa6ezv@arrl.net,** to get information for the May 7th demonstration and competition at McFarland Woods....The Ohio QSO Party was not in March as earlier reported but moved to August. Contact the Mad River Radio Club...Ohio Section Journal's deadlines for this year are April 10, June 10, August 10 and October 30, according to Editor Ron

CABLE X-PERTS, INC.

SUPER SATELLITE SYSTEMS use CABLE X-PERTS

Ready Made 9913FX 50 Ohm Low Loss Coax Cable w/Male "N" Connectors.

APS50	50FT	$54.95
APS35	35FT	$45.95
APS25	25FT	$39.95
APS15	15FT	$32.95

Enjoy "FREE FREIGHT" (UPS Ground within the 48 contiguous states only) on this special only. Shipping applies to all other destinations and products listed herein. Sorry NO COD'S. Illinois residents add 8.25% state sales tax.

JAKE sez Amateur Satellites are cool.

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	.58/FT	.56/FT	.54/FT
LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.59/FT	.57/FT	.55/FT
LMR 400"ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	.87/FT	.86/FT	.85/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JKT	1.25/FT	1.22/FT	1.20/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	.36/FT	.34/FT	.32/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	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/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	1.25/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+)	.20/FT	.18/FT	.16/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.25/FT	.24/FT	.23/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	.20/FT	.18/FT	.16/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/18) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

Quick disconnects: PS308 KIT (JONES 8/C M/F) $7.95/pr., PS309-KIT (JONES to AMP ROUND M/F)..$10.95/pr.
Or we can install either pair for $22.95, $25.95.

ANTENNA WIRE

	100FT/UP	300/FT	500FT	1000FT
14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.19/FT	.16/FT	.12/FT	.10/FT
14GA 7 STRD *"HARD DRAWN" (perfect for permanent Dipoles etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"COPPERWELD" (for long spans etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	.15/FT	.12/FT	.08/FT	.06/FT

ANTENNA & TOWER SUPPORT ROPE

	100FT/UP	250/FT	500FT	1000FT
ROPE: 3/16" DOUBLE BRAID *"POLYESTER"* 770# TEST WEATHERPROOF	.15/FT	.12/FT	.09/FT	.08/FT
ROPE: 5/16" DOUBLE BRAID *"POLYESTER"* 1790# TEST WEATHERPROOF	.20/FT	.17/FT	.14/FT	.13/FT

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' $129.95 175' $114.95 150' $99.95 125' $84.95 100' $69.95 75' $54.95 50' $39.95
25' $24.95 15' $21.95 10' $18.95 6' $12.95 3' $11.95 1' $10.95

RG213/U strd BC Mil-Spec NC/BD/UV JKT. 1.2dB 2500 watts @ 30MHz.
200' $89.95 175' $79.95 150' $69.95 125' $59.95 100' $49.95 75' $39.95 60' $34.95
50' $29.95 25' $19.95 15' $17.95 10' $15.95 6' $11.95 3' $9.95 1' $8.95

RG8/U strd BC foam 95% braid UV resistant JKT. 0.9dB 1350 watts @ 30MHz.
200' $81.95 175' $74.95 150' $64.95 125' $54.95 100' $44.95 75' $34.95 50' $24.95
25' $14.95 15' $15.95 10' $13.95 6' $11.95 3' $9.95 1' $8.95

RG8 MINI(X) strd BC foam 95% braid UV resistant JKT. 2.0dB/875watts@ 30 MHz
200' $47.95 175' $41.95 150' $34.95 125' $29.95 100' $24.95 75' $19.95 50' $15.95
25' $10.95 (18' $10.95) 3' $8.95 clear PVC JKT) (6' $4.95 3' $3.95 *China made*)

LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT 100' $72.95

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.
200' $147.95 175' $129.95 150' $110.95 125' $95.95 100' $80.95 75' $67.95 50' $54.95
35' $45.95 25' $39.95 15' $32.95 10' $25.95 6' $16.95 3' $15.95 1' $14.95

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' $139.95 175' $123.95 150' $104.95 125' $89.95 100' $74.95 75' $59.95
50' $44.95 25' $29.95 15' $26.95 10' $23.95 6' $14.95 3' $13.95 1' $12.95

With USA made Silver/Teflon®/Gold Pin connectors

RG142/U *Teflon®* 18' 24.95 6' 14.95 w/PL259. 3' $19.95 w/"N" MALE

HT Solutions: use any of these jumpers to improve & increse the life of your HT.
RG8 MINI (X) 6' PL259-male BNC 6' $9.95
RG58/U w/Right Angle Male BNC to SO239 3' $14.95
RG58/U w/Right Angle Male BNC to PL259 3' $14.95
RG142/U w/Female BNC to Male SMA 3' $9.95

Assemblies Discounted: visit our website www.cablexperts.com
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. CUSTOM CONNECTOR WORK TOO. Call for price and delivery.

CONNECTORS

Both connectors fit 9913 types and LMR400 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 $32.50.....25PC $75.00.....50PC $143.75..100PC $275.00

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.....$7.00 each

I.C.E. PRODUCTS

180A Beverage/Longwire matching unit.....$39.00/ea
348 Rotor cable Line filter.....$44.00/ea
303U Coax impulse suppressor 8 kW 1.5-200MHz.....$44.00/ea
516R Remote RF power switch for up to 6 antennas.....$184.00/ea
Individual Band Pass Filters.....$35.00/ea

Purchase two or more ICE units and enjoy a 10% discount.
All other I.C.E.s stocked.

HELIAX® LDF series from ANDREW® Corporation.

- **Premium electrical performance.**
- **100% RF shielding.**
- **50 Ω Impedance.**
- **Very Low Loss Foam Dielectric.**
- **Use "N" and/or UHF connectors.**
- **Termination price: $15.00/each.**

CABLE PRICES

Cable	Size	Price/ft
LDF2-50A	3/8"	$1.70
LDF4-50A	1/2"	$2.10
LDF5-50A	7/8"	$5.37

CONNECTOR PRICES

Cable	"N"/Price	UHF/Price ea.
LDF2-50A	$27.00	$41.75
LDF4-50A	$30.00	$27.00
LDF5-50A	$73.00	$70.00

Prices do not include shipping. $20.00 minimum order.
Prices subject to change without notice.

http://www.cablexperts.com
FAX: 847-520-3444
TECH INFO: 847-520-3003
416 Diens Drive,
Wheeling, IL 60090
HOURS: M-F 9AM-5PM CST.

ORDERS ONLY:
800-828-3340

For Complete Catalog Check Web Site or Mail Request.

Check out our new "shopping basket" format web site. http://www.cablexperts.com/ Calculates shipping too. Discounts

MasterCard VISA DISCOVER

CABLE & WIRE CUT TO YOUR SPECIFIC LENGTH • WE STOCK AND INSTALL CONNECTORS TOO.

Teflon® is a registered trademark of DuPont.

CABLE X-PERTS, INC.

Griffin, N8AEH, Assistant SM for NW Ohio. If you don't know what the OSJ is, contact me immediately. A comment on recent ham radio restructuring " 'I have recently noticed a flurry of comments about the upcoming license restructuring that we all are facing, some good, and some bad. I don't know if I agree with it 100% myself, but I think it holds much promise for Amateur Radio. Ham Radio for the most part has experienced declining numbers in the past few years, and as the old saying goes 'If you don't use it - you lose it '. We have already lost some frequencies, do we dare let them take more?' "While I'd like to take credit for this, actually Rick McKee, KC8AON, Lawrence County ARES/SKYWARN, wrote it....OHIO SECTION CONGRATS: (A) TO Salem Area ARA's new officers, pres, Mel Lippiatt, KA8EOB; Veep, Bill McClaren, KB8MNE; sec, Roger Thawley, KC8CTV; tres, Lela McClaren, KB8YPD; trustees, Roger Tullis, W8HZ, Tom Spellman, KB8EOG, Dave Sprouse, N8GOB; newsletter, Johnathan Thawlew, KC8CPW, (B) TO Skip Westrich, WB8OWM as Massillon ARC Ham of the Year for 1999, (C) TO Lawrence County ARES newsletter "Hello Radio" on its fifth birthday and to editor, Ken Massie, WN8F, (D) TO Joanne Solak, KJ3O, Mantua, for 15 years of serving the Ohio Section as ACC and more, (E)TO Findlay Radio Club's for its newest addition to its club station, W8FT, an Omni-6 transceiver...APRIL HAMFESTS, Athens on April 30 de K8QOE. Now for the January traffic reports.

Net	QNI	QTC	QTR	Sess	Time	Freq	Mgr
BN (E)	183	53	291	31	1845	3.577	WD8KFN
BN (L)	213	77	351	31	2200	3.577	NY8V
BNR	101	29	974	30	1800	3.605	W8LDQ
OSN	214	62	720	31	1810	3.708	WB8KQJ
OSSBN	2428	400	2600	93	1030, 1615, 1845	3.9725	KF8DO
OH Section ARES Net					1700 Sun	3.875	WD8IHP

Tfc: WD8KFN 149, N8IXF 144, KF8DO 136, KA8FCC 109, N8FWA 106, WA8SSI 94, WD8MIO 87, KC8HJL 83, K8WOQ 79, N8TNV 65, KD8HB 62, W8BO 50, KI8IM 50, WB8PMG 48, N8CW 48, WA8HED 47, NS8C 47, N8DD 46, N8RRB 42, WD8KBW 37, K8OUA 34, KI8G 33, WB8HHV 31, WA8EYQ 30, W8LDQ 29, KA8VWE 27, NY8V 25, KD9K 25, KI8O 20, KC8DWM 16, KB8UEY 16, K8JMP 15, W8RG 15, KC8HTP 14, KB8TIA 14, N8WLE 12, K8RDK 12, KC4IYD 10, KF8FE 10, W8RPS 10, W8GDQ 9, W8GAC 8, N8IBR 7, KC8HFV 5, W8GDQ 4, K8GOB 4, WB8IOW 4, KC8KYP 4, KB8SIA 4, KI8GW 3, KB8ESY 2, KE8FK 2, K8WC 2, W8DYF 1, K8QIP 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 (January 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 32/6 CDN 359/123 CGESN 38 HVN 562/192 SDN 360/138 NYPHONE 223/622 NYPON 365/358 NYS/E 425/439 NYS/M 255/160 NYS/L 285/419. The Hudson Division Convention is coming to Westchester 9/15-16. Mark your calendar! Upgrade now and avoid the April rush! K4ZDH is coming to SARA April 3 - All hams are invited! PSHR: N2YJZ 202,N2JBA 150,W2AKT 147,WB2ZCM 141,WA2YBM 97,KC2DAA 87, W2JHO 70. Tfc: N2YJZ 406,N2JBA 62,WB2ZCM 37, KC2BUV 24, KC2DAA 22, WA2YBM 17, W2JHO 15, W2AKT 10, W2CJO 5, KC2BUW 3, WA2BSS 2, N2NMF 2, K2AVV 1, KL7JCQ 1, N2AWI 1.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: K2EJ. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. Congratulations to the Grumman ARC on their 55th anniversary! Grumman is now meeting at the Underwriters Lab building in Melville on the 3rd Wednesday of the month at 6:30 PM, contact Pat, KE2LJ. Congratulations to LIMARC on their 35th anniversary! LIMARC is celebrating with a 35th Anniversary Dinner on April 9, contact Diane K2DO. Tom, KA2D, the NLI Webmaster, is asking for contributions to the EVENTS calendar. Please e-mail Tom at **ka2d@arrl.net**. Check the NLI Web page at **www.arrlhudson.org/nli** for more information on upcoming events. Please note all Suffolk county area codes change from 516 to 631 on April 1. NYC/LI VE exam list follows: Islip ARES, 1st Sat 9 AM, Islip Town Hall, 401 Main St, Islip, Len Battista, W2FX, 631-277-0893. Bears VE: ABC Bldg Cafeteria, 125 West End Ave at 66th St. Call Hotline 212-456-5224 for exact dates & times, Jerry Cudmore, K2JRC. Grumman ARC (W5YI) 2nd Tues 5 PM. Northrop-Grumman Plant 5 S Oyster Bay Rd via, Hazel St Bethpage, NY. Bob Wexelbaum, W2ILP, 516-499-2214, LIMARC, 2nd Sat 9 AM NY Inst of Tech, 400 Bldg Rm 409, Northern Blvd. Old Westbury, Al Bender, W2QZ, 516-623-6449. East Village ARC, 2nd Friday 7 PM, Laguardia HS, Amsterdam Ave and West 65 Street, Manhattan. Robina Asti, KD2IZ, 212-838-5995. Great South Bay ARC, 4th Sun 12 PM, Babylon Town Hall, ARES/RACES Rm 200 E Sunrise Hwy N Lindenhurst, Michael Grant, N2OX, 516-736-9126. Hellenic ARA: 4th Tues 6:30 PM; Pontion Society, 31-25 23rd Ave, Astoria, NY, George Anastasiadis, KF2PG, 516-937-0775. Larkfield ARC, Huntington Town Hall, room 114, 2nd Saturday in Feb, May, Sep, Nov, Contact Stan Mehlman, N2YKT, 631-423-7132. Columbia U VE Team: 3rd Mon 6:30 PM, Watson Lab 6th.floor 612 W 115th St NY, Alan Crosswell, N2YGK, 212-854-3754. PARC: exams held every three months at Southold School Oaklawn Ave, Southold, NY, on next to last Friday of the month.6:30 PM all classes of licenses. For info contact Ralph Williams/N3VT, 631-323-3646. Mid-Island ARC, Last Weds of each month at 7 PM at 36 Drew Flag Rd, Ridge, NY 11961, Contact Mike, W2IW, at 631-924-3535. HOSARC, 3rd Saturday at Queens Hall of Science, 9:30 AM. Pre-registration requested (for free admittance to the Hall), Lenny, W2LJM, 718-323-3464. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 297, N2AKZ 136, KB2KLH 95, W2RJL59, N2XOJ 53, K2GCE 37, WA2YOW 21, KB2GEK 18.

NORTHERN NEW JERSEY: SM, Jeffrey Friedman, K3JF—Net and traffic data compiled by STM David Struebel, WB2FTX.

Net	NM	Sess	QNI	QTC	QSP	QTR
NJM	WA2OPY	31	207	80	66	327
NJPN	W2CC	36	203	32	26	167
NJSN	K2PB	28	169	8	5	329
NJN/E	AG2R	31	240	101	81	365
NJN/L	AG2R	31	215	57	53	271
CJTN	N3RB	31	301	45	35	252
NJVN/E	N2RPI	31	420	49	42	269
NJVN/L	N2OPJ	31	318	37	36	208

Tfc: N2XJ 112, W2MTO 79, N2OPJ 71, K2VX 59, N2GJ 43, N2RPI 38, K2PB 37, N3RB 30, KB2VRO 24, W2CC 22, N2QAE 6.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD. SEC: NA0R. ACC: N0IJP @ KE0BX. BM: K0IIR @ W0CXX. SGL: K0KD. I regret to announce that Bob Mason, W0DIA, has elected to resign his post as the Section Technical Coordinator. Bob is finding that working QRP DX is too much fun. Thank you for the service, Bob. I am seeing lots of examinees for the testing sessions. Might as well get credit for what you have half done! (3A, 4A!) DMRAA reports that during Operation Santa Claus they collected 1-1/2 TRUCK loads of donated presents at one house! I count 66 in the list of those helping! Uh, Norm. DSM Hamfest is April 29! In the EIDXA newsletter, K0RX reminds their members to renew their ARRL membership. A Life Membership eliminates that problem. TSARC notes problems getting a clear freq for their comms for Y2K... try CW. It worked in MI. I regret to report that W0RFE has gone SK. Looks like the City of Marion is looking at a tower ordinance. CVARC is gearing up for another year; the hamfest, ARES, etc. Can you help? How about in your area! FMARC is reviewing the tower climbing safety tips given by W0EJ in the EIDXA some time back. Good advice. I have word of two groups doing DF/Fox hunting in the near future. The new repeater at Beresford is almost ready to go. TSARC has some interest in a code class. Have you completed the exams you would like before April 15? Time is about expired. How many years have gone past when you made no attempt to upgrade. I see much of a "something for nothing" syndrome in this rule change. Newsletters were received from NIARC, DMRAA, EIDXA, TSARC, ACRS, CVARC, FMARC, SARA, SA/SN, OARC. Traffic: W0SS 169, KA0ADF 39, N0JL 38, KA0ADF (Dec) 54.

KANSAS: SM, Orlan Cook, W0OYH—ARRL KS State Convention August 27 at Salina. Thanks to Ron, KB0DTI, I will have less work as he has taken the STM job. Scott, KC0DYA, has accepted the PIC job. Bill, WA0CBW, has accepted a TS job. Many tks. Bob, W0BH, has left the EC position. Tks for FB job. Milo McNall, W0NSW, of Topeka, has been nominated for the ARRL 1999 Herb S. Brier Instructor of the Year Award. Let me recognize reports from TSs WN8P & N8FN PIO KB0DTI. Let me hear from you if you have a suggestion for the ARRL KS 2-hour Section meeting Aug 27. This is your meeting. Any volunteers? Thanks to all the Net Managers, ORSs and Net Controls for giving Kansas our many many fine nets Dec Kansas Nets: sessions/QNI/QTC, KSBN31/1302/106 KPN 22/301/30 KMWN31/614/4803 KWN31/1078/706 CSTN 27/1786/176 QKS 57/315/63 QKS-SS 13/34/7 SEC 33/329/8QNS KB0AMY N0BTH WD0DDG WD0DMV AA0IQ N0LJR KF4LM W0PBV KB0PQP. TEN 481 msgs 62 sessions KS 68% KB0DTI AA0FO KX0I K0PY NB0Z WB0ZNY W0SS mgr. DTRN KS 100% with KB0AMY N0KFS KF0WS AA0OM W0OYH W0WWR N0XAQ N0KJ Mgr BBS reports: W1AW Bul/ Per/NTS AA0HJ 3/538/2 N0OBM 73/503/0 Ks Stns tfc N0KJ 578, WB0ZNY 74, WA0KS 73, NB0Z 66, W0OYH 56, KB0DTI 31, KX0I 23, W0WWR 19, K0RY 18, KB0NDT 14, N0ZIZ 13, K0BJ 13, N0LL 10, K0BXF 6, W0FCL 4.

MISSOURI: SM, Dale Bagley, K0KY—ASM: John Seals, WR0R. ACC: Keith Haye, WE0G. BM: Brian Smith, KI0MB. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA00A. SGL: E.B. DeCamp, KD0UD. STM: Charles Boyd, KE0K. TC: Wayland McKenzie, K4CHS. The Friends of Amateur Radio Hamfest in Springfield, MO, held their first Hamfest. Mike Blake, N0NQW, Skip Crane, KB0RUP, and Richard Wood, KB0MPO, provided the leadership for the hamfest. There was a good Hamfest and a nice turnout even with the 3+ inch snow that fell. Brian Smith, KI0MB, of Monett, Missouri, has been appointed to the position of Section Bulletin Manager. He is an excellent addition to the Section Cabinet. In April, there will be a Hamfest on April 1st in Lebanon, MO. Micki Jensen, KC0EEX, is the contact person for the Lebanon Hamfest. On April 15 the Joplin Amateur Radio Club will sponsor a Hamfest in the J.Q. Hammonds Trade Center. The Four States Amateur Radio Club has been confirmed as an ARRL affiliated club. The club will facilitate contest, DX repeaters and public service. Alan Shannon, KC0BUM, is the President of the Newly Affiliated Club. To check on current happenings in the Missouri Section, Amateurs can check on the Section Website **http://www.qsl.net/arrl-mo**. Information on hamfests can also be found on that site. Net Sess/QNI/Tfc: AUDRAIN ARC 4/42/1; CARL 3/38/0. WAAECI 5/129/0; MTN 31/675/90. HAMBUTCHERS 21/763/37 MON-1-2 62/197 41; QCWA-35 4/73/0; ROLLABILLBOARD 31/353/4; JACKSON CO ARES 5/50/0; MACON CO AREA 4/59/0. Paul Revere 5/200/0 Tfc: KE0K 63. PSHR: KE0K 98.

NEBRASKA: SM, Bill McCollum, KE0XQ—It is with deep regret to inform you that Janice Ziller, KB0ZTB, became a Silent Key on January 13. She was the YL of N0UVP and mother of N0XJG. Our heart goes out to Neal and his son, Michael. It seems like we are seeing more Silent Keys: KD0CQ, WB0ZUY, W0EGV and KB0DFD. Amateurs from the Omaha and Lincoln area provided communications for the Cornhusker Winter Games on Feb 5 – 6. ATV coverage of the Mt. Crescent (IA) was provided and the games officials were quite impressed. I am pleased to announce the following appointments: KC0GDG, EC for Kimball & Banner counties, N7GT, EC for Scottsbluff county. This part of the state has been without any ECs for quite some time and we welcome them. Also I want to welcome KB0MTT as Net Manager of the Eastern NE 2 meter ARES Net. Net Reports: ENE 2M ARES: QNI 341, QTC 2 & 31 sessions. NE 40 M Net: QNI 466, QTC 13 & 29 sessions. NE CW Net: QNI 210, QTC 12 &

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 worldí 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 Ameritroní 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 **$119.95**

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 **$109.95**

Extends your mobile antenna bandwidth so you doní 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**

MFJí 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 MFJí 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 **$79.95**

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
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

21 sessions. MIDNE ARES: QNI 325, QTC 7 & 31 sessions. NE Storm Net: QNI 1006, QTC 17 & 31 sessions. NCHN: QNI 403, QTC 24 & 31 sessions. MARES: QNI 342, QTC 4 & 6 sessions. NMPN: QNI 1559, QTC 3 & 31 sessions. Traffic: K0PTK 100, W0AP 38, KE0XQ 20, W0RWA 12, K0OAL 7, KA0DBK 6, WY0F 4, W0EXK 2, W0UJI 2, KB0MTT 2, WC0O 2, N0UUZ 2, KA0DOC 2, PSHR: KA0DBK 86, KB0YTO 23, KB0YTM 16.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: WA1TJT. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. There's lots of talk in the CT club newsletters about operation on PSK31. Jim, KD1YV, of CARA and several members of the Newington Amateur Radio League started the New Year off by experimenting with a mode new to them. Have fun! Speaking of new activities, The Lyman Hall High School is starting an Amateur Radio Club! John, KB1EEN is president; John, KB1ETB is VP and members of the Meriden ARC will serve as Elmers! Congrats to all the members of this new school club-just say the word if you need a hand. CT traffic handlers mourn the loss of Dawn, K1TQY, recently appointed NM of First Region Net. Dawn, a very active traffic handler from New Hampshire became a Silent Key suddenly just as she was preparing her monthly report for Headquarters. She was an active ham, owned a repeater and active in the community. Unhappily, two other FRN members passed away within the last few months: former NM Ed KT1Q and Alan, W1FYR who had a very active APLINK traffic BBS on the air. These friends will be missed by many of us. I had the pleasure of meeting each of them—terrific ops. On a happier note, start thinking about the Division Convention in Boxboro, MA, to be held the last weekend in August. Contact Mel early to make your room reservations! The W1QI DX packetcluster 145.73 is back on the air and N4GAA BBS will be up and running at full speed soon. Need an idea for an activity for ur club? NARL invited area radio amateurs to ask technical questions and bring their equipment for possible analysis to a free Clinic & Tech Session at their January meeting. Tnx to u all for ur hard work-c u next month! Net sess/QNI/QTC: WESCON 31/398/77; NVTN 31/219/106; ECTN 31/315/61; CPN 31/271/57; CN 29/95/39. Tfc: NM1K 1883, KA1VEC 452, KA1GWE 144, KB1CTC 140, KE1AI 102, WA4QXT 89, N1VXP 66.

EASTERN MASSACHUSETTS: The following was submitted by STM Bill Wornham, NZ1D—

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	62	240	288	468	K1SEC
EMRIPN	31	83	213	476	WA1FNM
EM2MN	31	100	331	449	N1LKJ
HHTN	31	45	250	295	N1IST
CITN	31	66	327	586	N1SGL
WARPSN	5	13	78	NA	K1BZD
NEEPN	5	8	15	NA	WA1FNM
CHN	31	42	204	429	W2EAG
OSTN	16	14	25	77	KA1JXH

Tfc: W2EAG 219, WA1TBY 139, N1LKJ 112, NZ1D 100, WA1FNM 82, K1SEC 62, WA1LPM 49, N1AJJ 43, N1TPU 40, K1BZD 38, N1IST 36, NG1A 35, KY1B 28, N1LAH 27, K8SH 24, KD1LE 16, N1TDF 15, KB1EB 14, KA1VAX 12, WA1VRB 11, N1OBL 8, N1BNG 5.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: NX1A. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO. With Spring arriving, Hams' thoughts start to turn to repairing winter's wrath. Antennas need repair, towers require attention. Remember to be safe; the list of SKs has been growing. We don't want to see your call there; be sure to use a full body harness and 100% tie off when on the tower and hard hats for all the ground crew. Radio activity will be in the extreme level, come Summer. W9WBA is still looking for help with OpSail 2K; if you can help, contact Dale at **W9WBA @juno.com**. Also, the AMSAT and the RV convention, as well as Lighthouses On The Air will give Hams statewide a variety of events to get involved with. Planning for Field Day? Count me in! As Section Manager, it gives me great pleasure to visit as many sites as time allows. If I can't make it personally, hopefully some of the other cabinet appointees can stop by to give support to your Field Day activity. 73, Bill, N1KAT.

NEW HAMPSHIRE: SM, Mike Graham, K7CTW— ASMs: WW1Y, W1NH, WB1ASL, N1KIM. TC: WA1HOG. STM: WA1JVV. PIC: KA1GOZ. OOC: WS1E. SGL: K1KM. BM: KH6GR. ACC: AA1QD. SEC (acting): WW1Y. Amateur Radio in New Hampshire and the NTS has suffered yet another loss - Dawn Cummings, K1TYQ, has become a Silent Key. Dawn was very active in the NTS, ARES, and in her local community. She was 1RN Cycle 2 Net Manager, served as Interim Net Manager for the Granite State Phone Net, and was a trustee for the Keene Repeater. I must also report that Larry Beavers, longtime OOC on the Section Staff, has had to resign due to his having accepted a new engineering position for a Portsmouth, RI firm. Larry, we all thank you for your service to Amateur Radio in New Hampshire. I am pleased to announce that John Gaffey, WS1E, OO and past president of NARC, has accepted the position of OOC to replace Larry. Heartiest congratulations to Don 'DEG' Grant, N1ZBM, on attaining the rank of Eagle Scout. A Hillsborough County Superior Court judge has reversed a decision by the Town of Hudson to permit Jerry Muller, K0TV, to erect several towers on his property. Jerry reports it will most likely go to the NH Supreme Court. Stay tuned. For now, best 73. Net NM/Sess/QNI/QTC: GSFM N1RCQ/31/253/31; VTNH WA1JVV/31/157/152. Tfc: W1PEX 1091, WA1JVV 188, N1NH 110, W1ALE 57, KA1OTN 56, N1CPX 13.

RHODE ISLAND: SM, Armand Lambert, K1FLD—Elections at the PRA/W1OP have resulted in the following line-up: Congratulations to, Pres, Neville, N1JDA, Vice Pres, David, K1DT, Sec, John, W1GS, Treas, John, KZ1K. The PRA founded in 1919 has been ARRL affiliated since 1921, a big hand for these dedicated operators while we wish them continuing

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 ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

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.

More hams use MFJ SWR Analyzers™ than any others in the world!

success. A video on the origins of Amateur Radio and the ARRL furnished by the AWA was obtained by Norm, W1AUT, the video was featured at the February meeting of the BVARC Sparked great interest and rekindled appreciation for our proud beginnings. OSARG has landed a new meeting site with plenty of parking at the Norwood Elementary School at 226 Norwood Ave. Warwick RI. Recent elections at the OSARG radio club have installed the following officers, congratulations to: Pres, Judy, KC1RI, Vice Pres, Mike, N1VSU, Treas, Joe, W1IJ and Sec, Dave, KB1AKJ, keep up the good work folks. With Ken, KB1AWV, presiding at the Feb meeting of the PVARC held at the West Warwick EMA Center, a special demonstration on Fox hunting using Doppler DF units and other methods was presented by Brian, N1BS. Neat stuff. Reminder to get your reservations in early for the ARRL Boxboro Convention this Year to be held on August 24-25, see ya all there. The next New England Division Cabinet Meeting is being scheduled for July, please have your club compile a list of topics you would like to have mentioned for discussion and get them to me before hand e-mail to **k1fld@arrl.org**. Reminder the 76 auction and flea is on May 20, talk in on 146.76 rptr. 73, till next time.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1NZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Siguard, KJ1K, and Ed, N1FGY, presented an interesting program for the NOBARC club members on UHF/VHF contesting. Fireworks brought in 2000 with a spectacular display from the summit of Mt Greylock. Paul, N1QDX, demonstrated to the MARA gang how simple it was to use a computer to send and receive SSTV. Almost all households have a video camera. Paul illustrates the ease of showing your shack and antenna installation using freeware software and a sound card. It was a fascinating display. Bob, WA1IDA, and his ARES gang in Worcester came to the forefront during the horrendous fire in Worcester that left six firefighters dead. They also maintained backup communications during the President's visit to the city for a wake and funeral of these men. Too many call signs to mention in this medium, but I want to thank one and all for an exceptional job. Well done. Under the able supervision of our SEC Dennis, K1VSG, and all the drills we have had, we are prepared to handle any emergency in this section. Thank you, all! Tfc: N1ISB 16, W1ZPB 106, KD1SM 5, K1TMA 54, N1RLX 2, W1BMK 2, N1RFQ 18, N1RKY 3, W1SJV 12, W1UD 231.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T — ASM: KL7JBV. OOC: KL7IKX. SEC: NL7DL. DEC: WL7JBV. DEC: WL7GK. TC: WL7CE. Sniper's Net 3920 daily 1800 AST, bush Net 7093 daily 2000 AST, Motley Group 3933 daily 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Code Practice Station (KL7G) 3575 kHz, 7075 kHz at 7:00 AM, 10:00 AM, 4:00 PM, 7:00 PM and 10:00 PM. AST daily. The speeds are 22 WPM, 15 wpm & 7 wpm. Congratulations to Ed Cole, AL7EB, new President of the Moose Horn ARC, and to Greg Griffith, KL0MW, elected President of the Juneau ARC. Moose Horn ARC preparing for Tustumena 200 Sled Dog Race. Arctic ARC preparing for Yukon Quest Sled Dog Race; may have ATV up this year. Anchorage and Matanuska Valley hams provided comm support to Eagle River Sled Dog Race and are now preparing for Fur Rendezvous. Juneau ARC to again to support local High School Science Fair. Numerous section cabinet positions are vacant; contact KL5T at **kl5t@arrl.org** to volunteer. Please report activities on FSD-157 to KL5T.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—This is the month (April) that the new license re-structuring goes into effect. You will keep your present operating privileges and the amateur sub-bands will stay the same. It appears the new rules have stirred some interest in the hobby and many hams are seeking to upgrade. Hopefully soon there will be more newly upgraded young hams on the HF bands. Attention traffic handlers, Don, W7GB, is in need of TCC operators. Please contact Don if you are interested. Mark Tharp, KB7HDX, Assistant Section Manager in Yakima, reports a new SAR repeater with good coverage in Central WA is on 146.86/26, pl 123. The Lilac City hamfest is in Spokane on April 8. 8 out of 12 OO stations reported monitoring activity. In Memorium — Patrick Stewart, W7GVC, of Walla Walla, Silent Key on Jan 5. Net Activity: WSN: QNI 831, tfc 257; Noontime Net: QNI 8273, tfc 213; WARTS: QNI 3610, tfc 93. Tfc: K7GXZ 224, W7GB 189, K7BFL 103, KA7EKL 79. PSHR: W7GB 138, K7GXZ 123.

IDAHO: SM, M.P. Elliott, K7BOI — OOC: N7GHV. SEC: AA7VR. STM: W7GHT. It is hamfest time! If your club or area is holding a hamfest let me know so that we can help with publicity for the event. K7BDS and AA7VR along with several other hams are meeting on a regular basis to work on proposed tower legislation to introduce in the state legislature. While the draft legislation is being patterned after successful bills that have passed in other states, they are working to include those items important to Idaho hams. If you have suggestions or wish to participate please let them know. It is hoped that the legislation can be complete and introduced as a bill during the 2001 session. 73— Mike, K7BOI. Tfc: W7GHT 298, KB7GZU 99, WB7VYH 54, and N7MPS 33. PSHR: W7GHT 128, WB7VYH 93, and N7MPS 65. Net (Sess/QNI/QTC/Mgr.): FARM-31/2869/24/W7WJH; WTN-31/1413/63/KC7RNT; IDACD -21/541/20/K7UBC; IMN-31/477/213/W6ZOH.

MONTANA: SM, Darrell L Thomas, N7KOR [**n7kor@mcn.net**] —The restructuring announcement of the Amateur Radio licenses appears to have taken a positive effect on members of the Montana Section. Clubs are reporting an increase in candidates at VE sessions and at least two clubs, Great Falls and Helena are holding classes to assist their members in learning code and higher level theory in anticipation of upgrading. This is the biggest push to attempt any up-grades we have seen for a long time. Congratulations go out to two Montana Hams who were selected as ham of the year by their respective clubs. The Yellowstone Radio Club of Billings MT has chosen Robert Blumer WB6EHV and the Capital City Radio Club of Helena has chosen Duane McNeil, K7SYO. Congratulations to both on their honor as ham of the year. Net/QNI/QTC/NM MSN 135/0 W7OW MTN 2189/40 N7AIK. PSHR 115 Cat 1/51 2/15 3/24 4/8 5/7 6/10.

OREGON: SM: Bill Sawders, K7ZM—ASM: KK7CW, ASM:

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 . . .

MFJís new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJís *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.

MFJís 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- thatís *5 times lighter* than an equivalent conventional power supply. MFJís 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies wonít 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 wonít 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 5¾Wx4½Hx6D 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

MFJís 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.

Itís highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- itís 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
$44.95
plus s&h

MFJ-1118, $74.95. This is MFJís 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 transceiverís 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 ìONî 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 ìONî 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
and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

ï 1 Year *No Matter What*™ warranty ï 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 MFJís famous No Matter What™ one year limited warranty.

KG7OK. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. Two more clubs reporting new officers for the year 2000: President at the Hoodview Amateur Radio Club is Joe Machaud, N7HA. Vice President is Ed Coery, K7OC. Secretary, Buck Layton, KD7FYI, and Treasurer, Bryan Hoffman, W7BJB. Y2K officers of the Willamette Valley DX Club include: President, Mike Conatore, K7NT. Vice President, Hank Lonberg, KR7X. Secretary, Jim Cassidy, KI7Y, and Treasurer, Rob Hinz, W7NX. Directors are Sandy Lynch, W7BX. Ron Hylton, AD7L, and Russ Fillinger, W7LXR. Good luck to all of you for a successful new year in office. Karl Fraser, KK1A, has received his BPL medallion, and has qualified for the Public Service Honor Roll, for having been on the PSHR for more than 18 months. Also receiving Certificates of Merit from the ARRL, are Alice Mc Cullough, K7RQZ. Mary Anderson, N7DRP. Jim Arnold, K6AGD, and Glenn Evelove, N7YSS. These awards are for promoting and dedication of the National Traffic System for 1999. Congratulations to all, for a job well done! Get ready for Seaside, and it's "not too early" to plan for Field Day. Keep in touch.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—This report via SEC N7NVP. Clallam Co. ARES/RACES signed an MOU with SAR to install and operate a GRC-193A general coverage HF transceiver in their Comm Truck. The MOU also provides for ARES/RACES assisting SAR with communications and other suitable tasks. Several searches were supported by the hams in Cowlitz Co. for a total of 66.5 public service hours and 629 miles. The Medical Service Team reported over 450 public service hours between support of the World Trade Organization visit to Seattle and Y2K. This is how Marina Zuetell, N7LSL, Med DEC described it. "WTO turned out to be way more of a problem than the city anticipated, and the role of the amateur radio teams escalated proportionately. Twelve Seattle ACS and twelve MST hams provided over 500 hours of service over the 6 days. I personally spent 54 hours over 4 shifts. Our role was to monitor many different radio systems and report items of interest to the EOC personnel. While Y2K turned out to be a non-event, the planning and preparation over the past 2-3 years by all the hospitals and other agencies was what made it a non-event. We staffed 14 hospitals in King Co, 2 in Pierce Co, one in Snohomish Co and several in Thurston, Lewis, Mason and Grays Harbor counties. Several other counties were on standby only and did not participate in the net. From the new Radio Room at Riverton Operations Center, we were able to track the bed count status and facility status of 24 different hospitals in seven different counties. In almost all of the hospitals, it was a very high visibility project as executive-level hospital staff were present in the hospital command centers throughout the evening, and the radio operators were integrated into the operation. I have heard nothing but high praise from the hospitals about the value added by the radio operators and the overall net in determining the status of the inter-dependent regional health car organizations." During the transition of the century, the OOs were all ears monitoring. More recently, Seattle area hams played an important, but invisible role during demonstrations near the Microsoft facility. Counties reporting during January were Island, San Juan, Skagit, Snohomish, Whatcom, King, Clark, Cowlitz, Wahkiakum and Skamania. In the world of traffic the top tfc handlers for the month were K7BDU 896, K7MQF 165, W7TVA 218, W7ZIW 157 and W7NWP 154. 73, W7JWJ.

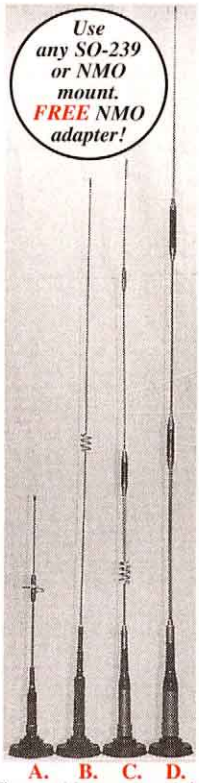
PACIFIC DIVISION

EAST BAY: SM, Andy Oppel, KF6RCO—SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. STM: K6APW. OOC: W6NKF. Check out the EB WWW Page at **http://www.pdarrl.org/ebsec/**. Webmaster is KB6MP. ORCA's new EOC is becoming operation with the installation of VHF/UHF radios. They setup a special packet BBS to save bulletins regarding the status of Y2K activities. LARK and SBARA have been sponsoring T-Hunts, generally held two Saturdays per month in the evening. SARS reported a successful Y2K operation at their OES and recognized K7LK for raveling all the way from Montana to attend their year-end pizza party. The VVRC Holiday Party was attended by over 40 people. SIRARC is delighted to have their old meeting place back - Spenger's Seafood in Berkeley; they welcome new members W6MBB and N6TUM. CCCC's Year 2000 board includes Pres/KC6VLL, VP/KF6FU, Sec/KE6MSF, Tres/KD6OKJ, Trustee/N6MNL, Dirs/AC6GQ, AC6WF, KD6JCT. MDARC's new education chairman is K3ZJJ. Congratulations to MDARC W6CX Award winners WB6OFH, KE6ELP, KE6TOT, KC6SOE, KR6CR and Ham of the Year KE6PTT. Tfc: W6DOB 633, WB6UZX 24. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7PM; NCN2-SLOW SESSION/3705/9 PM; NCN-VHF/145.21/7:30 PM; RN6/3655/7:45 PM & 9:30 PM; PAN/3651/7052/8:30 PM.

NEVADA: SM, Bob Davis, K7IY—ASM: Jan, NK7N. ASM: Jerry, W7YDX. SEC: Joe, N7JEH. TC: NW7O. ACC: N7FFP. STM/SGL: N7CPP. PIC: WW7E. OOC: N7ELV. Hello to all in the Nevada Section. Spring has nearly sprung now and many of the section clubs and organizations have submitted plans for major expansions and upgrades to their repeater systems. Many of the improvements involve full-time linking into systems outside of the local area. Please take time to learn and use the appropriate protocol when using these systems. Reports in from both the ARRL and W5YI VEC test sessions around the Section for the last two months have been tremendous. We should all take advantage of this opportunity to welcome these new and upgraded licensee's into our clubs and the League. They will most likely provide a new level of interest and activity within our organizations. With the license restructuring due date approaching of April 15th, please remember that you are required to register with the FCC first, via the ULS before attempting to submit your upgrade paperwork. Hello to Dennis, W6OGG in Rolling Hills. Thanks and 73, Bob, K7IY.

PACIFIC: SM, Ron Phillips, AH6HN—ASMs: Harry Nishiyama, KH6FKG; Lee Wical, KH6BZF; Jim Reid, KH7M; George Heloca, Sr. KH6ANA; Mel Fukunaga, KH6H. Stu Johnston, NH6DR. SEC: Dennis Carvalho, KH7H. TC: Chuck

MFJ *RuffRider*™ High Gain Mobile Antennas



Shown on mini mag mounts, not included.

Each MFJ RuffRider™ mobile antenna comes with MFJ's unique 90 degree "fold-over" feature -- lets you pull into your garage without knocking your antenna over!

MFJ's heavy duty bases are extremely strong to handle super rugged rides and day-to-day highway abuse.

MFJ's *RuffRider*™ High Gain dual band 144/440 MHz mobile antenna series is for the serious mobile ham who demands the highest quality, premium products at reasonable prices.

They feature the finest quality construction using precision machined components. *RuffRiders*™ battle the elements, handle rugged rides and day-to-day highway abuse.

Stacked elements with high-Q phasing coils give you outstanding gain. Stay in solid contact!

Phased Radiators

Phased radiators flattens the radiation pattern and concentrates your power to give you *super gain.*

High-Q phasing coils are housed in weather proof high-tech plastic insulation. They're attached to stainless steel stacked radiators by solid metal end sections.

Heavy Duty Base

Rigid, heavy duty solid metal base reduces SWR flutter due to wind vibration. Two Allen set screws securely fastens radiator.

Specially treated center pin provides excellent electrical connection.

Quickly screws off -- helps prevents theft of your expensive rig.

Use SO-239 or NMO Mounts

RuffRiders™ have a PL-259 base mount for quick installation to your heavy duty SO-239 magnet, trunk/hatch, gutter or mirror mount.

A *free* NMO adapter is included for use with an NMO mount.

MFJ mounts are recommended.

All MFJ *RuffRiders*™ are dual band 144/440 MHz antennas and factory tuned for SWR less than 1.5:1 and have 50 Ohm impedance.

MFJ's *No Matter What*™ Warranty

All *RuffRider*™s are covered by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your antenna for one full year.

Choose from several different length and gain antennas . . .

A. ***RuffRider Junior*™.** Premium, short 16½" antenna fits in any garage on any auto. ¼ Wave on 2 Meters, ½ Wave, gain on 440 MHz. 100 Watts. No fold-over.
MFJ-1402 **$34.95** add s/h

B. ***RuffRider High Power*™.** Just 40" long handles full *200 Watts.* Great for high power mobile amp. ½ Wave, gain on 2 Meters, ⅝ Wave, gain on 440 MHz.
MFJ-1412 **$49.95** add s/h

C. ***RuffRider High Gain*™.** 41½" long antenna gives extra gain with little height increase. Handles 150 Watts. ½ Wave, gain on 2 Meters, ⅝ Wave, gain on 440 MHz.
MFJ-1422 **$49.95** add s/h

D. ***RuffRider Hyper Gain*™.** 62½" brute gives a whopping gain on ⅞ Wave 2 Meters, ⅝ Wave, gain on 440 MHz. Our highest gain antenna. Handles 150 Watts.
MFJ-1432 **$69.95** add s/h

144/440 MHz Antenna Tuner with built-in SWR/Wattmeter
Covers 136 to 175 MHz. Handles 150 Watts. Compact 4x2½x1½". *New!* MFJ-922 **$79.95**

MFJ *RuffRider*™ super heavy duty Antenna Mounts

MFJ-345 Lip Mount is shown mounted vertically to a mini-van's angled hatchback lip. Note extra-wide mount with reinforcing tab at right -- safely secures heavy antennas. Swivel mount is adjusted so antenna is near vertical away from mini-van to clear luggage rack.

Trunk/Hatchback *Lip* Mount

MFJ-345 **$34.95** add s/h

MFJ's *RuffRider*™ super heavy duty solid steel Trunk/Hatchback *Lip* Mount mounts to any lip on your vehicle.

Extra-wide *four* inch lip and large reinforcing tabs on each side safely distributes the load over your vehicle's lip.

Two large set screws on each end of the mounting lip locks your mount in place. A scratch-proof rubber guard protects your vehicle's finish.

Secures large VHF, UHF and medium size HF antennas even at highway speeds.

Mounts on lips at any angle. Two axis of rotation lets you position your antenna vertically, horizontally or at any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 and locking screw, One year MFJ *No Matter What*™ limited warranty.

Mirror/Luggage *Pipe Clamp* Mount

MFJ-340 Pipe Clamp Mount is shown clamped solidly to vertical mirror support rod on a pickup truck. Antenna is slightly swiveled to the left and positioned about 30 degrees from vertical to clear cab of the pickup truck.

MFJ-340 **$34.95** add s/h

MFJ's *RuffRider*™ Mirror/Luggage *Pipe Clamp* Mount mounts on support rod of mirror, luggage rack or spare tire carrier of your truck, van, RV or SUV. Mounts on any horizontal, vertical or angled rod or pipe up to 5/8 inches in diameter.

Secures VHF, UHF and medium size HF antennas even at highway speeds.

Two axis of rotation lets you position your antenna to any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Convenient *Thumb and Finger* turn knob makes fold-over operation quick and easy. Locks in twelve positions.

Fold down your antenna at night when pulling into your garage and quickly put it back up to its operating position in the morning.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 base mount and locking screw, MFJ's famous One year *No Matter What*™ limited warranty.

MFJ's *MaxStrength*™ Hi-Flux Antenna Magnet Mounts

MFJ's *MaxStrength*™ high-flux magnet mounts give you maximum pull strength -- your antenna stays on top of your vehicle at highway speeds.

Base is *Euro-style*, black poly or chrome finish with a Mylar protective undersheet.

MFJ magnet mounts come with 17 feet of tough RG-58 coax with a PL-259 connector. Easily reaches operating position.

MFJ-333 **$14.95** add s/h

MFJ-335 **$19.95** add s/h

Choose your favorite antenna to go with these fabulous low-profile mounts for outstanding mobile performance.

MFJ-333 BS/BM, $14.95. Light to medium duty magnet mount. Low profile 3.5 inch diameter black base weighs 1½ lbs. For small to medium size antennas.

MFJ-335 BS/BM, $19.95. Medium to heavy duty magnet mount. Super strong 5 inch diameter *chrome* base weighs a husky 2½ pounds. For medium to large size antennas. It's perfect for MFJ's *RuffRider*™ High Gain mobile antennas.

Order BS for SO-239 connector.
Order BM for NMO connector.

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 ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

MFJ . . . the world leader in ham radio accessories!

Cartwright, AH7Y. PIC: Russ Roberts, KH6JRM. ACC: Bob Schneider, AH6J. HI QRP Club had their first monthly Hilo Hamfest and tail-gate swap meet Saturday, Jan 15. It was attended by KH6AFQ, KH6BMM, KH6HME, KH6AFS, WH6CME, W6ORS and KH6B. Corky Kirk, W6ORS, reports that tfc for Jan equals a big zero. December was: rcvd 3, del 3, orig 0, for a total of 6. Thanks, Corky, for your report. It is with deep regret that I report the passing of Myrtle Barton, NH6WX, of Hilo and Ernest Kurlansky, KH6CCL of Waimea. Both were members of BIARC and will be greatly missed. Planning is underway for a hamfest to be held in Waimea on March 18. All amateurs are welcome to attend. *QST* delivery is still slow to the Pacific. Please keep the reports coming. 73 and Mahalo, Ron, AH6HN.

SACRAMENTO VALLEY: SM, Jettie Hill, W6RFF— As of April 1, 2000 (no April Fool joke), there will be a new Section Manager for the Sacramento Valley Section. Because of personal reasons, I have submitted my resignation to the ARRL as of March 31, 2000. The new SM will be JERRY BOYD, K6BZ. Jerry has been active in the section for several years as the Section Emergency Coordinator. He is very experienced in emergency work, Public Service and Management. I know he will do an excellent job - otherwise I would not have recommended him. I want to thank all of the section staff and appointees for their dedication and hard work during the 10 and a half years I have been SM. Also to the affiliated clubs, thanks for your cooperation and hospitality through the years. I still plan to be active with the ARRL but not in an elected position. I have been a ham and a member of the ARRL for 61 years and enjoyed every minute of it!! Now back to section news. North Hill RC will be holding their annual hamfest on May 21, 2000 in Fair Oaks - same place as last year. They always get a good turn-out and there are lots of "boat anchors" to look at. See you there. Tom Schiller, N6BT, gave a talk on antennas to Sierra Foothills ARC. Tom is owner of Force 12 Antennas. Many hams taking exams now so they can up-grade their license on April 15. Amador County RC had good turnout at their annual dinner. I presented a 100% ARRL membership Certificate to the Mother Lode DXCC. The new SMs address is PO Box 252, Ono, CA 96047, **e-mail k6bz@c-zone.net**. Thanks, 73, Jettie.

SAN FRANCISCO: SM, Leonard Gwinn, WA6KLK— ASM: N6KM. SEC: WB6TMS. Valley of the Moon Radio Club will hold a hamfest and swapmeet in Sonoma on 29 April. San Francisco Radio Club has repaired their repeater and renovated their station complex. They are looking for new members and help for their events. Lambda Radio Club visited W6HDU for a review of old transmitters and receivers and have an interesting talk on radios and underground caving coming up. USS Pampanito Radio Club has an interesting project on a submarine. Ask!! Redwood Empire DX Club has certificates for working the north coast counties. Ask!! K7WWA new DEC for Mendocino County. Congratulations to all new club officers. Please send club news to WA6KLK, SM.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—With the advent of the new HF/VHF/UHF combination radios now showing up on the bands in abundance there is good reason to broaden the scope of our operating. In one radio now working the birds, local repeaters, weak signal two meter or four thirty, and HF is simple and will broaden our Amateur Radio experiences. I suggest that you check out ssb operation of 2 meters and the 430 MHz band for activity in the SJV Section as well as working the birds in space as you will hear some of your fellow SJV hams there. During the month of February, W1LP was heard, shipboard, in CM76 as he cruised toward San Francisco on a large commercial ship. He worked some of our SJV hams on VHF and UHF. N6KMR can be heard working the birds from many grid squares and giving out counties from his truck as he traverses the highways of California delivering wine from many of California's vineyards. In the news is that Kent LeBarts, K6IN, who, is SJV Sections Emergency Coordinator has accepted the position of Assistant Radio Officer, State OES, Inland Region 5. Congratulations, Kent, on a choice well made by the State of California. Kent LeBarts and I would like to thank all who participated in the Y2K vigil that took place on Jan 1 of this year. Although thankfully, nothing significant happened. What was significant is that our relationship with the State of California, the counties and local hospitals and the Red Cross was substantially improved for future cooperation.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. A short report this month - there's a LOT going on! Santa Clara County ARES/RACES held a very successful EOC-to-EOC traffic handling drill. The Naval Postgraduate School ARC meets the 2nd Thursday of the month at 7 PM local in Spanagel Hall Room 400 at the school. An informal group has started having lunch together every Wednesday at noon at Harry's Hofbrau on Saratoga Ave. Swing by and visit if you're in the area! The Millbrae ARC meets the 1st Thursday of the month, 7 PM in the community room of the Millbrae library at #1 Library Ave. You guys on our roster for sure! The Saratoga ARA net meets every Tuesday at 7:30 PM on 28.4 MHz (SSB) and 146.655- (114.8 pl). The Santa Clara County Amateur Radio assc. meets on second Mondays at 7:30 PM at HP Oak Room, contact Clark, KE6KXO, at 408-262-9334, for more info. The Santa Cruz County ARC meets at 7:30 PM on the third Friday at the Dominican Education building, 1515 Soquel DR, Santa Cruz. The Los Cumbres meets on the third Thursday at 7:30 PM in Hewlett-Packard bldg 48 (Cupertino) in the Oak Room. Talk-in on K6FB/R 145.45- pl 100. The Garlic Valley ARC meets at 8 AM on the LAST Saturday of each month, at the Little House Restaurant in Gilroy on Monterey Avenue. The South County ARES net is held each Tuesday at 7:30 PM on K6THR/R (147.825 -.600, no PL). Palo Alto Amateur Radio Association heard about the Orbiting Picosatellite Automated Launcher (OPAL) Satellite program at Stanford University at their Dec meeting. They meet the first Friday at 7:30 PM in the Menlo Park Recreation Center, 700 Alma Street, Menlo Park. For general information on clubs and other activities in the section, take a look at the SCV section Webpage at **http://www.pdarrl.org/scvsec/index.html** If you'd like to see your club mentioned in these pages, send me a copy of your club newsletter to me at home or via e-mail (**wb6w@arrl.org**). I can't report it if I don't see it!- See you next month! 73 de Glenn, WB6W. Tfc: W6PRI 4.

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

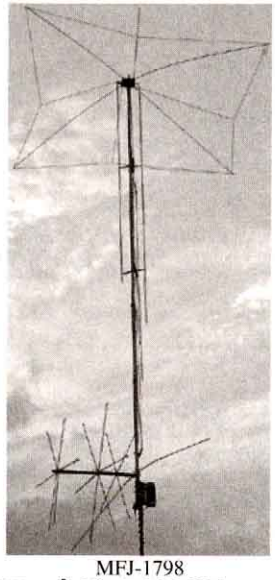
Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.



MFJ-1798
$269.95
Ship Code F

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$379.95
Ship Code F

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

NEW! **MFJ-1788, $429.95.** Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Portable Antenna

MFJ-1621 **$79.95** Ship Code A

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

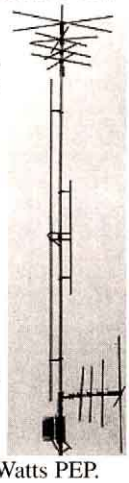
MFJ's G5RV Antenna

MFJ-1778, Ship Code A **$34.95**

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



MFJ-1796
$199.95
Ship Code F

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $159.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $179.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

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
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

MFJ . . . the world leader in ham radio accessories!

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— SEC: KE4JHJ. STM: K4IWW. TC: K4ITL. SGL: KI4AN. OOC: W4ZRA. PIC: KN4AQ. ACC: W4CC. BM: KD4YTU. **http://www.ncarrl.org** Part 97 (CFR 47) of the FCC Regulations is titled "THE AMATEUR RADIO SERVICE" and the first stated "fundamental purpose" is "service to the public...particularly with respect to providing emergency communications." I think it is most significant that the word SERVICE is used both in the title and in defining the purpose of Amateur Radio. (The word "hobby" does not appear in Part 97.) Along with the fellowship and fun comes the obligation of providing emergency communications to the public. Your ARRL has established the Field Organization and ARES to facilitate this, and your local Emergency Coordinator (EC) is the key person. The EC works with both county and relief agency officials to assure that we will be used effectively and in appropriate circumstances. The EC works with local Amateurs to assure that we will be trained and available when the opportunity to provide backup communications arises. The EC works with our PIOs and the media to assure that the public is aware of Amateur Radio's emergency communications activities. This PR activity may be the ECs most important job! I firmly believe that we need to take advantage of every opportunity to publicize Amateur Radio's emergency communications activities. Public perception that Amateur Radio is an essential emergency communications resource is, in my opinion, essential for the continuing existence of the Amateur Radio Service. (NOTE: I never call Amateur Radio a hobby in any public statements. I think it trivializes what we do.) The Em Mgt community is accustomed to dealing with groups that are part of national organizations with state and local level officials, e.g., the Salvation Army and Red Cross. ARRL has the advantage of a comparable organizational structure. There is little advantage, other than petty egos, not to function as ARES, a unified national organization. It served us well during our recent record snowstorms. Ask your EC to give you the opportunity to help fulfill our obligation for "service to the public." RARS Hamfest & State Convention in Raleigh Apr 9. Catawba Valley Hamfest in Morganton Apr 15. Jan tfc: W4EAT 451, AB4E 188, N4AF 185, K4IWW 157, NC4ML 154, AA4YW 121, KI4YV 111, W4IRE 83, KE4JHJ 68, K4AIF 61, W3HL 54, AC4DV 51, KE4AHC 37, AB4W 34, WA4SRD 28, AD4XV 22, N0SU 21, WD4MRD 21, W2CS 18, NT4K 15, W4CC 14 , AC4ZO 12, KF4OZF 12, KL7NL 11, KB8VCZ 8, W4DYW 8, KR4ZJ 7, KT4CD 7, KF4YMA 6, N2JLE 5, KF4YHG 4, KR4OE 2.

SOUTH CAROLINA: SM, Les Shattuck, K4NK— Greetings...This will be my last column as your section manager. As most of you know I am now the new Vice Director of our division. Your new section manager is Pat Hensley, N4ROS. I have enjoyed my stint as your section manager and hope I lived up to the job. I feel that I did the best job I could representing the ARRL in our state. As a Vice Director, I will continue to keep my eye on happenings in South Carolina. Please help Pat as she makes the transition. I would like to thank my staff for all the hard work. Hope to see you all at the Hamfest. Traffic, Jan 2000: KT4SJ 132, KA4LRM 77, K4JMV 70, KA4UIV 56, WA4UGD 28, W4CQB 16,W4DRF 15, WD4BUH 15. PSHR for Jan 2000 KA4UIV 133, KA4LRM 121, KT4SJ 108.

VIRGINIA: SM, Lynn Gahagan, AF4CD—ASM: W4TLM. SEC: K4EC. ASM/DSEC: KR4UQ. TC: W4IN. PIC: W2MG. OOC: KR4UQ. STM: ACC: AF4CD. A New DXCC Field Checker Program: The League is making the field checking of QSL cards for the DXCC Awards Program a little simpler for everyone. This would help eliminate a lot of the participants from having to send their cards to Newington to be checked for credit. Under the new rules, which will become effective on April 1st, the VA Section could have as many as three (3) checkers under the new program. This is determined by how many approved DXCC related clubs are in the Section. Bottom line folks is this: if we want more checkers in our Section, let's form more DX related clubs! For more details checkout the ARRL web site at **www.arrl.org/awards/dxcc**. Buddy, W4YE, invites all amateurs in his area (Roanoke) to join him and others at a QCWA chapter 202 meeting. They usually meet monthly for breakfast on a Saturday. All amateurs who were licensed at least 25 years ago are eligible to join Quarter Century Wireless Assoc. All Hams are welcome to attend. At least three traffic handlers of the Virginia Net (CW) belong to the chapter 202, W4UQ, WA4DOX, and W4YE. For more information, contact **w4ye@aol.com**. Virginia has five chapters currently: Northern Va., Tidewater, Shenandoah Valley, Charlottesville area, and Roanoke Valley area. K4IX, Bus of Norfolk reports that his dear friend of many years, "Nap" Perry, W4DHZ, is now a "Silent Key." Nap was a very fine CW operator. His code was sent on an old Vibroplex "bug." He was lightning fast and accurate and his call was known all over the world. He was at the top of the DX ladder, the Va. DXCC listing of countries confirmed. He was an official card checker for the DXCC Award program. When he served as an Assist. EC for Norfolk, he helped install VHF antennas on Schools that were designated as Emergency Shelters. In earlier years, Nap worked with Norfolk City officials setting up an Emergency Com Center at the Center Theater building and was the leader of that Civil Defense team. Although I knew him for only a short period, I will always miss the stories Nap told at the "bragging session" we have at the Va DXCC meetings. They were always interesting to say the least. Nap was also a member of the Tidewater QCWA chapter. 73 de AF4CD. Tfc: W3BBQ 189, K4MTX 166, WA4DOX 154, KR4MU 154, K4YVX 122, N4ABM 92, WB4ZNB 74, W4CAC 62, W4UQ 59, W4YE 30, KD4FUN 30, AF4CD 24, K0IBS 23, WB4UHC 21, W4TY 12, K4IX 11, W4JLS 9, W4MWC 6, KB4CAU 6, K4JM 4, N4FNT 2, KE4PAP 2, W4IN 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart , WD8V— Just glanced over last month article and was attempted to copy and paste it here. On the air, by e-mail, by telephone the main topic of conversation in Amateur Radio seems to be restructuring and what to do with it. As I indicated last month, the thing to do is to accept it and get some positive benefits out of it. The definite need for "Elmering" or tutoring on proper and adequate on-the-air procedures it a top-notch priority, and I strongly recommend that this be done by the local clubs. Just too many and too much for one-to-one. Please advise,

MFJ *tunable* super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP filters

U.S. Patent D374,010

MFJ-784B

$249.95

NEW!

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 phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57dB 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.**

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 milli-seconds. 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 tunable manual notch can be used when a 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 auto- matic 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.

NEW! 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 frequencies 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. 4½x2½x5in.

DSP for *your* MFJ-1278/B

MFJ-780

$99.95

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.

Free MFJ Catalog

Nearest Dealer . . . 800-647-1800

• 1 year *unconditional* warranty • 30 day Money Back guarantee (less s/h) on orders from MFJ • Add s/h

MFJ ENTERPRISES, INC.
P.O. Box 494
Mississippi State, MS 39762

• **MAIN** 601-323-5869 • **FAX** 601-323-6551 • **TECH** 601-323-0549
• **Call** 8-4:30 CST, Mon-Fri • **E-Mail:** mfj mfjenterprises.com

Web Site: http://www.mfjenterprises.com

MFJ . . . the world leader in ham radio accessories!

Jim, WD8MKS, or me, if your club would like any printed materials and such. The other facet of the restructuring that is really coming forward nationwide, is the excellent time for public relations through informing the public of what and why we are, and that the FCC is making the amateur license more accessible. The national trend for increased exam activity is definitely established, and there are adequate guidelines being provided by the VECs. Most VEs are up to date on how your license or your exams will be affected, and I am sure they will be glad to advise you. Don't forget to register for the Universal License System (ULS) with your TIN or social security number. Tfc: KA8WNO 427, W8WWF 107, WD8DHC 101, KC8CON 59, N8OYY 12. *PSHR* WD8DHC 138, KA8WNO 118; WVFN 1367/89/31 KC8CON; WVMN 386/22/31 N8OYY/WD8V; WVNE 131/71/31 W8WWF; WVN L 152/49/31 W8WWF; DIGITAL 132 K8MHR.

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. Tim and I had the pleasure of attending the annual meeting of BCARES. Great group of folks. Outgoing EC Pat Lambert, W0IPL, presented an award to Vicki Schneider, N0XCX for "Significant Contribution and Achievements". Congrats to her and thanks for volunteering and donating so many hours to public service. The Boy Scout Freezoree is an annual mid-winter campout at the US Air Force Academy attended by over 3,000 scouts from around the state and several troops from out of state as well. Area ham groups led by the Pikes Peak Radio Amateur Assn and the Mountain Amateur Radio Club provided several stations for the scouts to observe and participate in our hobby. Well done to all involved. A bill introduced in the Colorado state assembly would have outlawed the use of ham radio while mobile. The measure was aimed at cell phone users but ham radio got swept along. Many hams wrote letters to their state legislators and Wes Wilson, W0HBZ, Mike Manes, W5VSI, and Sid White, K4ARM were invited to testify in front of the committee considering the bill. In the end, the committee decided to "postpone indefinitely" any action on the legislation effectively killing it. If you have items for this column, e-mail them to me at n0wpa@arrl.net. 73, de N0WPA. NTS traffic: AD0A 150, K0TER 58, N0UOD 30.CAWN: W0WPD 822, W0GGP 552, W0LVI 526, AA0ZR 464, N0NMP 448, KI0ND 386, W0NCD 377, N0DKK 354, K0HBZ 321, N0JUS 257, WB0VET 201.

NEW MEXICO: SM, Joe T. Knight, W5PDY— ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner Net handled 117 msgs with 1189 checkins. New Mexico Breakfast Club handled 244 msgs with 1113 checkins. Yucca Net handled 28 msgs with 814 checkins. Caravan Club Net handled 11 msgs with 76 checkins. SCAT Net handled 26 msgs with 527 checkins. Four Corners Net handled 26 msgs with 300 checkins. GARS Net handled 3 msgs with 295 checkins. Rusty's Net handled 93 msgs with 673 checkins. Valencia Co Net handled 11 msgs with 45 checkins. We survived the January Tailgate with real thanks to K5TEE and his crew. We had over 300 at the event even if the weather started off at 23 degrees! The hot coffee and the breakfast burritos provided some warmth. Good to see such a good turnout, but at times some of us were bundled up so that you couldn't tell who you were talking to. We thank Rick from Rad-Com for driving all the way from Lubbock, TX. There were people from Farmington, Grants, Clovis, Socorro, Santa Fe, Ojo Sarco, and many other places, even Arizona! Our next tailgate event will be April 29 at St Pauls United Methodist Church at approximately Moon and Constitution NE. The Mesilla Valley (Las Cruces) "Bean and Chili Feed" usually follows that, and I assume that would be Sunday April 30 in Las Cruces. Very sorry to report the passing of N5JOG of Alamogordo and W5MDG of Roswell. They will certainly be missed. Best 73, W5PDY.

UTAH: SM, Mel Parkes, N5UVP—We were all saddened to hear about two of the hams in our state who became Silent Keys. Wilbur J. C. "Bill" Fahey, K7FY, passed away 24 Jan, and Orren W. Walker, Jr., W7LYC, who passed away 13 Feb. Both these hams have contributed much to amateur radio in our state and will be missed by many. Our thoughts and condolences go out to their families and relatives. I have been very impressed at all the upgrade activity and wish to congratulate those who have upgraded. Check out the Utah Hamfest 2000 Web page at **http:\\www.utahhamfest.org** and register early. 73, N5UVP.

WYOMING: SM, Bob Williams, N7LKH—The Wyoming Section is being asked again to provide com support for the March of DimesWalkathon. It must be because we do such a good job. This year it will be on 29 April at Casper, Cheyenne, Cody, Evanston, Jackson, Laramie, Lusk, Rawlins, Riverton, Rock Springs, Wheatland and Worland. It will be on 6 May at Sheridan. As in the past, the local ECs will be contacted by the local Walkathon Coordinator to work out the detailed plan and timing, and they will seek support from the local club members. We have been able to staff the task very effectively in the past and it is to be hoped it will only be better this time. In the future we also have the 2000 Tour de Wyoming Bicycle Tour 16-21 July involving Jackson, Pinedale, Farson, Lander, Shoshone and Thermopolis. The exact routing is not yet known but it will it will be available for review and discussion at the Hamfest in Casper over Memorial Day weekend. We will be seeking com support people for each lap of the Tour. Your SM and ACC expect to participate 17-21 July on return from the Glacier Hamfest. Tfc: NN7H 243. PSHR: NN7H 179.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland, KR4TZ—The license restructuring takes effect on April 15, and I look forward to the increased activity on our HF bands. Please check in to the Alabama Day Net on 3965 kHz daily at 10:00 AM, the Alabama Traffic Net Mike on 3965 kHz daily at 6:30 PM and

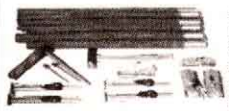
ELECTRONIC MILITARY SURPLUS

FAIR RADIO SALES

Capacitors - Motors - Tubes - Test Equipment

Radios - Antennas - Inductors - Transformers

30 FT MAST KIT



AB-1244/GRC MAST KIT, twelve aluminum alloy on steel sections form sturdy, yet light-weight 30 foot 1.7" dia mast. Kit includes five each lower and upper sections, one ea lower and upper adapter sections, gin pole swivel base, four ea 36 and 42 ft guy ropes, four guy stakes, two guy rings plus 2.5 pound sledge hammer. Part of OE-254/ GRC antenna set; 30 lbs sh. New, $139.50 plus shipping.

WEBSITE: fairradio.com

E-MAIL: fairadio@wcoil.com
PHONE: 419-227-6573 - FAX: 419-227-1313
1016 E. Eureka - Box 1105 Lima, OH 45802
VISA, MASTERCARD, DISCOVER accepted
Write for latest Catalog - Address Dept. QST

REP AIR & MAINTENANCE VIDEOS FOR VINT AGE RADIOS!

Highly detailed videos on operating, rebuilding, aligning & troubleshooting these classics!

NEW! R-390A ADDENDUM VIDEO • 4 hours • $49.95
HAMMARLUND SP-600-JX VIDEO • 4 hours • $89.95
COLLINS R-390A VIDEO • 7 hours • $109.95
COLLINS 75A-4 VIDEO • 4 hours • $89.95
COLLINS KWM-2 VIDEO • 4 hours • $89.95
COLLINS 75S-3/32S-3 VIDEO • 3.5 hours • $74.95
COLLINS KWS-1 VIDEO • 2 hours • $39.95
COLLINS 30L-1 VIDEO • 1 hour • $39.95
COLLINS 30S-1 VIDEO • 1 hour • $39.95
COLLINS AMATEUR RADIO EQUIPMENT VIDEO SPOTTER'S GUIDE • 1 hour 40 minutes • $24.95

Purchasing any three or more videos from our Video Library qualifies you for a 10% package discount! Visa and Mastercard gladly accepted! For Mail orders, add $4.50 each for the first two videos for shipping in the USA. Additional videos are shipped at no extra charge.

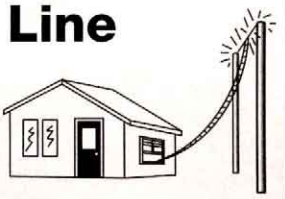
HI-RES COMMUNICATIONS, INC.
8232 Woodview Dr., Clarkston, MI 48348-4058
(248) 391-6660 (PHONE & FAX)
E-mail: info@hi-rescom.com • www.hi-rescom.com

W7FG
Vintage Manuals

Over *350* Manufacturers and over *6,000* Manuals
Radio, Test Equip., Audio

VISA **FREE CATALOG** 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

2539 W. 237th Street, Bldg. F, Torrance, CA 90505
Order desk only: USA (800) 872-8878 CA: (800) 223-9977
L.A. & Technical Info: (310) 784-5488 Fax: (310) 784-7590
http://www.digisys.net/timeline

TIMELINE, INC.

Minimum Order: $20.00. Minimum shipping and handling charge $5.00. We accept cashiers checks, MC or VISA. No personal checks or COD's. CA residents add 8.25% sales tax. We are not responsible for typographical errors. All merchandise subject to prior sale. Phone orders welcome. Foreign orders require special handling. Prices subject to change without notice. 20% restocking fee for returned orders.

OEM INQUIRIES WELCOME

Over 14 years and 32,000 customers and still growing

LIQUID CRYSTAL DISPLAYS

240x64 dot LCD with built-in controller
AND 4021ST-EO. *Unit is EL back-lit.* **$59.00 or 2 for 109.00** *or*
Optrex DMF5005 *(non back-lit)* **$49.00 or 2 for $89.00**
20 character x 8 line 7/8Lx2½H *The built-in controller allows you to do text and graphics.*

Alphanumeric – parallel interface

16x1	$6.00	20x2	$8.00	32x2	$8.00
16x1 (lg. char.)	$8.00	20x4	$8.00	40x1	$8.00
16x2	$6.00	20x4 (lg. char.)	$10.00	40x2	2 for $20.00
16x2 (lg.char.)	$10.00	24x2	$8.00	40x4	$20.00
16x4	$12.00	32x4	$10.00	4x2	$5.00

5V power required •Built-in C-MOS LCD driver & controller •Easy "microprocessor" interface •98 ASCII character generator •***CERTAIN MODELS ARE BACKLIT***, call for more info.

Graphic and alphanumeric – serial interface

Size	Mfr	Price	Size	Mfr	Price
640x480 (b.l.)	Epson	$20.00	320x240	Epson	$25.00
640x400 (b.l.)	Panasonic	$15.00	256x128	Epson	$20.00
640x200	Toshiba	$15.00	240x128 (b.l.)	Optrex	$20.00
480x128 (b.l.)	ALPS	$10.00	240x64	Epson	$15.00
480x128	Hitachi	$10.00	240x64 (b.l.)	Epson	$25.00
			160x128	Optrex	$15.00

6" VGA LCD 640x480, Sanyo LMDK55-22 **$19.00**

MONITORS

Non-Enclosed TTL
Comes with pinout. 12V at 1.4 Amp input • Horizontal frequency 15Khz • Ability to do 40 and 80 column.
5 inch Amber $19.00 • 7 inch Amber $19.00 •9 inch Amber or Green $19.00

5" COLOR MONITOR
• Flat Faceplate •320 x 200 Dot Resolution • CGA & Hercules Compatible **$29.00** 2 for $49.00
• 12 VDC Operation • 15.75 KHz Horiz. Freq. • 60 HzVert. Sync. Freq.
• Open Frame Construction • Standard Interface Connector • Degaussing Coil included • *Mfr. Samtron*

9" COLOR SVGA MONITOR **$169.00** Fully Enclosed – Tilt and swivel type.

HACKER CORNER

Rockwell™ "Jupiter"
GPS Receiver $69.00
Miniature (2.75" x 1.5" x .25") 12 channel receiver engine • Supports NMEA 0183 and binary protocols • Supports DGPS input in both protocols • Compatible with active and passive antennas • "Keep – Alive" reduced power capability • Standard 2mm 2x10 interface connector • Complete manual and interface documentation available • Compatible with most laptop software using NMEA interface • Suitable for wide range of GPS applications including: Handheld GPS, Automotive/Marine/Aviation Applications, Amateur APRS and Packet.

Embedded 486 Computer $79.00 2 for $149.00
Complete enhanced Intel 486SX-33 based computer in ultra small (9-7/8Lx6-5/8Wx3-1/8H) case. Ideal for embedded operations or as a second computer. Features include: • One 16 bit ISA slot • 3 serial ports plus dedicated printer port • Parallel optical coupled adapter port • Built in IBM PC/AT keyboard port • On board VGA video and port • Uses standard SIMM up to 32 MB • BIOS is PC/AT compatible
Unit has a backup Ni-Cd battery system in case of power failure (5 min. backup time) and lockable front cover to prevent floppy drive access. Mounting / interface provisions for standard 3.5" laptop floppy and 2.5 inch hard drives. Comes with very comprehensive manual.

SONY Miniature Color LCD Display (LCX005BKB) $29.00
1.8 cm (0.7 inch) unit LCX009AKB 827 x 228V **$29.00**

CELL SITE TRANSCEIVER $29.00 2 for $49.00
These transceivers were designed for operations in an AMPS (Advanced Mobile Phone Service) cell site. The 20 MHz bandwidth of the transceiver allows it to operate on all 666 channels allocated. The transmit channels are 870.030-889.980 MHz with the receive channels 45HMz below those frequencies. A digital synthesizer is utilized to generate the selected frequency. Each unit contains two independent receivers to demodulate voice and data with a Receive Signal Strength Indicator (RSSI) circuit to select the one with the best signal strength. The transmitter provides a 1.5 watt modulated signal to drive an external power amplifier. Channel selection is accomplished with a 10 bit binary input via a connector on the back panel. Other interface requirements for operation are 26 VDC (unregulated) and an 18.990 MHz reference frequency for the digital synthesizer. The units contain independent boards for receivers, exciter, synthesizer, tunable front end and interface assembly (which includes power supplies and voltage-controlled oscillator) Service manual, schematics and circuit descriptions included.

4 INCH LCD MONITOR $49.00
Compact (4.4" x 3.8" x 1.4") TFT active matrix LCD color monitor including fluorescent backlight. Analog RGB and composite sync input with switchable horizontal / vertical viewing. Back-lit. Single 8 VDC supply .

NTSC COMPOSITE 4" LCD MONITOR **$69.00**

Sunday mornings at 8:00 AM, and the Alabama Emergency Net on 3965 kHz on Tuesdays at 7:30 PM. Alabama hams are always on 3965 kHz, and you will usually hear some friendly rag chewing every evening after the nets. If you would like to use CW, please check out the Alabama Training Net on 3714 kHz daily at 6:00 PM and the Alabama Section Net on 3575 kHz daily at 7:00 PM and again at 10:00 PM. CW is alive and well in Alabama, and I hope you will take advantage of our CW nets. On April 15, the Franklin County ARC will have its Sand Mountain Hamfest at the Albertville Recreational Center in Albertville, AL. The hamfest opens its doors at 8:00 AM and admission is $5.00. Talk-in is available on 147.20+ and 145.11-. For more information check out the club's web-site at **www.qsl.net/mcarc-al** or call Buddy Smith, KC4URL at 256-593-2516. On April 29, the Bankhead ARC will have its hamfest at H. A. Alexander Park in Moulton, AL. Hours are 9:00 AM to 4:00 PM and admission is $3.00. Talk-in is available on 53.17, 146.96 and 442.425. License exams will begin promptly at 9:15 AM. For more information check out the club's Web-site at **www.n4idx.org** or call Rex Free, KN4CI at 256-905-0822 or Ed Weatherford, KS4B, at 256-974-0436. There is always something going on in our section, so please check out our Web site at **www.qsl.net/al-arrl** for more up-to-date news and information. 73, Bill Cleveland KR4TZ.

GEORGIA: SM, Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: Tom Rogers, KR4OL. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL, ACC: Bob Lear, K4SZ. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. I start off this month's news on a sad note. A lot of good people are slipping away from us. Recently we lost Chad Burris, K4UN, Lilburn. Chad was active in the Alford Memorial Radio Club. He is missed by club members and the rest of us. The 4th annual Southeastern VHF Conference is April 14-15 at the Marriott Hotel Northwest at Windy Hill Rd., Marietta. Two days of technical forums, a swap shop, exhibits, an auction, and plenty of comraderie topped off by a gala banquet featuring Joel Harrison, N5ZM, 1st Vice president of the ARRL. Noted VHF-ers from around the country will attend. This is a must conference for those interested in weak-signal VHF and UHF. Check-out the Website **www.svhfs.org/svhfs** for more details. The January ice storms on two successive weekends did more than make the run-up to Super Bowl more interesting. ARES was put to the test providing weather information for the NWS office in Peachtree City. The storm forced a postponement of the GARS techfest until middle March. The Statesboro ARS will sponsor its annual hamfest on May 20. The Atlanta Hamfest is June 2-3. The Albany fest is week later June 9-10. Spring is on the way. Really! All that ice will be a bad memory to tell your great grand kids about the winter of aught aught. 73, Sandy. Tfc Jan: WB4GGS 160, K1FP 105, AF4NS 80, WU4C 60, N4QX 54, KA4HHE 40, K4BEH 35, K4WKT 20, K4JNL 8, K4BAI 5, W4RU 4.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM-E CENTRAL: AC4PF. ASM-WPAN: KO4TT. ASM-APRS: WY8O. ACC: WA4B. BM: N4GMU. OOC: AF4EW. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. PACKET: N4GMU. All Club newsletters are reporting how well everything went in the Y2K event and seemed well pleased of Clubs participation. Several of you have reported gratitude and appreciation to your people for their time and efforts. The Governor, the Mayors of several cities, disaster agencies, and the State Dept of Emergency Communication have reported their appreciation for the Amateur Radio operators participation. While it is impossible for me to say thanks to each of you, your efforts are greatly appreciated. It is a pleasure to be part of a team that works together for the benefit of amateur radio in serving the general public. The Orlando HamCation is now history, and trust everyone enjoyed seeing friends, and making new ones. The UWF Club in Pensacola conducted a hamfest in Pensacola and was considered a great success. Members of FFARA Club in Pensacola assisted in this event. Another example of our people working as a team. The vendors seemed pleased with the attendance and suggested more vendors could attend if the date was changed to permit their stopping by in Pensacola on to other Fests. The DOF is presently considering using ARES Amateur Radio operators during major fires. Hopefully, details will be finalized in the near future. Listen on the NFAN Net for information as things progress. FCC announcement on restructuring of licenses has created a need for clubs and other VEs in giving exams. The attendance at exams is increasing as a result of the restructuring. 73 de Rudy. Tfc: WX4H 2274, NR2F 569, KE4DNO 333, AF4PU 236, KE4PRB 154, AD4DO 105, WD4IIO 97, K1JPG 95, N9MN 94, W5MEN 71, AF4GF 66, W4KIX 65, WB2FGL 60, KF4NFP 59, KF4TM 51, K8KV/4 42, K4JTD 32, KB4DCR 27, KJ4HS 27, WD4JNM 27, WB2IMO 26, N4ORZ 26, WD4IIO 26, AB4PG 14, WA4EYU W8IM 9, WX4J 8, WX4J 7, KE4LTS 4, WD4LIF 2, KG4EZO 2.

PUERTO RICO: SM, Víctor Madera, KP4PQ-- Se me ha asignado la tarea de reemplazar a nuestro SM anterior debido a su renuncia. Espero reorganizar nuestro equipo de trabajo para la Sección de Puerto Rico pronto con la ayuda de ustedes. La Liga Puertorriqueña de Radio-aficionados eligió su nueva directiva para el 2001 y tuvo como invitado de honor en su Asamblea Anual a Riley Hollingsworth de la FCC quien presentó una interesante charla sobre cumplimiento. El PRARL anunció que continuará su programa de "CW Certification" y comenzó clases en la UPR para Technician y telegrafía a 5 Wpm. Información por el 789-4998. El PRDXC celebra reuniones los segundos lunes de mes en la UPR a las 7PM. Todos bienvenidos. Se pueden comunicar conmigo vía email a **kp4pq@arrl.org**.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI—SFL Section cabinet members joined me at the "Welcome Booth" of the Miami Hamboree in Feb. We responded to comments and questions from hundreds of new, prospective, and seasoned hams. WB9SHT's working stations and 4 CW keyers were a great drawing card. Thirty section appointees gave up lunch to attend the Saturday noon workshop where cabinet members led small groups in goal setting for 2000 and beyond. Martin Co. EC, Ed Petzolt, K1LNC, was presented a plaque acknowledging him as recipient of the International

BATTERIES

BUY DIRECT FROM THE U.S. MANUFACTURER!

YAESU

FNB-2	10.8v @ 600 MAH
FNB-4	12v @ 750 MAH
FNB-4A	12v @ 1000 MAH
*FNB -10(S)	7.2v @ 1200 MAH
FNB-12(S)	12v @ 600 MAH
FNB-17	7.2v @ 600 MAH
FNB-25	7.2v @ 600 MAH
FNB-26	7.2v @ 1200 MAH
**FNB-26(S)	7.2v @ 1500 MAH
FNB-27	12v @ 600 MAH
**FNB-27(S)	12v @ 800 MAH
1/4" longer than FNB27	
FNB-31	4.8v @ 600 MAH
FNB-33(S)	4.8v @ 1500 MAH
FNB-35(S)	7.2v @ 600 MAH
FNB-35(S)(S)	7.2v @ 1500 MAH
FNB-38	9.8v @ 600 MAH
*1 1/3" longer than FNB38 case	

BATTERY ELIMINATORS AVAILABLE

SPECIAL
FOR THE MONTH OF APRIL
10% OFF
on all
ICOM
NiCD and NiMH
Replacement Battery Packs
Look for May's Special of the Month
Monthly Discounts Applicable to End-Users Only

Powerpac+®
6 V for Camcorders & 12 V for 2-way

W & W Manufacturing Co.

NYS residents add 8.5% sales tax.
Add $5.00 for shipping.

800 South Broadway, Hicksville, NY 11801-5017

E-Mail: w-wassoc@ix.netcom.com Web Site: wwassociates.com

Made in U.S.A.
Send for free catalog & price list

IN U.S. & IN CANADA CALL TOLL FREE 800-221-0732 • IN N.Y.S. 516-942-0011 • FAX: 516-942-1944

MADE IN U.S.A.

Prices and Specifications subject to change without notice.

RF POWER AMPLIFIERS

High Power Amps
144mhz 400watts
220mhz 225watts
440mhz 185watts

Model	Pin (W)	Pout (W)	Ic (A)	Gain/NF (dB)(dB)	(+13.8V) Type	$ Price
50 MHz						
0503G	1-5	10-50	6	15/0.7	LPA	204
0508G	1	170	28	15/0.7	Standard	359
0510G	10	170	25	15/0.7	Standard	314
0550G	5-10	375	59	15/0.7	HPA	503
0552G	25-40	375	54	15/0.7	HPA	463
144 MHz						
1403G	1-5	10-50	6	15/0.7	LPA	160
1405G	1-2	100	14	15/0.7	Standard	291
1410G	5-10	160-200	28	15/0.7	Standard	323
1412G	25-45	160-200	22	15/0.7	Standard	283
1450G	5-10	350+	56	15/0.7	HPA	563
1452G	10-25	350+	50	15/0.7	HPA	516
220 MHz						
2203G	1-5	8-35	5	14/0.8	LPA	166
2210G	5-10	130	20	14/0.8	Standard	341
2212G	25-45	130	16	14/0.8	Standard	313
2250G	5-10	225	40	14/0.8	HPA	574
2252G	10-25	225	36	14/0.8	HPA	531
2254	75	225	32		HPA	489
440MHz						
4405G	1-5	15-50	9	12/1.2	LPA	305
4410G	10	100	19	12/1.2	Standard	362
4412G	15-30	100	19	12/1.2	Standard	352
4448G	1-5	75-100	25	12/1.2	HPA	423
4450G	5-10	185	35	12/1.2	HPA	579
4452G	25	185	30	12/1.2	HPA	539

Description	Size	Wt	Connectors
LPA=Low-power amp	3x6x5	4lbs	UHF
Standard=Mobile/Base	3x6x11	6lbs	UHF or N
HPA=High-power amplifier	3x10x11	9lbs	UHF or N

REPEATER AMPLIFIERS- continuous-duty! See extensive listing in catalog or call factory for details.

Model 1410G

Model 1452G

Send for Catalog!

TE SYSTEMS
TE SYSTEMS TEL (310)478-0591
P.O. Box 25845 FAX (310)473-4038
Los Angeles, CA 90025

HamCall™ CD-ROM

U.S. & International - Over 1.5 million listings

Clearly, the most current and complete amateur radio CD-ROM available

Fresh every week!

Search by nearly any item in the database. QSL managers, photos, email addresses, interest profiles, lat/long, beam headings and more.

Browse our online catalog at:
http://www.buck.com/hammain.html
6 months free access to advanced Internet features with HamCall purchase.
$50, plus $5.00 shipping per order.
Free 800 technical support.Your satisfaction guaranteed!

BUCKMASTER
6196 Jefferson Highway
Mineral, Virginia 23117 USA
e-mail: info@buck.com
540:894-5777 • 800:282-5628 • 540:894-9141 (fax)

Convert Your Average Reading Wattmeter To PEP Reading For Less Than $20!

The PDC-1 is a universal Peak-Hold circuit that will convert ANY wattmeter, including the Bird 43, to true PEP reading! All that is required is a DPDT switch to choose between PEP and Average readings, and 6-12 VDC or 6.3 VAC power connections.

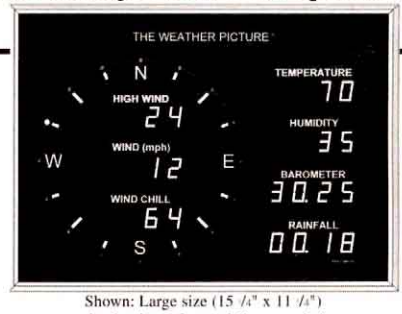
The PDC-1 measures 2" X 1.5" and fits neatly inside most wattmeters without any modification.

The PDC-1 is available for $19.99 (post paid in North America) in ready to assemble kit form.

Please add $3.00 postage for orders going outside of North America. Visa and Mastercard accepted! Don't forget to visit our new Home Page on the www!

HI-RES COMMUNICATIONS, INC.
8232 Woodview Dr., Clarkston, MI 48348-4058
(248) 391-6660 (PHONE & FAX)
E-mail: hires@rust.net • http://www.rust.net/~hires

THE BEST for ham radio operators!



Shown: Large size (15 1/4" x 11 1/4") in aluminum frame, fully expanded.

Put the weather on your wall

The most popular accessory for our precision weather systems, **The Weather Picture®** continuously displays all the vital weather data you've pre-selected from your ***ULTIMETER®*** Weather Station. Big red numerals are easy to read from across the room, day or night. Available in 2 sizes, in brushed aluminum, traditional oak or elegant solid teak frame.

ULTIMETER Weather Systems are simple to install and easy to use, yet accurate enough for the pros. Select the one that best fits your needs and budget.

Wireless displays now available!

For full details, write or call us **TOLL-FREE at 1-800-USA-PEET.** Or visit our Web Site to see and *actually try* a system:

www.peetbros.com

Phone: 1-800-USA-PEET Fax (407) 892-8552
PEET BROS COMPANY
Dept. QST, 31 E.17th Street, St. Cloud FL 34769
Our 25th year ©2000 Peet Bros.

Humanitarian Award. He is credited with saving the lives of 4 missionaries held hostage by gunmen in Guatemala. He was the only link between them, US authorities, and Guatemalan authorities for 7 hours, while a rescue by Guatemalan military and police forces was arranged. Congratulations, Ed. You have set a superior public service example for all hams! WA4AW, ACC, reports all incumbents (W4SS, KG4U, WD4IUD, W4NAV) were reelected for the WPB ARC. New officers for the Jupiter-Tequesta Rptr group are KE4PPI, KE4THT, and KD4QHI. WPBARC and the new Wellington RC will operate jointly on Field Day, while the Boca ARA and FAUARC plan to join forces on the FAU campus. Clubs and PIOs: Please send your news to PIC, W4STB, and ACC, WA4AW, to be shared with the section. The newly appointed OOC, RL Caron, K4GP, has started organizing his team. His years of experience as an OO in CA and here will be a bonus, and working with his NFL counterpart should benefit solving HF problems concerning all of FL. Keep checking our Section Web page at **www.sflarrl.org** as it continues to grow a little each week. Traffic by KJ4N: WA9VND 766, W7AMM 349, KC4ZHF 288, KA4FZI 262, KB4WBY 248, KD4GR 211, KJ4N 176, KD4HGY 151, K4FQU 135, W4DL 129, KE4IFD 126, WB4PAM 118, WA4CSQ 90, WA4EIC 84, W8SZU 63, AA4BN 55, KE4IDG 47, KT4XK 40, KE4UOF 33, KC4CHW 25, KE4WBI 22, W6VIF 18, K4OVC 9, W4WYR 7, W3JI 5, AF4NR 4. 73 de KA4FZI.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix—ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. SEC: Vic, WP2P, St Croix. PIC: Lou, KV4JC, St Croix. ACC: Debbie, NP2DJ, St Thomas. NM: Bob VP2VI/W0DX, Tortola. Sorry to have to report the passing of Frank, NP2I, January 15 (the day of the St Croix ARC party). Services were held at Holy Trinity Lutheran Church with Reverend Bob Wakefield (KV4IH) officiating. Frank was the ARRL contact VE for St Croix and CW op extraordinaire. He will be sorely missed. St John ARC will again participate in the "Tough One" race from Cruz Bay to Coral Bay on 2/26. Operators will be placed approximately every mile of the 7-mile course to report any problems. This annual event becomes more and more popular and record participation is expected this year. CW op, Jim, W0NB, sports a brand new call KP2L. Team Ritty (KP2N, NP2E, NP2W, et. al) in St Thomas expects to operate this weekend (Feb 12). Lou, KV4JC, now has parts to put damaged beam back together, NP2EF, NP2B, plus others to try to raise it next weekend. That's it for this month, 73, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR **ae4mr@arrl.org** WCF Section Web Page at: **http://www.wcfarrl.org** ASM K2SEC, ASM-Web KR4YL, SEC KE4MPQ, TC KT4WX, BM KE4WU, OOC W3BL, STM AB4XK, PIC WA4ATF, SGL KC4N, ACC AC4MK. Join me in welcoming the following new cabinet members: Assistant ACC, John Sproat, W4JS and ASM-Legal Affairs, Biff Crain, K4LAW. Biff will work closely with LGL in the section. **Restructuring:** I have scheduled a special midnight paperwork only session at 12:01 am April 15th at RT Systems in Brandon. Session results will be sent Fed Ex to insure that it beats the anticipated rush. W3BL asks: Have you done your RF Safety evaluation? Use the RF Safety calculator accessible from the WCF Section Web Page at **http://www.wcfarrl.org** to make sure you are in compliance. **Public Service Events**: Please lend a hand. 4/1 Juvenile Diabetes Foundation - Pinellas, 4/8 MS Walk - Pinellas, Hillsborough, Sarasota and Polk. 4/29 March of Dimes - Pinellas, Hillsborough, Sarasota. **Florida QSO Party:** 4/29-30 info **wd4ahz@arrl.net** or **www.qsl.net./fqp** The WCF First Contract, 9 county, 9 day, Special Event was a huge success in kicking off the new section. The logs show thousands of contacts, more on this later. Tfc by AB4XK: K4SCL 288, AB4XK 203, AD4IH 87, K4RBR 56, W4AUN 38, KT4PM 32, KT4TD 17, KE4VBA 12, KF4KSN 11, K4LKL 5, KG4DUF 4. 73, Dave, AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH— I hope you have had the opportunity to read and understand the changes to the license structure that will take place on 15 April 2000. Overall, I think it is a good change and will improve Amateur Radio as a whole. Many have formed an opinion on this matter, and I hope you also shared your ideas with the FCC. My trip to "ZX0A" land was a great success. We made over 70,000 different contacts from Myanmar (Burma) during the 4 weeks on the air. I really enjoyed myself and have started putting together a slide show presentation of this trip. Let me know if your club is interested. Tucson people used their skills to help during the "Climb A Mountain" event on February 11th. Phoenix has the Bike ride to Parker coming soon that needs many people. Don't forget the DeVry hamfest on 15 April 2000. Also during this same weekend is the DX convention at Visalia. It has been rumored that Rileyk Hollingsworth, K4ZDH, will be a speaker at the ARRL Southwest Convention in Phoenix. The year 2000 Southwest Division Convention will be held at the Ramada Inn in Scottsdale on 6-8 October. The Glendale hamfest was a great success and Mark Kessler did a great job of coordinating this event. Due to my being out of country for most of January and February, I have been out of touch with a lot of club activity. Keep sending me your club newsletters because this is the only way I can keep track of what is happening throughout the state. If you tried to contact me by telephone or by e-mail during my extended vacation and did not get a reply, send it again. My e-mail overloaded the computer memory and some of my messages got lost. Hobart (Bart) Paine, K7CC, has been a member of the ARRL for over 50 years. Congratulations for your support to both Amateur Radio and the ARRL. 73, Clifford Hauser, KD6XH. Net: ATEN 1060 QNI, 55 QTC, 31 sess. Tfc: K7VVC 654, W7EP 27.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF— Progress is often measured by changes. All changes are not always positive though. We are still free to try and amend the changes that we don't like. In the macro sense, most changes have represented progress, even when we disagreed with the direction or magnitude. Our new FCC rules and tests, in my thinking, do not represent, very much progress, but we are still free to try and change them. There are many more upgrades and more equipment sales. The question of the Internet taking over Ham Radio for the younger generation has been discussed at length. New young hams

and computers both represent progress and new technology, so go for both. You almost need computer experience just to get a job these days. The GPS and APRS capability is impressive even to the most ardent technologist. - The ARRL, Public Service Honor Roll, is one form of showing our appreciation to people like Barry, AD6HR, who reports a message total of 102 for January 2000. It was my pleasure to speak to the Long Beach Club at their annual election bash. Disaster preparedness and ARES was the theme for the Long Beach meeting. Nate, K6OSC, and many of the 123 Long Beach operators of the Queen Mary radio station (W6RO) were present. K6YMJ, Hank, is our SEC (Section Emergency Coordinator), and he always needs help. Joe, W6UPN, is our OOC, and Joe is ready to help with your questions and problems. Al, W6UBM, our ASM, is always available for telephone and RFI questions. Al represents more than 45 years of outstanding experience in the Telephone industry. Our Los Angeles Section Web site is up and running at **www.qsl.net/arrlsw/lax**. If you need more or different information on our Web site, send me an e-mail with your suggestion. Our deepest sympathy is out to Archie, W6LPJ, our, 6th District QSL Manager. Archie's wife Rosemary, KF6EKP, became a Silent Key last month. Rosemary was a great friend and hard worker for the "QSL Bureau" and the "Los Angeles Area Council of Amateur Radio Clubs." Rosemary will be greatly missed by her hundreds of good friends in the Los Angeles area. The Section Managers' net meets every Sunday, at 8 AM on 3965 kHz. Visitors are welcome. Fried tries to bring us the latest information from Headquarters. The So CAL DX Club has a new president Jim, N6KZ, and a new secretary, Herb, KG6OK, **kg6ok@packbell.net.** Vy 73, de W6BF, Phineas

ORANGE: SM, Joe Brown, W6UBQ—Y2K reports indicate over 300 Amateur Radio Operators in the Orange Section indulged in this project. In the event of communication failures or if supplement comm channels were needed, the Amateur Radio Service was available. This exposure to the public and government is needed by the Service. Public Relations and League membership are now listed as high priority action in the Section. Mike Unfired has been appointed ASM. His goal will be to bring new people into the service (hobby), recruit hams for public service, explain the wondrous services of the ARRL and sign them up. Good luck, WB9MJQ. Huntington Beach RACES & Boeing Aerospace established and signed an agreement that permits Boeing emergency operators to pass priority radio traffic between Boeing and the City EOC via HBRACES. From the Modulator. There is a difference in standards for routing messages between the services, and an effort to reorganize the format is underway. From N6IIE/AAR9CR. From the 220 SMA The Amateur license restructuring order released by the FCC clearly indicates the direction the Commission is going as far as self-regulation is concerned. Despite recent comments by some FCC staff to the contrary, I believe that management of our bands will become more and more our responsibility. Are we, the Amateur community, ready for this task? de Jim, K6IYK. Southern Calif DX Club officers for the year 2000 are Pres Jim N6KZ, VP Chuck KR6C, SEC Herb, KG6OK. Tres Skip KJ6Y. From The Inland Empire Council of Amateur Radio Organizations, Fred, W6TKV, after 2 years of exemplary service decided not to run for another term. For the year 2000, the Chairman is Don, KD6UVT, of the Riverside Co ARA. Vice is Gary, KD6OLT, of the Desert R.A.T.S. Sec/Tres Jim, AD6CW, of the Lake Perris QRP. Judy, W6YBS, is holding down the 2001 SWD Convention Chair. Traffic: W6QZ 162, KO6RZ 112, KC6SKK 96, N6GIW 39. DIGITAL: W6QZ NTS BBS 254, N6GIW Mailbox 240. PSHR: W6QZ 162, KO6RZ 112, KC6SKK 96. SCN/V NET: 31 SESSIONS, QNI 232, QTC 87.

SAN DIEGO: SM, Tuck Miller, K6ZEC, 619-475-7333—How time flies. I am now starting my second term as your Section Manager, and I do thank you for the opportunity to work with you in this great service of ours. I love being able to meet each and everyone of you. Former Section Manager Harry Hodges, W6YOO, fell and broke his hip in the middle of February while chasing the family's dog. Knowing Harry, by the time he reads this, he will be back up and running. Even though it has been some time since the mishap, if this is the first you have heard of it, why not send him a card at his *Callbook* address, or even send him an e-mail at **w6yoo@arrl.org**. I am sure he would really appreciate the gesture. Time is drawing nigh for the International DX convention to be held in Visalia, Ca., April 14-16, 2000. Then in May, we will be at the ARRL National-Dayton Hamvention. A lot of travel in the next few months. In fact, I will be in my hometown of Danville, Il during the week of May 22. Hope to see many of my home town friends while there. Well, have you passed your upgrade yet? I was lucky enough to pass my Extra theory, so just waiting till April 15th for it to become effective. Attendance at exams sessions have nearly tripled over the last few weeks, and because of that, walk ins will not be allowed for the time being. Please call 465-EXAM to find out the team captain for the site you want, and then give them a call to make a reservation. Good to have Jack Dobbs WB6AXW back home. Tfc: KT6A 458, KD6YJB 190, WA6ODQ 168, WA6IIK 1. PSHR: KT6A 138, WA6ODQ 138, KD6YJB 111.

SANTA BARBARA: SM & STM, Rob Griffin, K6YR, 805-543-3346 & **k6yr@arrl.org**—SEC: Jack Hunter, KD6HHG (**kd6hhg@arrl.net**). ACC: Michael Atmore, KE6DKU (**jatmore@telis.org**). OOC: Howard Coleman, W6HQA (**w6hqa@pacbell.net**). PIC: Jeff Reinhardt, AA6JR (**jreinh@ix.netcom.com**); TC, Warren Glenn, KM6RZ, (**wglennrz@ix,netcom.com**); ASM-Ventura, Don Milbury, W6YN (**w6yn@juno.com**).ASM- Internet, Jack Bankson, AD6AD (**jackbankson@jps.net**); DECs: Santa Barb-Dave Lamb, WA6BRW (**dlamb@silcom.com**); SLO-Bill Peirce, KE6FKS (**ke6fks@arrl.net**) & Ventura-Dave Gilmore, AA6VH (**aa6vh@arrl.net**). Congrats to Y2K SBARC Officers: N6ZKJ, Prexy; KF6DI, ExVP; VPs KE6WGO, K6HOZ,WA6MBZ & WA6VNN; Secy, KF6YGI; Tres, KD6BIV; & Dirs, AD6EZ, N6OLT, WA6IDZ, KF6LDC & KE6HTS. The SBARC "Key-Klix" newsletter sparkles under Editor-in-Chief, Terri, KF6DZK! New License Restructuring will increase importance of our Amateur Auxiliary Program. Consider joining the OO ranks and help the Amateur Radio Service be more "self-enforcing!" SB Sec Web: wwww.qsl.net/arrlsb. Join in our Section 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) & 448.875- (100). PSHR/Tfc: K6YR 168/222, KF6OIF 132/101, KE6MIW 99/74, KM6RZ -/20 & KF6UMU 108/2. That's 30, Rob, K6YR.

KITS ARE FUN AND AFFORDABLE!

FM TRANSCEIVERS FOR 2M, 6M, & 220

Building a sophisticated microprocessor-controlled rig is easy with our step-by-step assembly manual. You build in sections and then make progress tests along the way. Added benefit is the knowledge to maintainit yourself for years to come. The only essential test equipment is a VOM.

Build in 25 hrs

- 2M Version tunes 143.5 - 148.5 in 5 kHz steps (or 2.5 kHz)
- 15 memories store repeater offset and subaudible tones
- Stores non-standard split (CAP, MARS)
- Built-in subaudible tone encoder
- Instantaneous PIN diode T/R switching
- Packet-ready with rear panel DIN connector (1200 baud)
- Large LED readout
- Build it now 5 or 30 watts, or upgrade to 30 watts later (2M version)
- Complete enclosure, mike, and mobile bracket included
- 2.25" H x 6.5" W x 6.75" D or 7.75" D for 30 watts

1220....2M.....5 watts out.....$195* 1260....6M.....5 watts out.....$195*
1222....2M.....30 watt module.....$ 64* 1230....220.....20 watts out.....$295*

EXPLORE 6 METERS FOR ONLY $95

No need to buy a complete transceiver to discover the fun of 6 meters. T-Kit offers two transverters to choose from. **Model 1209** converts your 2 meter handheld or mobile rig to 6. All features and modes on your 2 meter rig immediately available on 6 (FM SSB CW). Tune 144 -148 MHz to work 50 - 54 MHz. **Model 1208** converts any modern HF rig with 20 meters to 6. Tune 14-16 MHz to work 50 - 52 MHz.

Build in 12 hrs

- 5 watts max input delivers 8 watts out
- Silent RF-sense PIN diode T/R switching

1208...20 to 6 meter, kit....$ 95* 1208A...20 to 6 meter, factory assembled....$159*
1209...2 to 6 meter, kit.....$ 95* 1209A...2 to 6 meter, factory assembled.....$159*

9-BAND SWL RECEIVER

Modernized "first radio kit" classic. Five transistor, 3 IC design, electronic bandswitch. Tune both AM broadcast and SSB/CW from 1.8 - 22 MHz. Has Main and Fine tuning, Regen, RF gain, Volume. Powerful audio to built-in speaker, your own speaker or stereo phones. Use 8 C cells or ext. 12 VDC.

1253.....$59*

2 METERS, ALL MODES, $139

Add 2 meter, all mode capability to any HF transceiver for only $139. Four to 20 watts input on 10 meters from your HF rig produces 10 watts output on 2M. All features and modes on your HF rig immediately available on 2M. Tune 28 - 30 MHz for 144 - 146 MHz coverage.

1210, kit.....$139*
1210A, factory assembled.....$239*

MONOBAND CW TRANSCEIVERS

Ten-Tec's long tradition of offering quality rigs for QRP enthusiasts continues with these single band CW transceiver kits. Features 3W RF output, QSK CW, sensitive single conversion receiver with built-in 4-pole crystal filter and RIT. Measures 2.75" H x 6" W x 6" D. Draws 35 - 80 ma on receive, 800 ma on transmit from 13.8 VDC source. Available for 20, 30, 40 meters, and now ***80 meters!***

Coming Soon - 15 and 17 meters!

1320, 1330, 1340, 1380.....$ 95*

PORTABLE SWL RECEIVER

Enjoy quality shortwave listening comparable to factory built portables. Listen to local and international AM broadcast as well as SSB/CW from around the world.

Build in 25 hrs

- Covers 100 kHz - 30 MHz
- 2.5 kHz and 100 kHz tuning steps with clarifier
- 15 programmable memories
- Dual conversion, superheterodyne
- 13.8 VDC operation; AC wall transformer included
- 2.25" H x 6.5" W x 6.5" D

1254.....$195*

CALL FOR A FREE CATALOG TODAY
865-453-7172

Includes these kits and more budget priced projects for hams and SWLs.

ASK ABOUT CLUB FUNDRAISING OR CLUB QUANTITY DISCOUNTS!

Orders only:800-833-7373
FAX: 865-428-4483
E-Mail: sales@tentec.com
9:00 a.m. - 5:30 p.m. EST
Monday - Friday

...America's Best!

TEN-TEC

or write us at: T-Kit a div. of TEN-TEC, Inc. 1185 Dolly Parton Pkwy. Sevierville, TN 37862

Visit our web site at http://www.tentec.com

*Plus shipping & handling

WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM—STM: KC5OZT. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASMs: KX5K, K5RE, KK5QA, KK5NA, N5JZ, KB5LWZ, KD5HIS, AD5X, W5GPO. Visit the section Web page at (**http://www.lsic.net/net/ntexas.html**) for the most current information. If you would like to be on the Section Newsletter mailing, send me an e-mail: **dmathis@lsic.net**. I have several on the e-mail listing that are bouncing back to me. If you are not receiving any of these please refresh your address for me. Tom Mobley, KD5AC, and Jeff Fant, N5OLF, are doing something about the shortage of young hams. The two Colin County Community College professors have gotten grants and corporate sponsorships to license public school students and teachers. The first phase of their program culminates in a Summer Technology Camp that includes licensing and foxhunting and other competitive games. Each student that becomes licensed gets to take home a new Kenwood TH-D7A! They need your help in teaching classes, elmering and generally helping out. More info at their Web site at **http://iws.cccd.edu/tmobley/camp.htm**. John Fullingim, WN5PFI, ACC, will be the section liaison to this group. We had 3 traffic handlers make BPL this month, N5JZ, KB5WEE, and N7DXH. N5JZ has completed 12 straight months of BPL. SAR for January N5JZ 569, KB5WEE 279, KC5OZT 268, N7DXH 219, K5AO 157, WA5I 147, K5MXQ 118, KC5VLW 102, PY2CGB/W5. 73, KB5TCH 68, W5AYX 53, AC5Z 16, AC5PO 5, KD5AHW 4, KB5YAM 4, KC5SMC 4. 73, Don, KB5YAM.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. STM: K5KXL. Well, Green Country was a great success and the new facilities were impressive. I hope everyone enjoyed it, and found what they were looking for. Enjoyed seeing everyone and meeting many new folks. The buzz now is license restructuring, which will go into effect shortly after this is published. I am entertaining invitations to club meetings to discuss this and any other League-related topics you may be interested in. Just drop me a line, and we'll see if we can fit it into the schedule. The Arbuckle Amateur Radio Klub has a new wide area repeater on top of Arbuckle Mountain. 147.150 with a PL of 131.8 for more info check out their Web page at **http://www.brightok.net/hamradio**. Many of the VEC groups in the state have reported large increases in attendance at their test sessions. Check the Section Web site for more information and dates on test sessions in your area. Next month is the big Dayton Hamvention. I hope to see many of you there. The Choctaw ARC was presented with a very nice letter from the Executive Director of the Mid-Del Food Pantry for their contributions over the Christmas holiday. Rather than having a gift exchange, they decided to pool their resources to help provide for the hungry. This is very commendable, and I applaud their efforts! I still send out occasional e-mails to the section, and would like to have your e-mail address for my section list, so forward it to me if you can. **http://www.busprod.com/k5ttt** 73, Charlie. Tfc: N5IKN 712, KF5A 478, K5GBN 457, WB5NKC 353, K5KXL 118, KI5LQ 113, WA5IMO 97, WA5OUV 83, KE5JE 80, K5HEZ 56, KK5GY 55, WB5NKD 53, KM5VA 48, W5REC 30.

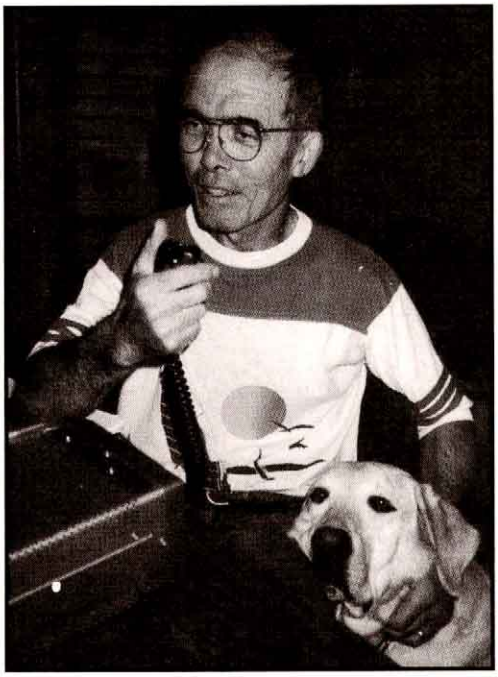
SOUTH TEXAS: SM, E. Ray Taylor, N5NAV—ASMs: NR5ED, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, and K5SBU. STM: W5GKH. SEC: K5DG. ACC: N5WSW. PIC: KA5WSS. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: K5PNV. We're looking forward for the April showers, we need the rain. Also awaiting the *QST* April fools article. It always comes in handy. I want to take this opportunity to congratulate Jim Haynie, W5JBP, as he assumes his new position as President of ARRL. Coy Day, N5OK, has now moved into the West Gulf Director's position, with Dr David Woolweaver, K5RAV, as Vice Director. Your work has just begun. I wish you the very best for the years to come. We had a tornado touch down in downtown Angleton, TX on February 7. There was some damage to the Court House and a few cars. No one was hurt. We are getting ready for hurricane season here. I have really been enjoying the newletters from the clubs. Coy Day and myself will meet with the Austin Repeater Organization on March 7 to explain the benefits of becoming an ARRL Affiliated Club. I might point out, there is nothing but benefits, and your club has a lot to gain, by becoming affiliated with the League. If your club is not affiliated, let us know so we can have material sent to you. I would think that would be one of the first things one would check into after forming a club. Clubs will really have a job after April 15 getting all the newcomers involved in HF. I've heard a lot of comments on the new license restructuring. Most have been with a negative slant, because of the code change. Let's all get together with a positive attitude and lead the new hams into the proper way to conduct themselves on HF and in the hobby. The clubs have an important role to play in this. Teach them the art of emergency communications, DXing, and how to build and maintain their own equipment. Above all, don't look down on them, because they didn't have to go through the testing that we went through. There is nothing that can be done to change the FCC ruling. Let's continue the year 2000 without bickering between clubs, nets, and amateurs in general. This is a hobby, and let's learn to get along with each other, and enjoy the hobby. Have a good month. God Bless. Tfc: W5SEG 610, KA5KLU 332, NR5ED 162, W5TUK 158, W5KLV 117, W5GKH 72, N5OUJ 49, K0YNW 38, N5NAV 33, K5UCQ 16, W5OYY 6, N5JUU1. (Nov) W5ZX 53.

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. New officers for Big Spring ARC: Pres., Irene LeMarr,N5JZM; Secy, Alan Nichols, KC5NHV; Treas, Lee Reed, KC5NHW; Events Coord, Jose Gonzales, KB5GXW. Traffic report in 62 sessions, QTC 530, QTR 1164 minutes. WTX rep 74% by KF5NI and KM5FQ. New DXCC rules now permit QSL card checkers; one per section appointment by SM. Lubbock has once again licensed more new amateurs than all of the rest of the section combined. Hamfest in Abilene will be held May 6th and 7th, with the ARRL Forum at 9:30 AM. Hope to see many of you there! 73 de Charlie, WB5T.

Are you radioACTIVE?

Jerry Kloss, NØVOE, sure is!

"I was hooked the moment I first saw ham radio. Since I am visually impaired and have great difficulty reading, passing the FCC exam seemed like an insurmountable obstacle. A friend suggested the **Courage HANDI-HAM System.** In a matter of a few days I was listening to the voice of Tony Tretter, WØKVO, as he read ARRL's "Now You're Talking." I attended Radio Camp, learned code, and worked on upgrades using taped study materials."



Jerry and guide dog, Kerwin.

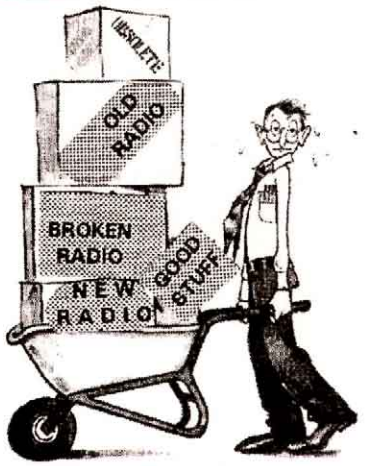
The **HANDI-HAM System** is a non-profit international organization dedicated to Amateur Radio education for persons with physical disabilities. We can help you gain your license. We welcome volunteers, too! Your tax-deductible gifts of financial support and amateur radio or computer equipment will help us do this work.

Courage HANDI-HAM System
3915 Golden Valley Road • Minneapolis, MN 55422
(612) 520-0511
handiham@mtn.org • http://www.mtn.org/handiham

courage

WHERE ABILITIES AND DISABILITIES BECOME POSSIBILITIES

NEED SOME HELP WITH THAT?



DONATE YOUR RADIO

Turn your excess Ham Radios and related items into a tax break for you and learning tool for kids.

Donate your radio or related gear to an IRS approved 501 (c)(3) charity. Get the tax credit and help a worthy cause

Equipment picked up anywhere or shipping arranged. Radios you can write off - kids you can't.

Call (516) 674-4072
FAX (516) 674-9600
crew@wb2jkj.org
http://www.wb2jkj.org

WB2JKJ

THE RADIO CLUB OF
JUNIOR HIGH SCHOOL 22
P.O. Box 1052
New York, NY 10002

Bringing Communication to Education Since 1980

NOTT LTD

3801-4001 LA PLATA HWY
FARMINGTON, NM 87401

BROADBANDER BB3
Remotely tuned 3.5-30 MHz mobile antenna.
Monoband operation on 160 meters with accessory coil.

BB10 BASE STATION ANTENNA
160, 80, & 40 meters. High efficiency with only 34' height.
Remotely tuned from your hamshack.

PARK N' TALK WHIP FOR STAIONARY OPERATION
Improve your mobile antenna with a 22' whip on top.
Telescopes for easy storage.

1-800-443-0966
phone 505-327-5646
Fax 505-325-1142
email: judy@tjantenna.com
MasterCard/Visa/Discover

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.

Mix Business with Pleasure at Dayton!

Dayton Special RF Safety Training
Learn about the FCC's and OSHA's new RF exposure regulations and General Safety Issues for Telecommunications for your business.

Call RSI at: 1-888-830-5648 to register

RSI Radiofrequency Safety International, Inc.
www.rfcomply.com

RIGblaster rig to sound card interface

PSK31, SSTV, RTTY, AMTOR, PACKET, Voice Keyer, CW, HSMS

RIGblaster and a computer .....

The powerful replacement for old expensive adapters or TNC's.

- **Ready to go**....with cables, 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.

Introductory Price

$79.95 plus shipping

For info and online ordering:
http://www.westmountainradio.com

West Mountain Radio de N1ZZ and K1UHF

18 Sheehan Avenue, Norwalk, CT 06854 (203) 853 8080

THE POCKET GENERATOR

5 Amp-Hr, Portable Gel-Cell and 110 VAC Inverter..... .$59.95 + $10.50s&h

ONLY 3" x 3.5" x 4" & Very Light Weight (3.5 Lb.) Perfect for Laptops, Chargers, Boom Boxes, Cameras, etc.

- AC Wall Charger
- 50 Watt Continuous/80 Watt Peak DC to AC Inverter Measures Only 1.25" x 2.5" x 3.25"
- 110 VAC Outlet Modified Sine Wave
- Shoulder Strap and Soft Carrying Case
- 12 VDC Cigarette Lighter Outlet
- DC Charging Cord

THE POCKET STATION

Same as THE POCKET GENERATOR, But a Smaller, Lighter **3 OR 7 Amp-Hr Gel-Cell**, Without the Inverter..... **$34.95** or **$44.95** +9.50s&h.

12 VDC to 110VAC INVERTERS

- Modified Sine Wave
- Great w / The POWER STATION or MEGA STATION
- Overload, Thermal, & Undervoltage Protection

Model	Cont. Pwr	Peak Pwr	Price
PC140	140 Watts	250 Watts	$34.95*
PC300	300 Watts	500 Watts	$49.95*
PP600	600 Watts	800 Watts	$99.95*
PP1000	1000 Watts	2000 Watts	$219.95**
PP1500	1500 Watts	3000 Watts	$324.95**
PP2500	2500 Watts	4000 Watts	$549.95***

*$10.50s&h **$12.50s&h ***$14.50s&h

CHARGE CONTROLLERS

- Flexcharge 12V x 7 Amp Controller.....**$59.95**+$8.50s&h
- Flexcharge 12V x 25 Amp Charge.....**$119.95**+$8.50s&h
- Charge Controllers for Multiple Battery Banks Also!

POWER STATION

- 12 Volt x 7 Amp/Hr Gel Cell Battery
- 12 Volt Cigarette Lighter Outlet
- 3, 6, & 9 Volt Output Jack
- Car & Wall Charger w/Auto Shutoff, Built-in Voltmeter
- 2 Hidden Terminals For Hardwiring Provide Up To 90 Amps (Short Circuit)
- **Call for Specials**

MEGA STATION

- 17 Amp/Hr Gel Cell w/Heavy Duty Jumper Cables Provide up to 300 Amps Short Circuit
- Cigarette Lighter Output
- Charge Indicator Meter
- Car & Wall Charger

SOLAR CELLS

All Wattage's & Sizes

- Rigid - 5, 11, 22, 32, 42, And 64 Watt Panels
- 5 Watt: $105* 11 Watt: $179** 22 Watt: $219** 32 Watt: $269*** 42 Watt: $329*** 64Watt: 449****
- Flexible 5, 11 & 32 Watt Panels
- 5 Watt Flex: $115* 11 Watt Flex: $189** 32 Watt Flex: $399***
- Reverse Blocking & By-Pass Diodes
- Silicon Alloy Deposited on Stainless Steel. No Glass to Break
- Triple Junction Silicon Cells
- *$10.50s&h **$12.50s&h ***$16.50s&h ****$18.00s&h

WWW.HAMCONTACT.COM

P.O. Box 4025,
Westminster, CA 92684, Dept. Q
INFO 714-901-0573
FAX 714-901-0583
ORDERS 800-933-4264
E-Mail: QST@HAMCONTACT.COM

For Literature on Antennas, HT & Gel Batteries, Inverters Power Supplies, Etc., Send a large SASE w/3 stamps

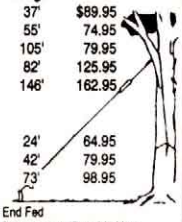
ALL BAND ANTENNAS

TRAP DIPOLES

Model	Bands	Traps	Length	Price
D-314	12/17/30	4	37'	$89.95
D-42	10/15/20/40	2	55'	74.95
D-52	10/15/20/40/80	2	105'	79.95
D-56	10/15/20/40/80	6	82'	125.95
D-68	10/15/20/40/80/160	8	146'	162.95

TRAP VERTICALS-"SLOPERS";*

VS-42	10/15/20/40	2	24'	64.95
VS-53	10/15/20/40/80	3	42'	79.95
VS-64	10/15/20/40/80/160	4	73'	98.95



* Can be used without radials
* Feedline can be buried if desired
* End Fed
* Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to Use - Coax Fed - Factory Assembled - Commercial Quality - Handles 600 Watts - Comes complete with: Deluxe Traps, Deluxe Center Connector, 14 ga. Stranded Antenna Wire and End Insulators. Automatic Band Switching - Tuner usually never required - For All Transmitters, Receivers, & Transceivers - For All Class Amateurs - One Feedline works All Bands - Instructions included.

SINGLE BAND DIPOLES

Model	Band	Length	Kit Form Price	Assembled Price
D-10	10	16'	$18.95	$23.95
D-15	15	22'	18.95	23.95
D-20	20	33'	19.95	24.95
D-40	40	66'	24.95	28.95
D-80	80/75	130'	29.95	33.95
D-160	160	260'	41.95	45.95

Includes instructions, Deluxe Center Connector, 14 ga. Stranded Antenna Wire and End Insulators. Coax Fed.

LIMITED SPACE DIPOLES

- Reduces overall length over 40%! • Coax Fed.
- Shorteners" are enclosed, sealed, weatherproof and lightweight.
- Complete with Deluxe Center Connector, 14 ga. Stranded Antenna Wire, End Insulators, and Assembly Instructions.
- Use as inverted "V", or flat-top. • Excellent for all class amateurs.

Model	Band	Length	Price
LS-40K	40	38'	$48.95
LS-80K	80/75	69'	54.95
LS-160K	160	100'	56.95

● **Any single band, or Trap antenna with PB-1 Balun instead of Deluxe Center Connector; Add $10.00 to antenna price. (For PB-1-C – Add $12.00)**

"PRO-BALUN" PB-1 – $19.95

- 1:1 For Dipoles, Beams & Slopers
- Handles Full Legal Power
- Broadband 3 to 35 Mhz.
- Lightweight, Sealed & Waterproof
- Deluxe connectors require NO soldering
- NO jumper wires
- Minimizes coax & harmonic radiation
- Accepts standard PL-259 connector

"PRO-BALUN" PB-1-C – $21.95

"Current Type" 1:1 Ratio - 3KW – 1.5 to 55 Mhz.

"PRO-BALUN" PB-4, 4:1 Ratio – $21.95

ALL BAND – LIMITED SPACE ANTENNA

- Works ALL Bands 160 thru 10 Meters
- Sealed, weatherproof lightweight shorteners utilize NO rust terminals
- Perfect match for your Antenna Tuner with balanced line output
- Handles Full Power
- Works with all transmitters, transceivers receivers, etc.
- Completely Factory Assembled – Ready to install – NO adjustments necessary
- Only 70 feet overall length!
- Perfect for ALL classes of Amateurs
- Install as Flat-top, Sleper, Inverted "V", or almost any configuration
- Shorteners provide full 135 feet electrical length, with only 70 feet physical length
- Utilizes Heavy 14 gauge stranded wire
- INCLUDES 100 ft. of 450Ω Feedline

MODEL AS-2 – $49.95

★ ☆ ★ ☆ ★ ☆ **COMBO SPECIAL – #AS-2-SP** ☆ ★ ☆ ★ ☆ ★

AS-2 – ALL BAND Antenna with popular MFJ-949E Ant. Tuner only $179.95!

And get a 18' RG-8X Interconnect cable **FREE!!**

SEE YOUR DEALER, OR ORDER DIRECT FROM FACTORY.

SHIPPING: Add $4.00 within U.S.; CANADA: Add 10% (min. $5.00)

VISA / MC – give card no., exp. date & signature

ORDERS ONLY - 1-800-728-7594

FREE BROCHURE & INFORMATION - 423-913-1615

FAX - 423-913-2131

SPI-RO MFG., INC P.O. Box 189
Jonesborough, TN 37659
www.spiromfg.com

The DWM-4 Digital Wattmeter...
Only from LDG Electronics

Digital Accuracy

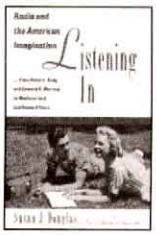
- Microprocessor Controlled
- Monitor 4 Radios With 1 Meter
- Accruate Measurement for: QRP/HF/VHF/UHF
- Programmable Alarms
- Programmable Callsign Display
- 11 to 14 VDC Operation

Special Pricing:
$129.00 Fully Assembled And tested!
Plus Shipping

LDG ELECTRONICS

1445 Parran Rd.
St Leonard, MD 20685
Toll Free Sales 877-890-3003
Info: 410-586-2177 Fax: 410-586-8475
Web Site: www.ldgelectronics.com
E-mail: sales@ldgelectronics.com

Move your shack to the microprocessor age! Purchase any assembled Automatic Antenna Tuner and get the DWM-4 Digital Watt Meter for $99.00, Fully Assembled! (applies to phone orders only)



Listening In

©1999 by Susan J. Douglas, PH.D.

ARRL Order No. 7466
$27.50
plus $5 shipping/handling.

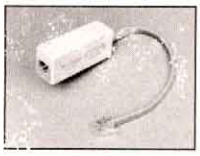
A detailed chronicle of radio culture covering every interest and mode from ham radio, to earlysports casting, live concerts, and talk shows. Subtitled, "Radio and the American Imagination..." A thoughtful presentation for anyone with a passion or obsession for radio. 415 pages.

ORDER TOLL-FREE 1-888-277-5289
PHONE: 860-594-0355 • FAX: 860-594-0303
ARRL
225 MAIN STREET, NEWINGTON, CT 06111-1494
email: pubsales@arrl.org • http://www.arrl.org/

STOP TELEPHONE RFI

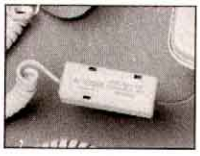
With K-COM™ Telephone Interference Filters

K-COM Filters provide your choice of optimized performance curves: 0.5-3MHz, 3-30MHz, 26-60MHz & 100MHz. Includes proven, step-by-step instructions. Made in U.S.

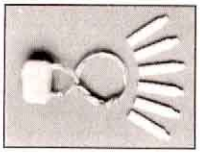


K-COM RF-1 Single Line
Modular filter for single line telephones, modems, fax, cordless phones, answering machines. **$16.95**

K-COM RF-1 Two Line
Modular filter for two line telephones and most business telephone systems. **$22.95**



K-COM RF-1 Coiled Cord
Recommended when RFI enters through the coiled telephone cord. **$22.95**



K-COM RF-2 Hard Wired
Insert interference rejection in telephone wiring where modular connectors are not used. **$10.95**

K-COM
World Leader In Solutions To Telephone RFI

Toll Free
877-242-4540
330-325-2110
Fax 330-325-2525

K-COM
Box 82
Randolph, OH 44265 USA
Free S&H in U.S.

DISCOVER NOVUS VISA MasterCard

UL AND C UL
UL listed to U.S. and Canadian safety standards

For in-depth information about Telephone RFI plus K-COM filter specifications and applications visit: www.k-comfilters.com

From MILLIWATTS to KILOWATTS℠

Eimac® Svetlana Taylor Tubes™

TRANSMITTING & AUDIO TUBES

Immediate Shipment from Stock

3CX400A7	3CX10000H3	4CX3000A	6146B
3CX400U7	3CX10000A7	4CX3500A	6146W
3CX800A7	3CX15000A3	4CX5000A	6JB6A
3CX1200A7	3CX15000A7	4CX7500A	8560AS
3CX1500A7	3CX20000A7	4CX10000A	3-500Z
3CX2500A3	4CX250B & R	4CX10000D	3-500ZG
3CX2500F3	4CX350A & C	4CX15000A	3-1000Z
3CX2500H3	4CX400A	4CX20000A7	4-125A
3CX3000A7	4CX800A	5CX1500A & B	4-250A
3CX3000F7	4CX1000A	572B	4-400C
3CX6000A7	4CX1500A & B	811A	4-1000A
3CX10000A3	4CX1600B	833A & C	4PR1000A

- Motorola RF Transistors
- Toshiba RF Transistors
- Door Knob Capacitors
- Semco Metal Clad Micas
- Vacuum Relays
- Japanese Transistors
- RF Power Modules
- Broadband Ferrite Xmfrs
- Power Tube Sockets
- Bird Meters & Elements

RF POWER TRANSISTORS & MODULES

MITSUBISHI ELECTRIC TOSHIBA MOTOROLA

Complete inventory for servicing Amateur, Marine, and Commercial Communications Equipment.

Se Habla Español • We Export

Visit our Web Site for latest Catalog pricing and Specials:
rfparts.com

1968 30 Year Anniversary 1998

ORDERS ONLY
1-800-RF-PARTS • 1-800-737-2787
ORDER LINE • TECH HELP • DELIVERY INFO.
760-744-0700
FAX **760-744-1943** TOLL-FREE FAX **888-744-1943**
E-MAIL: **rfp@rfparts.com**
435 S. Pacific St. • San Marcos, CA 92069

RF PARTS™ COMPANY

HamAds

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. Submitted ads should be typed or clearly printed on an 8½" x 11" sheet of paper.

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 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 April 16th through May 15th will appear in June *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 hartleyal@aol.com. Or, SASE to BMHA, Box 4009-Q, Boulder, CO 80306-4009.

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 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. 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

500+ TELEGRAPH KEYS AT DAYTON HAMFEST: History, Appraisals, pretzels! Space: 2555. http://w1tp.com

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

MANUALS FOR MOST OLD HAM GEAR. Best source for 20 years and now at lower prices! Most USA made ham gear. Our catalog "P" ($1 USA/$3 elsewhere) required to order or get free info via internet at www.hi-manuals.com. Hi-Manuals, Box P-802, Council Bluffs, IA 51502.

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://w1tp.com

W7FG VINTAGE MANUALS AND LADDER LINE: Most manuals in stock. SASE for catalog or call. 600 Ohm Ladder Line. Visa/Mastercard accepted. 402731 W. 2155 Dr., Bartlesville, OK 74006. 918-333-3754 or 800-807-6146. http://www.w7fg.com

WANTED: Electronic estates purchased. Ham radio, tubes, broadcasting, Hi-Fi, transformers, military, etc. Top cash paid! 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: Telegraph sounders, relays, and apparatus. Instruments needing parts or repair OK. John Casale, W2NI, 3 Pickering La., Troy, NY 12180. 518-272-3631.

WANTED: Western Electric audio equipment. Amplifiers, pre-amps, tubes, speakers, parts, mixing boards, etc. 800-251-5454.

www.interestingoldjunk.com

QSL CARDS/CALLSIGN NOVELTIES

100 QSL Cards $8.50 postpaid. 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. 914-339-1996.

BROWNIES QSL CARDS. Free catalog of samples (stamps appreciated). 3035 Lehigh Street, Allentown, PA 18103.

NEW

Revolutionary New "STEALTH™" Ham/Radio Antenna

36" x 2" Hoop - "CTHA‡" Design
Covers 3-30 MHz (with tuner)
Replaces Ugly, Visible 66' Dipole Ants.
Transmits & Receives while hidden in car trunk, pick-up shell, RV, boats, attic, office or Anywhere!
30 Day Money Back Guarantee!
$289.95 + $9.95 S&H + COD
(With This Ad - Retail Price $389.95)
Check/MO to JWM, Box 533, Red River, NM 87558

1-800-435-SHOW

‡CTHA - Contrawound Toroidal Helical Antenna - Pat. 1997
See Our Web Site at: www.nomosno.com/satellite

$$SAVE$$

Boom mic headset with optional connector/preamp installation. Available for "plug and play" on new and old -
- ALINCO
- COLLINS
- DRAKE
- ICOM
- JRC
- KENWOOD
- TENTEC
- YAESU, more!

*Prices less connectors, plus S&H. Credit card phone orders accepted!

~~29.95~~ KIT ~~44.95~~ ASSEMBLED ~~64.95~~ 44.95

CALL NOW TOLL-FREE
1-800-634-0094
30-DAY MONEY-BACK GUARANTEE!

WARREN GREGOIRE & ASSOCIATES LLC
229 EL PUEBLO PLACE, CLAYTON, CA 94517, USA
VOICE 925-673-9393 • FAX 925-673-0538
WEBSITE www.warrengregoire.com

Repeaters

On your freq tuned, plug & play
6m, 2m & 440.. $399.95 & $499.95

Repeater Controllers

RC-1000V w/voice ID, CW ID, autopatch, reverse patch, remote base and more.....$259.95
RC-1000 w/o voice ID....$199.95
RC-100 w/remote base...$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://home1.gte.net/k4lk/mcc

See You At Dayton - Booths 602 & 603

Am-Com Inc.

ClearSpeech™ Speaker
Digital Noise-Canceling Speaker for Two-Way Communications

This easy-to-use DSP speaker activates automatically and filters 95% background noise, static and other interference.
- Improves clarity & intelligibility
- Continuous, adaptive removal of background noise
- Listen with less fatigue & greater concentration
- Improves signal to noise ratio
- New: increased audio output and speaker jack added.

$129.95 plus $8.50 S&H
(Reg. Price $149.00)

Noisebuster ™ Extreme!™ Headphone System

Electronically cancel low-to-mid frequency room noises generated by amplifiers, blowers, computers, fans, air conditioners, engines. For two-way radio or personal stereo systems. Use at home, portable, or on aircraft. Active noise cancellation 2-1500 HZ, better than 15 bd between 15-300 HZ.

Am-Com carries a complete line of NCT Noise Canceling Telephony Headsets, Cellular Telephone Headsets, proActve™ Industrial Noise Canceling Hearing Protectors and Communications Headsets.

For the Best Time.... Radio controlled clocks from LA CROSSE TECHNOLOGY

$49.95 ($5.50 S&H)

WWVB Radio Controlled Time & Date
- Ideal for expeditions & field operation
- 12/24 Hour Format
- Indoor Temp (C & F)
- 2 Alarms w/Snooze
- 3-3/4"X2"X2"

$99.95 ($6.50 S&H)

World Time Center
- A must for all well equipped ham shack
- WWVB controlled accuracy
- 12/24 Hr, 2 Time Zones
- Indoor/Outdoor temp & RH with remote wireless sensor
- Battery Power
- 11.81"X1.22"X8.8"

See website for clocks & weather stations

Protect your Hand-Held GPS, Cellphone

$24.95 ($3.50 S&H)

Cell Safe™

- ABS plactic, shock absorbant shell, cushioning interior foam conforms to your phone shape
- Water resistent O-Ring seal
- Floats with contents weighing up to 1.5lbs
- Additional room for keys money, I.D. etc.
- Fits securely into a standard waterbottle cage
- Belt loop & hook for additional shoulder strap
- Ringing can be heard when Cell Safe is closed
- Inside dimensions 7.5" X 2.5", weight 6.5 oz.

NEW

ATAS-100 Universal Controller
Use the Yaesu ATAS-100 with any transceiver

$69.95 ($6.50 S&H)

- Operates with any Transceiver
- Operates on 12VDC
- Small & Compact, Mounts Anywhere
- Low Cost
- Easy to Install

Available Spring 2000

Unit shown is a prototype. Final product may vary in appearance. Size: 2-3/4"x3/4"x3" (Approx.)

Am-Com Carries A Complete Line Of Gap™ & Ham Stick™ Antennas & Accessories

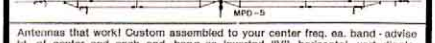
Website: www.amateurcommunications.com
(Product Information & Secure Ordering)
Email: **amcom@digisys.net**
Phone Orders: **1-888-803-5823**
Mail Orders To: **Am-Com, Inc., 100 Bierney Creek Rd, Suite C, Lakeside, MT 59922**

NEW! **Check out *RADIOS ON-LINE* on the ARRL web site:** NEW!

http://www.arrl.org/ads/RadiosOnline/

Buy, Sell, or Trade gear FAST...VERY FAST!

HI-PERFORMANCE DIPOLES



Antennas that work! Custom assembled to your center freq. ea. band - advise ft. of center and each end - hang as Inverted "V" - horizontal, vert dipole, sloping dipole - commercial quality - stainless hardware - legal power - no-trap, high-efficiency design. Personal check, MO or C.O.D (.$3)

MPD-5*	80-40-20-15-10M Max-Performance Dipole, 87' or 78' long....	=$125
MPD-2*	80-40M Max-Performance Dipole, 85' long = $77, 105' long	=$83
MDP-3712	30-17-12M Max-Performance Dipole, 31 ft. long.....	=$80
HPD-3*	160-80-40M Hi-Performance Dipole, select 113 ft. or 125 ft..	$95
SSD-6	160-80-40-20-15-10M Space-Saver Dipole, 71ft. long.....	=$179
SSD-5*	80-40-20-15-10M....42' long = $125.....60ft. long.....	$130

*Tunes 9-Bands with Wide-Matching-Range-Tuner. S&H PER ANETENNA.=$7.00

(2) Stamp SASE for 30 Dipoles, Slopers, & Unique Ants. catalogue

847-394-3414 W9INN ANTENNAS BOX 393 MT. PROSPECT, IL 60056

W2IHY 8 BAND AUDIO EQUALIZER AND NOISE GATE $229.99 Assembled + $8 S&H

optional cable to radio $15.00 each

OPTIONS
8 bands Equalizer
Noise Gate
MIC IN
- 600 ohm & HI-Z
- XLR, 8 Pin Mic, RCA,
- Supports popular rigs

MIC OUTPUTS
- Dual Outputs)
- 600 ohm + HI-Z

Built In Monitor
Price includes power supply

Julius D. Jones, 19 Vanessa Lane, Staatsburg, NY 12580
tel: 914-8894933 E-Mail W2IHY@prodigy.net
homepage: pages.prodigy.net/w2ihy
30 day Money back guarantee

HAM VACATION/RENTALS PROPERTY

Come With us On a Fascinating Journey to Explore the Excitement of Amateur Radio and the Mystery of Basic Electronics

Basic Technology for the Amateur Radio Enthusiast

Table of Contents

The Alpha Delta *video/book* production "Basic Technology for the Amateur Radio Enthusiast" is a simple straight-forward program that takes you on this journey, explaining the wonderment of the hobby along the way.

- The ***video*** shows how radio waves are formed and how electrons move to do work, and explains terms like voltage, current, power, resistance and other terms you'll hear relating to the hobby. You will even go with a miniature **"tour guide"** on a walk through a receiver printed circuit board. He will show you how amplification, power supplies, radio frequency and audio amplifiers and other parts of a radio work. He will also explain what "semiconductors" are all about. Neither the video nor the book get into math or formulas--**we've kept it simple**.
- The ***book*** is designed for the non-technical person interested in joining the hobby or the amateur operator who would like to know more about "what's behind the dials", and explains the fascination of the hobby in detail. The book is ideal as a support tool for someone who is being mentored by an "Elmer", and for amateurs involved with **school system programs**. The program was designed by our Training Director who formerly did college course development and was director of training for a major electronics company.

This **video/book program** is not a study guide for a specific license class but bridges the gap between study guides and programs that go into technical detail with formulas, math, circuits and theory. In fact, it is a great support program for license study guides, and the **new FCC License restructuring. Every aspiring or existing amateur should have this wonderful program in his or her collection!**

"Basic Technology for the Amateur Radio Enthusiast" video/book ----$39.95 ea.

At your Alpha Delta dealer or direct plus $5.00 s/h in the U.S., Exports quoted

ALPHA DELTA COMMUNICATIONS, INC. AA

P.O. Box 620, Manchester, KY 40962 • Phone (606) 598-2029 • Fax (606) 598-4413

Toll Free Order Line: 888-302-8777

Alpha Delta - Where Imagination And Reality Merge

Website: www.alphadeltacom.com

GENERAL

#1 CALLSIGN CD-ROM. "HamCall" contains U.S. and International callsigns with lat/long, grid square, e-mail addresses and more. Updated weekly. Check/Visa/MC. $50, $5 ship/handling. Buckmaster, 6196 Jefferson Hwy., Mineral, VA 23117. 800-282-5628 or http://www.buck.com/haminfo.html

2000 CALLBOOK CD-ROM: $38.95 POSTPAID. All **ARRL** tems discounted. Email: **<AA6EE@amsat.org>, http://www.radiodan.com/aa6ee/**

500+ TELEGRAPH KEYS AT DAYTON HAMFEST: History, Appraisals, pretzels! Space: 2555. http://w1tp.com

59(9) DX REPORT Weekly DX and Contest bulletin. SASE for sample. P. O. Box 73, Spring Brook, NY 14140.

8874's Needed K6ZSK 760-806-7553

ALUMINUM CHASSIS AND CABINET KITS. VHF-UHF antennas and parts. Catalog: callbook address. E-mail: k3iwk@flash.net, http://www.flash.net/~k3iwk

ANTENNA DESIGN BOOK, 140 pages, helical, loop yagi, beams, loops, short antennas, flat tops, and VLF projects, $12.95. R.A.C., POB 37, Clarksville, AR 72830.

ANTENNA HARDWARE - S.S. "U" bolts, aluminum saddles, element and boom plates, S.S. hose clamps. Write for list to Harbach Electronics, WA4DRU, 2318 S. Country Club Road, Melbourne, FL 32901-5809. http://www.harbach.com

APPLE I Microcomputer wanted for museum. KK4WW, 540-763-3311.

ARRL, RSGB, GORDON WEST BOOKS, CALLBOOK & QRZ CDs, Code Keys, Oscillators, etc. Discounts on all. Free catalog. Only $0.50 handling per order plus actual shipping. Credit cards accepted. Worldwide service. JWO SERVICES, 12 Hickory Place, Camp Hill, PA 17011; On line catalog, easy to use shopping cart at www.jwoservices.com. E-Mail: johnw3is@igateway.com. Call 3-10 p.m. Eastern, Phone (717)-731-4747; Fax (717)-730-9373.

ASTRON POWER SUPPLY, Brand new w/warranty, RS-20m $99, RS-35m $145, RS-50m $209, RS-70m $249. AVT, call for other models, 626-286-0118 or sales@aventrade.com; www.aventrade.com

ATTENTION SB-200 & SB-220 OWNERS: Restore and up-grade your tired old amplifier with our parts and kits. Power supply boards, soft keys, soft starts, new fans & motors, many more items. Write for details. **Please specify the model.** Harbach Electronics, WA4DRU, 2318 S. Country Club Road, Melbourne, FL 32901-5809. http://www.harbach.com

ATTENTION **YAESU FT-102**. Expert repairs. Over 6000 hours servicing the 102. Reasonable rates. Call evenings, Mal, NC4L, 954-961-2034.

ATTN: CW OPERATORS - Still available! Super CMOS III Semi-Kit, same features as Logikey K-3. SASE for details to Idiom Press, 95441-1025.

ATV Video Test Pattern Generators with Character ID, composite and S-video outputs, audio tone. Many options. Other video products and kits also available. Tom Gould, WB6P, GEKCO Labs, Issaquah, WA. 888-435-7221. **www.gekco.com**

AVVid is an authorized **Kenwood** and **Icom** service center for warranty and non-warranty repairs. Reasonable rates and fast turnaround. E-Mail to clif@avvid.com or call 800-214-5779. AVVid, 222N. Story Road, Suite 128, Irving, TX 75061.

BATTERY: Sealed lead acid/gel cell at wholesale price. 0.5AH to 100AH. 626-286-0118; www.aventrade.com

Browse our web site and check out the "Monthly Special" TDL Technology, Inc., www.zianet.com/tdl.

CALLSIGN HISTORY UR Call From 1912 - Present typed on parchment certificate $20 or will trade for 1x2 license plate from Maine, Georgia, Kansas, or North Dakota, or...??? Ron Allen W3OR, PO Box 73, Bethel, DE 19931-0073. (302)-875-1100 or e-mail w3or@delanet.com

CASH FOR COLLINS. SM-1, 2, 3; 312A-1, 2; 55G-1; 399C-1; KWM-380; 62S-1; KWM-1; 302C-3; 51S-1; 75S-3C; 32S-3A; buy any Collins equipment. Leo, KJ6HI, ph/fax 310-670-6969. radioleo@earthlink.net

COLLECTOR- wants pre 1945 QSL cards. Can pay reasonable amount or reimburse mailing costs. Jack Hotchkiss W7CNL, 3708 Hawthorne Drive, Boise, ID 83703 (208)-336-5620

ICOM

IC-756 PRO COMING SOON!
Call For Details

IC-746 HF+6M+2M-SPECIAL $1479.95
IC-706MKIIG HF+6M+2M Transceiver w/CTCSS encode/decode **$1199.95**
IC-706MKII HF+6M+2M Transceiver comes with UT-106 DSP (From ICOM) **$1099.95**
IC-2800H NEW 2M/440MHz **$519.95**
IC-2100H NEW 2M Mobile 55 Watts, Remote Control Mic...**SPECIAL $199.95**

IC-207H Dualband Mob., 45W/35W Detach. Front Panel.....**$309.95**

IC-T8AH 6M/2M/440MHz HT ...**$274.95**
IC-T81A Four Bands 6M/2M/440MHz/1.2GHz HT.....**$399.95**
IC-T2A NEW 2M/HT 6 Watts **$179.95**
IC-W32A 2M/440MHz HT 3/5W..**$309.95**
IC-R2 NEWAM, FM, WFM Receiver, .5-1300MHz, 400 Memories.....**$209.95**
IC-R10 .5MHz-1.3GHz HT Rec. .**$299.95**
IC-PCR 1000 5-1300MHz **$399.95**
IC-PCR 100 .1-1.3GHz **$209.95**
IC-R8500 .1MHz-2GHz Rec. **$1499.95**

KENWOOD

TS-870S HF Transceiver All Amateur Bands.....**$2269.95**
TS-50S 1.8-30MHz HF Transceiver Super compact.....**$759.95**

TS-570DG HF Transceiver,100W Auto Antenna Tuner, DSP.....**$1099.95**
TS-570SG HF with 6M.....**$1339.95**

TM-D700A APRS MOBILE

TM-G707A Dualband Mobile.....**$329.95**
TM-261A 2M Mobile 50W.....**$199.95**

TM-V7A FM,Dual Band, Detachable Front Panel

TM-V7A SPECIAL
$449.95 **list $719.95**

NEW!!! TH-D7A Data Communicator
TH-79AKSS Dualband HT.....**$379.95**
TH-G71A NEW, Dualband HT...**$265.95**
TH-22AT 2 Meter HT **$199.95**

YAESU

FT-10R/A16-41B
2 Meter Handheld
First Ham Handhelds with MIL-STD 810 Rating
5 Watts Output
Alpha-Numeric Display
High-Speed Scanning
Battery Savers
Compact Design
99 Memories
Time-Out Timer
Read Amount of Battery
Programming Software Available

FT-10R/A16D-41B
Same As Above,
Plus Encode/Decode
$129.95
list $379.95

FT-10R/A16S-41B
Same As Above, Plus
Encode/Decode & Digital Recorder
$139.95
list $399.95

800-882-1343 / 800-564-6516
Out of State California

TIMEWAVE · cushcraft · hy-gain by Telex · MAGELLAN · DIAMOND ANTENNA · TE SYSTEMS · MAHA · MFJ · COMET · buttermut · ASTRON CORPORATION · PALOMAR · GARMIN · HUSTLER · PROPHEX · rfconcepts · VIBROPLEX · NYE & Co. · Force 12 Antennas and Systems

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 $$**

DR-610T 2M/440MHz Mobile.....**CALL $$**
DJ-191TH 2M HT .....**CALL $$**
DJ-C1T/C4T
Credit Card size 2M or 440MHz HT
SPECIAL!.....**$89.95**

BARGAIN BOX

AOR
AT-400 440 HT 5watts.....**$139.95**
AT-600 2/440 HT 2.5watts.....**$199.95**
AR-146 50W, 2 meter Mobile...**$149.95**

ICOM
IC-BP173 9.6V 600ma Battery **$59.95**
IC-B157A 7.2V 900ma Battery **$59.95**

JRC

JST-245 160-10M PLUS 6 Meter Transceiver
JRL2000F Full Auto. MOSFET HF Linear Amp
NRD-545 DSP Receiver

prices subject to change without notice

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

IN BUSINESS SINCE 1978

KANTRONICS · DAIWA · Larsen · W & W · MIRAGE · SGC · M² Antennas · KLM · BENCHER, INC. · GAP

Crystals* & Channel Elements

- 50-Years of Service
- 2 Week Delivery
- Lifetime Guarantee*
- Most standard two-way crystals under $12.00
- Expedited Delivery Available
- Hard to Find Parts

ICM
INTERNATIONAL CRYSTAL MANUFACTURING, CO INC

800.725.1426 • Fax: 800.322.9426 • www.icmfg.com

Ar² Communications Products

P.O. Box 1242
Burlington CT 06013

High Performance Communications Equipment Since 1978

Low noise preamplifiers
Broadband amplifiers
Gunnplexers
Horn antennas
Power dividers
Sequencers
Cable assemblies
Attenuators
RF connectors
& more

www.advancedreceiver.com 860 485-0310

YOUR FAVORITE RECEIVER KIT IS BACK!

The ***OCR***, an Optically Coupled Regen, is an all-mode (AM CW & SSB) 40 M receiver. Excellent selectivity & stability. Easy to assemble. (See QST JUNE 98).....**$92.45** PP

ANTENNAS: UHF & VHF | **SMART BATTERY CONTROLLERS:** AC or SOLAR 110/220 FROM 1 AMP TO 6

Code Practice Oscillator (see Now You're Talking) **$23.45** PP

SEND FOR FREE CATALOG

Check monthly specials on www.jadeprod.com/

1-800 JADE PRO (523--3776)

JADE PRODUCTS INC. E. HAMPSTEAD NH 03826-0368

The QEX Collection CD-ROM.

Technology at your command! Browse all QEX issues from 1981 through 1998.

ARRL Order No. **7660—$39.95**

plus shipping: $4 US/$5.50 International

Order Toll Free

1-888-277-5289

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

The AOR DDS-2A

A Work of Art?

Introducing a new external VFO for KWM-2/A, 75-S and 32-S

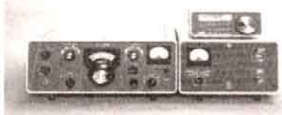
Here's a new microprocessor TXCO VFO designed for your classic Collins radio!

- DDS and PLL technology produce accurate, clean signals • 100 memory channels •
- BFO shift compensation and 1 Hz accuracy on USB & LSB • Easy Installation •
- Excellent stability +/- 5 ppm • General coverage includes WARC bands •
- Full metal construction • Design and color matches your classic Collins•

The AOR DDS-2A was designed *for* Collins owners *by* Collins owners. Add functions, features and versatility to your classic! Installs to KWM-2/A without mods to radio; some mods required for 75S/32S units. Add this "work of art" to your Collins – we think Art would approve!

Limited Edition Item - Act Now!

$769.95+Shipping and Handling
CA residents add 8.25% tax
Credit Card orders add 5%
Available directly from AOR USA Inc.



AOR

AOR U.S.A., Inc.
20655 S. Western Ave. • Suite 112 Torrance, CA 90501
310-787-8615 Phone • 310-787-8619 Fax
www.aorusa.com

Radio not included. Names used for identification only. All trademarks remain the property of their respective owners.

COMPUTER BAREBONES SPECIAL! AMDK6 450MHz 3-D $245. Upgrades or complete systems. Email or call for prices. Free advice. AC4OD, P.O. Box 540633, Greenacres, FL 33454. 561-965-7491. dataplus@quickbyte.net

COMPUTERS - WANTED early Pre-1980 microcomputers for museum collection. Also early magazines and sales literature. KK4WW, 540-763-3311/382-2935.

CONTEST LOGGERS. EI5DI's Super-Duper. **http://www.ei5di.com**

CONTESTER laminated keyboard overlays, QSL return envelopes, DX Edge and more. www.HamStuff.com by W7NN.

CQing all **DXers,** if E+F skip makes your day! Then check out G+H. For a free tract about tuning in -Self Ministries, P.O.B. 117, Bristolville, OH 44402 USA.

DIGITAL FIELD strength meters: http://www.digifield.com

Digital Processor MFJ-784B Mint. Cond. $85 W6XM 805-541-5368

DUSTCOVERS: Plastic dustcovers for the following paddles: Bencher, Vibrokeyer, Vibroplex lambic, Jones, Kent, and MFJ-564 with your call engraved. $16 includes S&H. Larry Stamm, 28 Topton Road, Kutztown, PA 19530.

ELECTRIC RADIO Magazine in our eleventh 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- Amplifiers, Internet Broadcaster, Fiber Optic, Radio, Transmitters, Voice Changers, J-Tron, Call 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: Henry 5K, excellent condition, 2K+ output, 2-3CX-1200s. Local pickup only. $3.5K. K4MS ph: 843-873-5540 after 5pm. E-mail: k4ms@cchat.com

FOR SALE: Tempo One; Power Supply, Mikes, Spare Tubes-$200-U-Ship, K4JAI (Alfred) 305-651-5678, eves.

For Sale: Ten Tec Scout 555. Bought reconditioned from Ten Tec, 99. Two Modules 40, 10 meters, manual, etc. $375. Roy Fortier 770-517-6549.

FREE Ham Gospel Tracts; youth leaders needed for national outreach. SASE, W1REZ, P. O. Box 8, Harmony, ME 04942.

FREE: Ham Radio Gospel Tracts, SASE. KW3A, 265 West Ave., Springfield, PA 19064.

FREE IBM DISK CATALOG with Ham Radio, shareware programs and CD-ROMS. Specify disk size. **MOM 'N' POP'S SOFTWARE**, P. O. Box 15003-HA, Springhill, FL 34609-0111. 352-688-9108. momnpop@webcombo.net

GREAT CIRCLE MAPS computer generated for your exact QTH, $20 ppd. worldwide. Printouts $12 ppd. SASE for info. Bill Johnston, K5ZI, Box 640, Organ, NM 88052. 505-382-7804.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify model numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

Hallicrafters SX25 and S20R. Collins 388/URR. All manuals. W8TIV 937-429-1341

HAM PRODUCTS! www.ElectronicsUSA.com

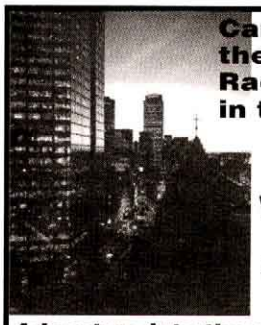
HEATHKITS WANTED: Top dollar paid for unassembled kits. Michael Seedman, 847-831-8823 eve., or mseedman@interaccess.com

HEATHKITS WANTED: Unassembled kits, catalogs, manuals and older gear. Bill, WA8CDU, 616-375-7978. billrobb@net-link.net

HEATKIT AMATEUR RADIO REPAIR by RTO Electronics, 5810 Shang Hai Road, Eau Claire, MI 49111. 616-461-3057. E. Mail: hamtech@rtoham.com. www. rtoham.com

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

HT carrying cases and dealers: www.ThePouch.com/ham.htm



Can you find the Amateur Radio station in this photo?

No? Welcome to *STEALTH* AMATEUR RADIO

Adventure into the world of hidden stations and invisible antennas!

- **Set up and operate** a station without calling attention to yourself.
- **Successfully operate** a low power (QRP) station.
- **Install safe antennas,** including indoor antennas.
- **Build invisible antennas.**
- **Install and operate a mobile station,** to "get away" from radio-forbidden locations.
- **Operate a portable station** from a campground, motel room, picnic area, mountaintop or other location.
- **Handle interference** *from* your station to nearby consumer electronics devices as well as *to* your station from other nearby devices.
- **Enjoy operating from just about anywhere!**

STEALTH AMATEUR RADIO

ARRL Order No. 7571—$14.95*
*plus shipping: $4 US / $5.50 International

ARRL 225 Main St, Newington, CT 06111
tel: 860-594-0355 fax: 860-594-0303
e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/
QT 04/2000

"I can't believe it's a kit!"

ELECRAFT K2

160-10m SSB/CW Transceiver

The K2 is an all-band SSB/CW transceiver with world-class performance and styling—that *you* can build. Features include synthesized dual VFOs with split and RIT/XIT, back-lit LCD, memory keyer, smooth QSK, and multiple crystal filter bandwidths. The K2 is also the ideal portable rig (size 3x8x8", weight 3.4 pounds, and a low 100-mA receive current drain setting). You can even add a variety of *internal* options, including 2.9-AH battery and zero-current-drain automatic antenna tuner.

Unlike traditional kits, the K2 uses modular, "no–wires" construction, simplifying assembly. And there are no surface-mount parts. To top it off, all the test equipment you need is *built in*, including frequency counter and digital voltmeter.

The CW, 10-W (QRP) version of the K2 starts at only $549.
(SSB adapter and 160-m module w/ant. switch optional.)

VISA MasterCard

ELECRAFT
www.elecraft.com

P.O. Box 69
Aptos, CA 95001-0069

Phone: (831) 662-8345
Dayton Booth #196

DJ-C4T
DJ-C5T

DJ-G5TH

ALINCO

DX-70TH

HANDHELDS

DJ-C4T 440 300mw HT w/lith batt ..... Closeout **$69.95**
DJ-C5T 2m/440 300mw lith batt w/spkr ..... © **149.95**
DJ-G5TH 5w 2m/440 FM HT/charger ..... © **279.95**
DJ-S11T 340mw 2m HT/AA battery holder ..... *© **79.95**
DJ-S41T 340mw 440 HT/AA batt holder ..... *© **79.95**
DJ-V5TH 5w 2m/440 FM HT ..... © **239.95**
DJ-X10T .1MHz-2GHz AM/FM/SSB/rcvr ..... © **319.95**
DJ-180TH 5w 2m FM HT/TTP ..... © **149.95**
DJ-195T 5w 2m FM HT ..... © **159.95**
DJ-280TH 5w 220 FM HT/TTP ..... © **169.95**

FAMILY RADIO SERVICE

DJ-S46 FRS Handheld ..... *© **$94.95**

HF + 6 meters

DX-70TH Compact HF/100w 6m xcvr ..... © **$759.95**
DX-77T 160-10m 12V Base xcvr ..... © **719.95**
DM-330MVT 30 Amp switching power supply **199.95**
DM-340MVT 30 Amp power supply **179.95**

ANTENNA TUNERS

EDX-1 Manual coax antenna tuner **$269.95**
EDX-2 Automatic wire antenna tuner **319.95**

Call or E-mail to Get the Winter 1999/2000 Catalog!

© w/Instant Coupon, coupons expire 4/30/00
*© w/Instant Coupon, coupons expire 6/30/00
All Prices are subject to change without notice.

MOBILES

DR-M03SX 10w 10m FM xcvr/TTP/encoder ..... *© **$164.95**
DR-M06TH 20w 6m FM xcvr/TTP mic ..... *© **249.95**
DR-140TQ 50w 2m FM w/CTCSS decoder ..... © **194.95**
DR-140TPKT 2m FM/1200 baud packet xcvr ..... © **174.95**
DR-150TQ 50w 2m FM w/CTCSS decoder ..... © **219.95**
DR-430TQ 440 FM xcvr w/CTCSS decoder ..... *© **229.95**
DR-605TQ 50w 2m/35w 440w/CTCSS ..... *© **339.95**
DR-610TQ 50w 2m/35w 440w/CTCSS ..... *© **439.95**

DR-150TQ

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			STORE HOURS
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	1072 N Rancho Dr Las Vegas, NV 89106 702-647-3114 1-800-634-6227 Fax 702-647-3412 lasvegas@aesham.com	Monday-Friday 9am to 5:30pm Saturday 9am to 3pm Over 43 Years in Amateur Radio

Internet **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.

http://www.hamsearch.com

ICOM 735 brand new base/mobile transceiver $750 VEGALN 780-469-7833.

KENWOOD FACTORY AUTHORIZED SERVICE: Warranty, non-warranty. Repair most brands. Groton Electronics, 978-448-3322. http://www.ultranet.com/~jacques

LEARN CODE by Hypnosis, http://www.qth.com/cweasy/ or 800-425-2552.

LOW BAND DXers K1FZ Beverage antenna transformers. Single wire and, two wire switchable two direction types. Email: k1fz@agate.net or Web: www.qsl.net/k1fz/

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**

"MORSE CODE DECIPHERED." Simple, elegant, inexpensive, comprehensive, logical, easy! Email judlind@earthlink.net.

MOTOROLA B94MDB-1105A UHF 250W continuous duty Base, low time 4CX250B finals, mint condition. Also, MOTOROLA LO9DAL Paging Terminal with RACOM Identifier and CODE-A-PHONE Announcer. All factory manuals. $900. Six SORENSEN SSD9-80 80amp D.C. Supplies with manual, Blowers and Cabinet, $375. Approximately 293ft. NEW ANDREWS LDF4-50A Hardline $295. Approximately 275ft. used half inch HARDLINE with connectors and pigtail, $175.00 Approximately 99ft used half inch HARDLINE with connectors $75. Various lengths RG9/U/BU double shielded COAXIAL CABLE. PURE GAS 1500 Airline dryer, pressurizer $75. W4UKV, 813-643-0208

MOTOROLA MICOR REPEATERS: 2m, 440 - $400. 440mhz Duplexers $200-$450. Tuned and guaranteed. Matt Bush, 941-470-3074.

MS-Windows software and accessories for **Ultimeter** weather stations, visit http://www.QTH.com/n2ckh.bytewise.org

NEED DRAKE TR7 Filter 6,0+1,8+MS7. WA2VHQ, 212-532-5845

POCKET MINI-PADDLES! Inexpensive. www.ElectronicsUSA.com

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 98547-0697. 360-267-4011. Email: w7ddf@yahoo.com

RECOMMENDED 50 MHZ DX BAND PLAN & Addendum. Only available comprehensive 6M band plan. EVALUATION OF 50 MHZ TRANSCEIVERS. Listed 1963-1999 sets in comparison 6M Scale. Free by SASE to WA6JRA, 714-637-3989.

ROSS $$$$ New Specials: Kenwood , TM-261A, $189.50; TR-8400, $239.50; BC-6, $69.50; TS-570DG, $1095.00; Yaesu, SP-8, $159.00; FT-703RTT, $199.50; VX-5R, $319.00; ICOM, IC-2000H NO BOX,MIKE,MAN, 90 DAY ICOM WARRANTY $150.00; IC-77R, REPACK $610.00; IC-435, $240.00; IC-O4AT, $245.00; IC-7072, $90.00; IC-UXS-92A, $610.00; ALL Cash FOB Preston. Call (208)852-0830 or visit our Web page. http://www.rossdist.com. Ross Distributing Company, 78 South State, Preston, Idaho 83263

SAVING the best for last! Clearing out test equipment, semicondutors, ICs, construction parts, manufacturers design books and data sheets. Great stuff at great prices. Send SASE for multipage list. Budd Meyer, 6505 Yellowstone, Flushing, NY 11375

STRAT (Magazine of G-QRP-Club) issues 1-100 on CDROM. $25 include S&H. Memberprice $20 only! Pay by MC, Visa, Amex, cash or check. FUNKAMATEUR, Box 73, 10122 Berlin, Germany. Fax ++49-030-44669469 www.qsl-shop.com

SX88 HALLICRAFTERS receiver wanted. Jim, W6OU, 714-528-5652.

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 Corsair II 561 Transceiver w/260 PS, 214 Mic, 263. Remote VFO, and 229 Tuner: $1100. Tailtwister rotor: $100.00. Drake DL1000: $25. Much more including Rohn FK4558/45G foldover Tower, keyers, keys, PSs. Call Jim NG8T 513-662-9560, evenings.

The Daily DX - Do you have e-mail? Get two free weeks of the most up-to-date DX news. Send an e-mail to qst@dailydx.com or visit http://www.dailydx.com

The Dxer's Control Panel. Http://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, 888-833-3104.Web site: www.championradio.com,

Tubes f/s - M/p of ge 6jb6a or 6146w & driver 38.00. M/p 6js6c & driver 70.00. Other amateur related tubes are available. Web site: http://www.jorsm.com/~n9tew. E-mail: n9tew@jorsm.com. Bob Bieker 219-924-0945.

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. 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.

VIBROPLEX BUGS with NY address wanted for private collection. Especially want bugs with 2.5" or 3" wide base or S/N under 100,000. Other old or unusual keys and bugs and collections from estates wanted. Randy Cole, KN6W, 4540 Fairway, Dallas, TX 75219. 214-521-7041 or cole@netcom.com

WANTED: 6502-based Hardware/Software/Literature, whatever. KIM'S; SYM'S; AIM'S; OSI, anything & everything! John Rawley 1923 Susquehanna Rd. Abington, PA 19001. Phone: 215-884-9220, johnr750@aol.com

WANTED: British, Commonwealth, W.S.62, W.S.22, W.S.18, W.S.48, W.S.46. Service manuals for CU-1368/FLR-9, CU1280/FRQ10. George H. Rancourt, K1ANX, 82 White Loaf Rd., Southampton, MA 01073. 413-527-4304.

WANTED: Electronic estates, hi-fi, broadcasting. Cash paid. KB8CCY, 419-782-8591.

WANTED for personal use: Globe King-500, JOHNSON Viking-500, Drake B-line; KB0W, (916)-635-4994. frankdellechaie@sprintmail.com

WANTED: Hi capacity 12 volt solar panels for repeater. kk4ww@fairs.org or 540-763-2321.

Wanted: Tube Testers: RCA WT-100A, WESTON 686-10A, Hickok 539C, Triplett 3444, Tektronix 570 curve tracer, General Radio 1661-B bridge. John Birck (801) 224-1216; fax (801) 224-6059.

WANTED: Tubes. Nobody pays more or faster than us! Mike Forman, 1472 MacArthur Blvd, Oakland, CA 94602, 510-530-8840.

WWII Electronic Equipment. Send $2 for 40 page list and receive $5 credit on first order. F.J. Conway, 2217 N.E. 17th Terr., Ft. Lauderdale, FLA 33305-2415.

www.interestingoldjunk.com

Yaesu 757gxii, HF transceiver. Looks and works great. OEM computer serial interface, all mode incl fm excellent performance. Complete ready to go with manuals. $595. W2IXU 609-698-8442 higgie2@juno.com

Yaesu FT101B, FV101B. FTV250. SP101, and service manual $600. Tempol, AC1, needs work $75. MFJ1224, Hamtex C64 $80. Azden PSC3000 $95. KC8UP (517) 362-8217 2300-0300 UTC.

JOBS

Amateurs get paid to be on-line www.URGE2SURF.COM

WANTED FOR SUMMER OF 2000: 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.

YAESU

FT-1000D Transceiver
tx: 160–10m **rx:** 100kHz-30MHz • 200w • 100 mem. • Dual receive • Antenna tuner & AC • 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 $3799.95**

FT-1000MP Advanced features • EDSP Collins mechanical filter..... **$2799.95**

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 © $1499.95**

FT-920 HF Transceiver
6m • 50MHz w/100w • AF-DSP • Auto antenna tuner • 127 memories • FET RF amp • Digital voice memory system • Dual display • Keyer • **FREE FM-1 FM unit for a LIMITED TIME**.....**Special $1369.95**

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..... **$739.95**

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 • 16¼" x 5⅜" x 16¼" • (amp) 33 lbs; (pwr sply) 26 lbs..... **$3999.95**

NEW!

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 memory keyer • Speech processor .....**Special © $1099.95**

NEW!

FT-90R Micro 2M/440 Transceiver
50/35w 2m/440 micro FM xcvr • Built-in CTCSS/DCS enc/dec • Select. TX power • 186 mem. • Direct keypad freq. entry • 8 mem. DTMF autodialer • ADMS PC program. • Auto repeater shift • RF-lavel squelch • Program. front panel/mic key func. • 1200/9600 bps compatible • 3.9"w x 1.2"h x 5.4"d.. **$399.95**

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 $429.95**

FT-3000M 2m FM Transceiver
70w • 110 to 180MHz, 300 to 520, 800 to 999MHz receive (cell blocked) • 81 memories • 1200/9600b comp. • 5½"w x 1⅝" x 6¼"d, 2¼ lbs **$399.95**

© with Instant Coupon, coupons expire 3/31/00

Prices subject to change without notice.

Call or E-mail to Get the Winter 1999/00 Catalog!

New! –

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 $209.95**

FT-290RMkII 2m Transceiver
144 to 148MHz transmit/receive • 25w • FM/SSB/CW or 2w portable power with 12VDC at 1A or optional battery case • Dual VFOs • 10 mem. • DTMF up-down mic scanning • 2⅛"h x 6¼"w x 7½"d, 2½ lbs .....**Closeout $559.95**

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 **$1199.95**
VXR-5000UCDC 400–512MHz **1199.95**
VXR-5000V/TA 2m rptr w/PS..... **1399.95**
VXR-5000U/TC 440 rptr w/PS..... **1399.95**
VXD-40UB 440 Duplexer..... **199.95**

FRG-100B Receiver
50kHz-30MHz, SSB/CW/AM modes, FM opt. • 50 mem. • Selectable bandwidths • Dual ant. inputs • 9¼"w x 3⅜"h x 9¾"d **$599.95**

Antenna Rotators
Light, medium, heavy & extra heavy-duty models, plus elevation & azimuth – elevation.

G-450A Lt/medium, 10 sq. ft..... **$259.95**
G-550 Elevation 12 sq ft..... **299.95**
G-800S Medium, 17 sq. ft **339.95**
G-800SDX Same, w/presets..... **429.95**
G-1000SDX Heavy, 23 sq. ft..... **C/O 519.95**
G-1000DXA Same spec as 1000SDX **519.95**
G-2800SDX Extra HD, 23 sq. ft **1139.95**
G-5500 Azimuth/elevation 11 sq ft .. **629.95**

Handhelds
NEW! FT-23MKII/12 5w 2m HT **$159.95**
FT-33R 5w 220 MHz FM HT **Special 249.95**
FT-50RD/41B 5w 2m/440 .....**Special 239.95**
NEW! FT-411MKII/12 5w 2m HT..... **179.95**
FT-911 1w 1.2GHz HT **459.95**
VR-500 100kHz - 1300MHz AM/FM/SSB handheld receiver **339.95**
VX-1R 500mw 2m/440 **FREE** case & battery holder (limited time) **.Special 169.95**
VX-5R 5w 6m/2m/440 HT ....**Special 319.95**
VXA-100-16/41B 5w air HT w/VOR . **499.95**
VXA-100-6/41B 5w air HT... **Special 299.95**
VXF-10 FRS HT w/wx ..... **Special 69.95**

POWER SUPPLIES
FP-712 10A switching ps.....**Closeout $89.95**
FP-1023 23A switching ps w/fan..... **159.95**
FP-1030A 25A ps w/meters..... **249.95**

MISCELLANEOUS CLOSEOUTS
CA-8 Chrg sleeves; NC-50/416/530..... **$1.95**
CSC-24S Case; FT-23/33/73R/FNB12S **99¢**
CSC-35 Case; FT-411E w/FNB-17 ..... **99¢**
CSC-50 Case; 415/416/FNB-25..... **1.95**
CT-20 Mic cable for use w/MD-1C8 ..... **4.95**
DVS-3 Voice; 2200/5200/6200/7200 ... **29.95**
FNB-49 600MA 6V battery **9.95**
FRC-4 Pager unit; 5200/6200..... **4.95**
FRC-6 Pager unit; 2500M/7400H **4.95**
FTS-6 Encoder/decoder; 09 series **4.95**
FTT-12 16# keypad/dec/dvrs; FT-50R.. **19.95**
FTT-4 TTP unit; FT-23R/33R/73R **9.95**
FX-1 Xcvr-fax interface/controller **9.95**
MMB-21 Mobile bracket; 09/727R..... **4.95**
MW-2 Remote control wireless mic **39.95**

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			STORE HOURS
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	1072 N Rancho Dr Las Vegas, NV 89106 702-647-3114 1-800-634-6227 Fax 702-647-3412 lasvegas@aesham.com	Monday-Friday 9am to 5:30pm Saturday 9am to 3pm Over 43 Years in Amateur Radio

Internet **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

TS-570D(G) HF Transceiver

160–10m Ham Band operation • 500kHz–30MHz receive • 100w output • Auto antenna tuner • 16-bit DSP technology • Scrolling menu; 46 types of func. • "One-touch" DSP filter wide mode • Enhanced CW DSP including 11 user-selectable CW DSP filters • RS-232 port for up to 57,600 bps PC control • Electronic keyer • Different settings for TX & RX • 9-step operator controllable NR1 • 10⅜"w x 3¼"h x 10¹⅛"d • 15 lbs .....**Special $1099.95**

TS-570S(G) 160-10m/6m **Spec 1319.95**

TM-G707A & TM-V7A Software FREE from Kenwood web site

TM-V7A Dual Band FM Transceiver

50w 2m/35w 440 • Five-in-one 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 • 5½"w x 1⅜"h x 7½"d.**Special $449.95**

TM-G707A Dual Band FM Transceiver

50w 2m/35w 440 • High visibility LCD Detachable front panel • 180 memory channels • Alpha numeric display • CTCSS encoder/decoder • Duplexer built-in • Priority scan • 5¼"w x 2⅛"h x 7½"d. **Special $349.95**

TS-950SDX HF Transceiver

150w 160-10m all mode w/100kHz-30MHz rcve • Built-in antenna tuner • 100 mem. Select. tone/CTCSS • Dual rcve • 23 position AF digital filter • Speech processor QSK semi-break-in • Computer interface 5½"h x 15.8"w x 15¾"d • 51 lbs. **$3999.95**

TM-742AD Dual Band Transceiver

2m/440 50/35w dual-band FM..... **$649.95**

TS-642AD Dual Band Transceiver

Same as TM-742AD but is a 2m/220 dual-band FM **$739.95**

TS-870S HF Transceiver

160–10m amateur band operation • 100kHz - 30MHz general coverage rcvr • 100w output • IF-digital signal processing func. • AIP sys. • Vari. AGC voice equalizer • Speech processor • Electronic keyer • Multi scan modes • Menu func. • 13.8V DC @ 20A 13"w x 4¾"h x 13"d, 25 lbs **$2299.95**

Affordable

TM-261A 2M FM Transceiver

144-148MHz tx; 118-174MHz rx • 50w • MIL -STD 61 multi-funct. mem. channels plus 1 call channel • Mem. name funct. • DTSS selective calling • Multi-scan capability • Dual menu sys. • Multi-funct. mic • DTMF mem. funct. CTCSS tone enc; opt. dec • 13.8V DC @ 11A • 5⅞"w x 6⅜"h x 6⅜"d.. **Special $179.95**

TM-461A 70cm FM Transceiver

Same features and looks as TM-261AD but 438–450MHz transmit, 400-470MHz receive, 35w output **$439.95**

TS-50S HF Transceiver

Super compact! • 160–10m Amateur Band operation • 500kHz–30MHz General Coverage receiver • 100w output • Dual vfos • DDS (Direct Digital Synthesizer) with "fuzzy-logic" control • AIP system • 100 memory channels • Dual-menu system • Multi-function mic • 12V DC @ 20A • 7"w x 2½"h x 9"d, 6½ lbs..... **Special $729.95**

VC-H1 Visual Communicator

Outdoor SSTV • Compatible w/ any FM xcvr • 10 image mem. • Connects to PC w/opt. kit to save pics as JPEG • Call sign superimpose • 270,00-pixel CCD image sensor • Rotatable, detachable camera head • Built-in mic & spkr • 1.8" color display • 4 AA batt. • 2⅝"w x 1⅜"h x 6¼"d .....**Special $349.95**

NEW!

TM-D700A Dual Band Mobile

50w 144MHz, 35w 440MHz • 118-1300MHz receive, cell blked • Remote head install. only • Alpha-numeric display • Built-in 1200/9600 bps • 200 mem. • Advanced APRS-99 • CTCSS enc/dec • Digital code squelch • Tone burst • Tone freq. scan • 5½"w x 1"h x 7"d (body), 5½"w x 2½"h x 1"d (head)..... **$669.95**

Other Products Not Pictured

BC-15A Desktop quick-chrgr **Closeout $19.95**
PG-3E Cigarette cord w/filter...**Closeout 19.95**
SC-36 Case; 78A w/PB17/18...**Closeout 99¢**
TM-331A 25w/220 FM xcvr **499.95**
TM-541A 10w 1.2GHz FM xcvr..... **449.95**
UBZ-AL14BK Black family radio HT **49.95**
UBZ-LH14BK Black family radio HT **99.95**

TH-79AKSS

TH-D7A

TH-G71A

TH-22ATH

TH-22ATH 144MHz single band operation • MOS FETpower module • 5w output • DTMF keypad 40 mems, 1 call channel • Multiple scan functions (VFO, call, mem.) • Dual scan stop modes 2.2"w x 5.7"h x 1.0"d..... **$229.95**

TH-42AT 2.5w 440MHz version ..... **Closeout 269.95**

TH-79AKSS 2m/440MHz dual bander • 5w output • MOS FET power module • Dual receive Cross-band repeat • 82 memories • ID and DTMF memory • Built-in CTCSS encode and decode 2.2"w x 5.1"h x 1.0"d..... **Milwaukee Only 379.95**

TH-D7A 5w 2m/440 handheld • w/1200/9600 TNC. ***includes FREE PG-4W from KENWOOD thru 3/31/00*** ..... **Special 429.95**

TH-G71A 5w 2m/440 dual band • Multiple scan modes • Wide range receive including aircraft CTCSS encode/ decode • One band at a time • 10 DTMF autopatch mem. • PC programmable plus DTMF remote control to your Kenwood TM-V7A • 2⅛"w x 4⅛"h x ⅝"d....**Special $249.95**

AES purchased Kenwood's entire inventory of the CLOSEOUT items below!

BT-10	6 AA alk. case; TH-235A	**$2.95**	**PB-37**	12V 5w batt; TH-235	**$9.95**
DFK-4B	13' cable kit; TM-733A	**29.95**	**SC-33**	Case; TH-28A/48A/PB13/BT8	**4.95**
DFK-7B	22' cable kit; TM-733A	**49.95**	**SC-34**	Case; TH-28A/48A/PB17/18	**4.95**
DTU-2	Digital paging; TM-541A	**14.95**	**SC-41**	Soft case; PB-32	**4.95**
MB-13	Mobile mt; TS-50S	**19.95**	**SC-43**	Soft case; TH-79/PB-33/34	**4.95**
MB-14	Mobile mt; TM-742AD	**19.95**	**VP-1**	Bumper mount, spring	**9.95**
ME-1	Mem. expand;TH-28A,TM-251A	**4.95**	**YK-88S-1**	2.4kHz SSB filter; TS-450	**69.95**
PB-36	7.2V batt; TH-235	**9.95**			

Prices subject to change without notice.

Latest New, Used & Demo Pricing is available on our Web Site.

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			STORE HOURS
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	1072 N Rancho Dr Las Vegas, NV 89106 702-647-3114 1-800-634-6227 Fax 702-647-3412 lasvegas@aesham.com	Monday-Friday 9am to 5:30pm Saturday 9am to 3pm Over 43 Years in Amateur Radio

Internet **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.

ICOM

Super Deal

IC-746 HF/VHF Transceiver

HF+6m/2m • IF-DSP, front panel adjustable • 100w • All-mode • Twin passband tuning • HF + 6m automatic antenna tuner • 11"w x 4½"h x 12½"d ..... © **$1489**95

NEW!

IC-756PRO HF/6M Transceiver

5-100w output–variable • All mode • 32-bit floating point DSP tech. • 24-bit AD/DA converters • DSP controlled AGC loop • 51 IF filters • 4.9" color display • Real-time spectral scope • Auto notch (-70db manual) • Internal voice recorder **$2999**95

IC-756 5-100w output–variable • All mode • 13.8V option .....**Closeout $1988**95

IC-756 w/PS-85 Purchase radio & switching ps together & receive the special promotional price .....**Closeout** © **$2158**90

IC-707 HF Transceiver

100w • All mode • General coverage receive • 32 memory channels • 100% duty cycle • Min. # controls • Front facing speaker • Large display..... **$649**95

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 power supply **$3499**95

NEW!

IC-706MKIIG 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 .....© **$1249**95

IC-706MKIIG with AH4 .....© **$1539**90

IC-706MKIIG with AT180 ....© **$1699**90

IC-706MKII 6m (100w); 2m (20w) • Tone enc • W/DSP .....**Closeout $998**95

IC-821H Transceiver

2m/440 MHz • Advanced satellite and digital base • All modes • 9600 full compatibility • Sub band transmit • 160 memories • Noise blanker • Adjustable transmit power • Satellite doppler correction **$1399**95

Super LOW

IC-2100H FM Transceiver

144MHz, 55w • FM switchable • PC ready • 14 channel DTMF • 113 memory channels • Selectable squelch delay • Optional HM-90A 5½"w x 1⅞"h x 7⅞"d **$199**95

NEW

R-75 Receiver

.03-60MHz • Triple conversion • Auto notch filter • Twin passband tuning (PBT) • Synchronous AM detection • Opt. DSP • Large front-mounted spkr **FREE UT-106 DSP from Icom thru 3/31/00** .....© **$699**95

IC-207H Dual Band Mobile

2m/440MHz FM • 50w/35w • Wideband receive • 182 memory channels • 9600 baud capability – PC ready • 50 frequency en/decode • Backlit TTP mic .....© **$314**95

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 $1499**95

NEW!

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 .....© **$519**95

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 • **FREE Percon Spectrum from Icom thru 3/31/00**..... **Special** © **$349**95

PCR-100-12 .01-1300MHz PC-controlled • AM/FM/WFM • CTCSS • Ant.**Special** © **$199**95

HANDHELD COMM. RECEIVERS

R-10-05 (pictured) Wideband coverage: 0.5-1300MHz (cell blkd) • FM/WFM/AM/USB/LSB/CW modes • 1000 memories • 8 chara. alphanumeric LCD • 7 scan modes w/priority • Cloning • **FREE CS-R10 software & OPC-478 cable from Icom thru 3/31/00**.....**Special** © **$299**95

R-2-06 .5-1300MHz • AM/FM/WFM • w/chgr/batt **Spec $199**95

PW-1 Amplifier

HF + 6m • 1KW PEP SSB and 1kw CW/RTTY output • Auto band change • Built-in auto antenna tuner • Wide ALC adjustable range • Full break-in CW operation • Built-in 110/220VAC • Auto input voltage selector • 14"w x 10⅜"h x 14⅜"d, 56 lbs **$4799**95

HANDHELDS

IC-T22A IC-T2H IC-T8A/HP IC-Q7ABC IC-W32A

IC-T22A *Affordable Beginner's HT!* 2m • 3w (5w @ 13.5V) • Small, easy to use • Alphanumeric display • Air band rx • 80 mem.; 40 w/alpha. display.....© **$209**95

IC-T2H 2m 6w • Wide band rcvr • 43 mem. • 8 program. keys • 8 AA batteries **$169**95

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 • Built-in CTCSS encode/decode.© **$229**95

IC-T8A/HP 6m/2m/440MHz • 123 memories • **FREE** BP-197 battery case for a **LIMITED TIME** .....© **$279**95

IC-Q7ABC 2m/440 • 300mw • rx: 30-1300MHz cell blkd • 200 mem ...© **$149**95

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 **$299**95

NEW LOW PRICE! IC-T81A Quad-band HT • 5w 6m/2m/440MHz, 1w 1.2 GHz **$349**95

Other ICOMs not Pictured

A-22 5w Navicom Air HT **$549**95

AH-4 80-6m/120w/auto wire tuner **319**95

AT-180 Auto coax tuner HF + 6m **499**95

IC-2GXAT/HP 7w 2m HT **229**95

IC-4008A Family radio service HT **79**95

IC-M3A 5w VHF marine HT..... **189**95

IC-M45AW 25w VHF marine xcvr **199**95

© w/Instant Coupon, coupons expire 3/31/00

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			STORE HOURS
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	1072 N Rancho Dr Las Vegas, NV 89106 702-647-3114 1-800-634-6227 Fax 702-647-3412 lasvegas@aesham.com	Monday-Friday 9am to 5:30pm Saturday 9am to 3pm Over 43 Years in Amateur Radio

Internet **www.aesham.com** • E-mail **info@aesham.com** • Toll Free **1-800-558-0411**

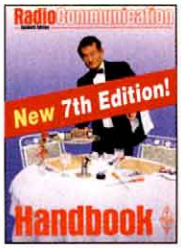
ORDER TOLL FREE 1-800-558-0411

6:00 A.M. Pacific to 8:30 P.M. Eastern
Monday – Friday • Saturday to 6:00 P.M.

Radio Society of Great Britain Products Imported by ARRL!

Communication Reference

Packed with technical information!



Radio Communication Handbook
One of the most comprehensive guides to the theory and practice of Amateur Radio communication. Find the latest technical innovations and techniques, from LF (including a new chapter for LowFERS!) to the GHz bands. For professionals and students alike. 820 pages.
ARRL Order No. 5234—$53

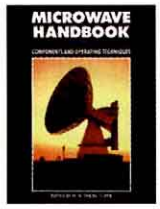
Good radio housekeeping!

The RSGB Guide to EMC
Diagnose and cure unwanted RF interference and achieve electromagnetic compatibility (EMC). Also covers filters and braid-breakers. 204 pages.
ARRL Order No. 7350—$34

RadCom 1998 on CD-ROM

All of the words, diagrams and photographs of the technical articles, news and reviews published in RadCom magazine during 1998. Includes a fully searchable keyword index covering all12 issues; over 1000 pages including all advertisements; and Adobe® Acrobat® Reader for Windows.
ARRL Order No. 7415—$33

Technical Topics Scrapbook 1990 to 1994
An invaluable collection of experimental HF/VHF antennas, circuit ideas, radio lore, general hints and comments…all from the popular *RadCom* magazine column, *Technical Topics*. 314 pages.
ARRL Order No. 7423—$25



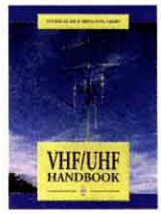
Microwave Handbook, Volume 1
Operating techniques, system analysis and propagation, microwave antennas, transmission line and components, microwave semiconductors and tubes. 200 pages.
ARRL Order No. 2901—$22

Microwave Handbook, Volume 2
Construction techniques, common equipment, microwave beacons and repeaters, test equipment, safety, filters and additional circuit data. 244 pages. **ARRL Order No. 3606—$35**

Microwave Handbook, Volume 3
Microwave theory and practice, reference information, practical designs, hints and tips. Covers 1.3-24 GHz. 284 pages.
ARRL Order No. 3975—$35

Calling All LowFERs!

The LF Experimenter's Source Book
Food for the dedicated Low Frequency experimenter! In the US, unlicensed "Lowfers" may operate 1-watt between 160 and 190 kHz. Are you up for the challenge? Antennas, propagation, receivers, transmitters, special modes and test equipment. Plenty of detail for the LF beginner! 146 pages (comb bound).
ARRL Order No. 7148—$15



VHF/UHF Handbook
A guide to the theory and practice of VHF/UHF operating and transmission lines. Includes essential background on antennas, EMC, propagation, receivers and transmitters, together with construction details for many projects. Plus, information on specialized modes such as data and TV. 317 pages.
ARRL Order No. 6559—$35

Order Toll Free
1-888-277-5289

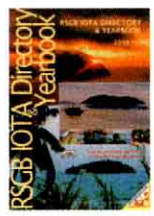
Operating

The VHF/UHF DX Book
Assemble a VHF/UHF station, and learn about VHF/UHF propagation, operating techniques, transmitters, power amplifiers and EMC. Includes designs for VHF and UHF transverters, power supplies, test equipment and much more. 448 pages. **Order No. 5668—$35**

No HF or 6m op should be without!

RSGB Prefix Guide
DXCC listings by prefix, latest CQ/ITU Zones, hours +/-on UTC, latitude/longitude, and more!. 5th ed. 1999.
Order No. 7237—$15

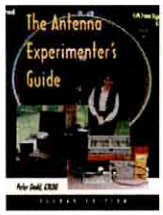
The official IOTA award sourcebook!



RSGB IOTA Directory
Try your hand at island expeditioning! The entire IOTA (Islands on the Air) award material, much statistical information and features many national island programs.
2000 Edition Coming Soon!

Antennas

Take the guesswork out of experimenting!

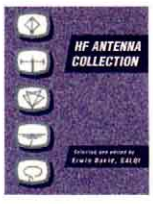


The Antenna Experimenter's Guide
Build and use simple RF equipment to measure antenna impedance, resonance and performance. General antenna construction methods, how to test theories, and using a computer to model antennas. 158 pages. **Order No. 6087—$30**

Pocket Guide!

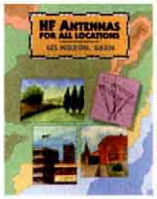
Your Guide to Propagation
This handy, easy-to-read guide takes the mystery out of radio wave propagation. It will benefit anyone who wants to understand how to get better results from their station. **ARRL Order No. 7296—$17**

Outstanding Antennas!



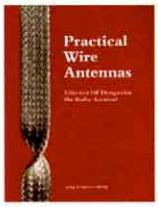
HF Antenna Collection
Articles from RSGB's RadCom magazine. Single- and multi-element horizontal and vertical antennas, very small transmitting and receiving antennas, feeders, tuners and more. 240 pages.
ARRL Order No. 3770—$18

Antennas for every situation!



HF Antennas for All Locations
Design and construction details for hundreds of antennas, including some unusual designs. Don't let a lack of real estate keep you off the air! 322 pages.
ARRL Order No. 4300—$15

Build the antenna that's right for you!



Practical Wire Antennas
Dive into the practical aspects of HF wire antennas: how the various types work, and how to buy or build one that's right for you. Marconis, Windoms, loops, dipoles and even underground antennas—they're all covered! The final chapter covers matching systems. 100 pages. **ARRL Order No. R878—$17**

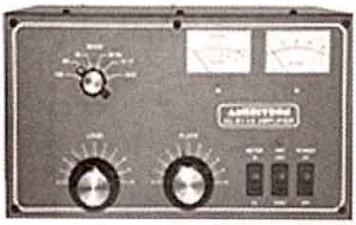
Radio Auroras
Explore the world of Amateur Radio communications via auroral propagation. What causes auroras, how they are forecast and how to best use them to work DX. You'll find an abundance of tables and charts. 96 pages. **Order No. 3568—$9**

Shipping: US orders add $4 for one item, plus $1 for each additional item ($9 max.). International orders add $1.50 to US rate ($10.50 max.). US orders shipped via UPS.

ARRL 225 Main St., Newington, CT 06111-1494 tel: 860-594-0355
fax: 860-594-0303 e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/

AMERITRON. . . 800 Watts. . . $795

Ameritron gives you four 811A tubes, 800 Watts and far better quality -- for less money than the competitor's 3 tube 600 watt unit . . . Why settle for less power, less quality and pay more money?



AL-811H
$795
Suggested Retail

AL-811
$649
Suggested Retail

Only the Ameritron AL-811H gives you four *fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

Ameritron mounts the 811A tubes vertically -- not horizontally -- to prevent hot tube elements from sagging and shorting out. Others, using *potentially damaging horizontal mounting*, require special 811A tubes to retard sagging and shorting.

A quiet, powerful computer grade blower draws in plenty of cool air. It *pressurizes* the cabinet and efficiently cools your 811A tubes. Our air flow is so quiet, you'll hardly know it's there--unlike noisy, poorly chosen blowers.

You also get efficient full size heavy duty tank coils, full height computer grade capacitors, heavy duty high silicon core power transformer, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual meters, QSK compatibility with QSK-5 plus much more.

AL-811 has three 811A tubes and gives 600 Watts output for only $649.

Near Legal Limit™ Amplifier

AL-572
$1395
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of a full legal limit amp! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 8½Hx 15½Dx14½W in. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Linears with Eimac 3CX800A7

AL-800H
$2395
Two tubes, 1500 W plus

AL-800
$1695
Single tube, 1250 Watts

These HF linears with *Eimac*® 3CX800A7 tubes cover 160-15 Meters including WARC bands. Adjustable slug tuned input circuit, grid protection, front panel ALC control, vernier reduction drives, heavy duty 32 lb. grain oriented silicone steel core transformer and high capacitance computer grade filter capacitors. Multi-voltage operation, dual illuminated cross-needle meters.

AL-80B. . . Desktop Killowatt 3-500ZG Amplifier

Ameritron's AL-80B kilowatt output desktop linear amplifier can double your average SSB power output with high level RF processing using Ameritron's exclusive *Dynamic ALC*™!

AL-80B
$1299
Suggested Retail

You get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias*™ completely turns off the 3-500ZG tube between words and dots and dashes. It saves hundreds of watts wasted as heat for cooler operation and longer component life.

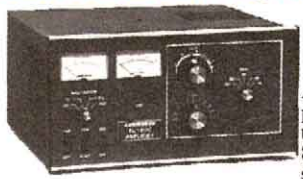
You get a full kilowatt PEP output from a whisper quiet desktop linear. It's a compact 8½Hx14Dx15½ inches and plugs into your nearest 120 VAC outlet. Covers 160 to 15 Meters, including WARC and MARS (user modified for 10/12 Meters with license).

You get 850 Watts output on CW, 500 Watts output on RTTY, an extra heavy duty power supply, genuine AMPEREX 3-500ZG tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatability, two-year warranty, plus much, much more! **Made in the U.S.A.**

AMERITRON offers the best selection of legal limit amplifiers

AMERITRON's legal limit amplifiers use a super heavy duty Hypersil® power transformer capable of 2500 Watts!

Ameritron's most powerful Linear



AL-1500
$2845
Suggested Retail

Ameritron's super powerful amplifier uses the herculean *Eimac*® 8877 ceramic tube. It's so powerful that 65 watts drive gives you the full legal output -- and it's just loafing because the power supply is capable of 2500 Watts PEP.

Ameritron's 3CX1200A7 linear Amp

AL-1200
$2395
Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200 -- the EimacR 3cx1200A7. It has a 50 Watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 Watts PEP two tone output for a half hour.

Ameritron's dual 3-500 linear

AL-82
$2295
Suggested Retail

This linear gives you full legal output using a pair of 3-500s. Most competing linears using 3-500s can't give you 1500 Watts because their lightweight power supplies can't use these tubes to their full potential.

AMERITRON no tune Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

AL-500M
$799
Suggested Retail

Ideal Mobile amplifier uses 13.8 VDC mobile electrical system, very compact 31/2x9x15 inches, extremely quiet, 500 Watts output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm-up, no tubes, SWR protected.

ALS-600 Base 600 Watt Amp

AL-600
$1299
Suggested Retail

No tuning, no fuss, no worries -- just turn it on and operate. Includes AC power supply, 600 Watts output, continuous 1.5 to 22 MHz coverage, instant bandswitching, fully SWR protected, extremely quiet, very compact. Amp is 6x9½x12 inches.

AMERITRON brings you the finest high power accessories!

RCS-8V Remote Coax Switch . . . $149

Replace 5 coax feedlines with a single coax. 1.2 SWR at 250 MHz. Useable to 450 MHz. 1 kW at 150 MHz. **RCS-4, $139**, 4 position remote HF switch.

ADL-1500 Dummy Load with oil . . . $59.95

Oil cooled 50 Ohm dummy load handles 1500 Watts for 5 minutes. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz.

ICP-120/240 Inrush Current Protector . . . $79

Stops power-up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110 to 120V, ICP-240 for 220-240 V.

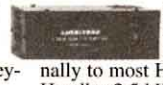
ATR-15 Legal Limit Antenna Tuner . . . $399

Designed for legal limit amplifiers! Covers 1.8 to 30 MHz, peak reading SWR Wattmeter, six position antenna switch switch, 1:1 or 4:1 balun. Lexan front.

ARB-702 (I,K,Y) amp-to-radio interface . . . $39.95

Protects your costly transceiver from damage by keying line transients, steady state current and excessive voltages.

QSK-5 Pin Diode T/R Switch . . . $349



Self-contained, connects externally to most HF amps. Handles 2.5 kW PEP, 2 kW CW. Six times faster than vacuum relay. 6x4x9½ in.

ATP-100 Tuning Pulser lets you safely tune your amplifier . . . $49.95 Pulse tuning lets you safely tune up your amplifier for full power output and best linearity. Keeps average power to low safe level to prevent overheating, tube damage, power supply stress and premature component failure.

ADL-2500 Fan cooled 2500W dry dummy load ...$199.95 Whisper quiet fan. Handles any legal limit amplifier -- 2500 Watts average power for 1 minute on, ten off. 300 Watts continuous. SWR below 1.25 to 30 MHz and SWR below 1.4 to 60 MHz.

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 (601) 323-8211 • **FAX** (601) 323-6551
8 a.m. - 4:30 p.m. CST Monday - Friday
For power amplifier components call (601) 323-8211
http://www.ameritron.com

FOR MEMBERS ONLY!

Armed with the NEW QST, "Members Only" Web Site access, and a myriad of benefits and services, you'll be more than ready to take on 21st Century Amateur Radio!

QST the #1 US Ham Magazine — Now Better Than Ever!

Each month, ***QST*** gives you over 170 pages of hard-hitting product reviews, the latest equipment ads, construction projects, features and columns. It's also THE reliable source for the latest Amateur Radio News. And the ***NEW QST*** offers even more — new columns dedicated to the subjects YOU want to read about.

Radios to Go — a bimonthly column that focuses on radio operating from cars, trucks, ships, aircraft and just about anywhere else!

Old Radio — follows the growing fascination with vintage radio gear. Read about radio collecting and restoration every month.

QST Workbench — 10 pages each month of projects, reference information, Hints & Kinks and a new column offering abbreviated hardware and software reviews.

QRP Power — covers low-power operating. If you've been bitten by the QRP bug, you'll want to check out this column.

When you join, you'll also gain exclusive access to the ARRL "Members Only" Web Site.

Enjoy exclusive features, photos, news, reviews and sounds from the world of Amateur Radio.

http://www.arrl.org/members

As an ARRL member you can also take advantage of the following services:

- **Free Technical help at your fingertips**
- **Available Rig Insurance**
- **The Fun of Contesting and Awards**
- **Outgoing QSL Service**

If you're an Amateur Radio enthusiast, ARRL membership is the deal of the century. Join today!

ARRL

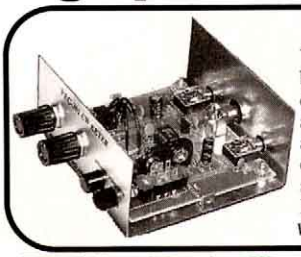
225 Main Street, Newington, CT 06111-1494 tel: 860-594-0355 fax: 860-594-0303
e-mail: circulation@arrl.org World Wide Web: http://www.arrl.org/

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.

VECTRONICS® kits

High-performance electronic kits . . . fun to build and use!

Full featured CW Keyer Kit, $24.95!



VEC-201K, the best electronic keyer bargain in ham radio! Send beautiful sounding Morse Code. Self-completing dot-dash and dot-dash memory forgive timing errors -- makes sending CW easy and accurate. Front panel volume/speed (3-65 wpm) controls. Weight adjusts 25-75%. Sidetone (300 -1000Hz) has LM386 audio amp for external speaker/phones. Select Iambic A or B, fully automatic or semi-auto "bug" mode. Tune mode for tuning rig. RF proof. Sleep Mode battery saver. Use 9V battery. 1¾x4x3½ in. *Simple skill level.*

VEC-201K shown in optional case (vinyl cover top not shown), VEC-201KC, $14.95

Aircraft Receiver Kit tunes entire voice aircraft band 118-136 MHz. Picks up air traffic 100 miles away. Track progress of incoming/outgoing traffic in your area, gain advanced weather information, and discover how the National Air Traffic System really works. Great way to learn about aviation. Use 9V battery. Drives external speaker/phones. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-131K, $29.95.**

20/30/40/80 Meter Receiver Kits give high performance! Covers entire band or tailor to cover desired portion. Copy CW/SSB/AM. NE602/ 612 mixer-oscillator, LM386 high gain audio amplifier. 1¾x4¾x 5¼ in. *Moderate skill level.* Order **VEC-1120K** (20 Meters),**VEC-1130K**(30 Meters),**VEC-1140K** (40 Meters), **VEC-1180K** (80 Meters), **$29.95 ea.**

20/30/40/80 Meter QRP CW transmitter Kits have variable crystal oscillator tuning, front panel switch selects 1 of 2 crystals. 1 crystal included. Transmit and Receive switch. Connect receiver. 1¾ x4x3½ in. *Intermediate skill level.* Order **VEC-1220K** (20 Meters), **VEC-1230K** (30 Meters), **VEC-1240K** (40 Meters), **VEC-1280K** (80 Meters), **$29.95 ea.**

Tunable SSB/CW Audio Filter Kit has sharp *four* pole peak and notch filters. Zero in with frequency control & adjust bandwidth for best response. Tune frequency from 300-3000 Hz. Notch is an outstanding 50 dB. 1 Watt amplifier. Speaker/Phone jacks. 12 VDC at 300 mA. 1¾x4¾x5¼ in. *Intermediate skill level.* Order **VEC-841K, $34.95.**

***Vectronics Comprehensive Soldering Course* and Kit** is the best home study soldering course available! Includes theory, quizzes, PC board, tools, safety, techniques and materials. Get professional soldering skills and a fun blinking LED project. Gets you ready for "through-hole" PC board assembly and repair. *Simple skill level.* Order **VEC-1500K, $29.95.** New!

Super CW filter/amplifier Kit has powerful 1 watt audio amplifier to drive speaker. 8 poles active IC filtering uses cascaded low-Q stages. 3 bandwidths: 80,110, 180 Hz. Center frequency: 750 Hz. Up to 15 dB. Use 9-18VDC, 300 mA max. 1¾x4 x3½ in. *Simple skill level.* Order **VEC-821K, $29.95.**

Super SSB Audio Filter Kit improves readability with 8 poles, optimizes audio bandwidth, reduces SSB splatter, low, hi-pitched interference, hiss, static crashes, background noise. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-830K, $19.95.**

144/220/440 MHz Low-Noise Preamp Kits soup up your antenna system. Helps pull in weak signals. Works wonders for scanner or ham-band receiver. Gives great low-noise performance and immunity from damaging electrostatic discharge. 1x1½ in. *Simple skill level.* Order **VEC-1402K** (144 MHz),**VEC-1422K** (220 MHz), **VEC-1444K** (440 MHz), **$17.95.**

CW Memory Keyer Kit stores 512 characters in four 128 character non-volatile EEPROM message memories. *Carry on entire QSOs by just pressing memory message buttons.* True sinewave sidetone with soft rise and fall time eliminates harsh keyclicks. Has all features of VEC-201K CW Keyer Kit. 1¾x 6¾ x5¼ in. *Simple skill level.* Order **VEC-221K, $69.95.**

High-performance 2 Meter Preamp Kit pulls weak signals out of noise. Solves three reception problems -- boosts signals using a 1-dB noise figure microwave transistor, provides razor-sharp bandpass filtering, eliminates unwanted electrical noises with built-in balun. Uses 9-14 volts DC. Tiny 1½x3x1 in. fits in any size box. *Intermediate skill level.* Order **VEC-1402DK, $59.95.**

2/6/10 Meter FM Receiver Kits let you tune into the world of ham radio. Catch all the action! Each covers the entire FM sub-band and runs off your 9 volt battery. Plug in speaker or headphones for loud clear reception. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-1002K** (2 Meters), **VEC-1006K** (6 Meters), **VEC-1010K** (10 Meters), **$34.95 each.**

2 Meter Monitor Kit receives 144-148 MHz. Low noise, high gain RF preamp gives you excellent 0.1 uV sensitivity. Air variable tuning capacitor has 8:1 reduction. Dual conversion superhet provides selectivity and stability. Automatically eliminates squelch tails. Built-in speaker, squelch, tone, volume controls. 19¼ in. telescopic whip. 9V battery. 2x4¼ x4 in. *Intermediate skill level.* Order **VEC-104K, $79.95.**

5 Watt 2 Meter FM transmitter Kit lets you transmit voice and data -- AFSK data (up to 1200 baud) and FSK data (up to 9600 baud). Jumper select reactance or direct FM modulators. Reliable Motorola NBFM transmitter IC and PA transistor. Crystal controlled (x8 frequency multiplication). -60 dBc spurs and harmonics. Use 12-14 VDC, 1.5 amps. 5-pin DIN microphone jack. 1¾x4¾x5¼ in. *Difficult skill level.* Order **VEC-1202K, $99.95.**

Ni-Cad/Ni-MH Battery Charger Kit safely quick charges expensive batteries -- no overcharging -- many in less than an hour. HTs, cell phones, camcorders, lap top computers. Handles 1 to 12 cells. Charging status LEDs. Discharge before charge function reconditions batteries. Also removes memory effect. Runs on 12-15 VDC. 1¾x4¾x5¼ inches. *Moderate skill level.* Order **VEC-412K, $49.95.**

Shortwave Converter Kit converts AM or AM/FM radios to shortwave receivers at a push of a button. Choose two 1 MHz bands between 3 and 22 MHz. Popular 13, 16, 19, 25, 31, 41, 49 and 60 Meters international broadcast bands. On/off bypass, NE-602/612 mixer-oscillator IC and tuned input circuit. Use 9 V battery. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-101K, $27.95.**

Crystal radio set Kit lets you relive the experience of early radio pioneers. This baby really works! Wind your own inductor, wire up the earliest radio circuit without soldering a thing and listen to the magic of radio that needs no power. Put up an antenna, connect a ground. Stations come in amazingly loud and clear. Includes antenna wire, sensitive earphone. 1¾x5x6½ in. *Simple skill level.* Order **VEC-121K, $19.95.**

Shortwave Receiver Kit lets you listen to the world! Covers 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15 and 13 Meter bands. Explore AM, SSB, CW, WWV, RTTY and Packet signals. Vernier reduction drive, smooth regeneration control, RF stage. *Includes all metal cabinet.* 2 earphone jacks. Use 9V battery. 2½x7x6 in. *Intermediate skill level.* **VEC-102K, $59.95.**

QRP Transceiver Kits for 80/40/30/20 Meters

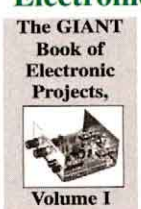
Great introduction to QRP, the hottest and fastest growing activities in ham radio. With this tiny *transceiver*, you'll discover what thousands of QRP enthusiasts already know -- you don't need a $1000 radio to get on the air and communicate worldwide. All it takes is some simple circuitry using less energy than a pen-light bulb! You get VXO frequency control, broad-banded transmitter circuitry, solid one Watt plus output, shaped keying, .3 uV sensitivity, direct conversion receiver. Includes crystal for popular QRP calling frequency. 1¾x4¾x5¼ in. *Intermediate skill level.* Order **VEC-1380K** (80 Meters), **VEC-1340K** (40 Meters), **VEC-1330K** (30 Meters), **VEC-1320K** (20 Meters) **$59.95 each.**

New!

Super CW Audio Filter Kit gives you three bandwidths: 80, 110, 180 Hz. Eight poles gives super steep skirts with no ringing. Pull CW QSOs out of terrible QRM! Plugs into phone jack to drive phones. QRM down 60 dB one octave from center frequency (750 Hz) for 80 Hz bandwidth. Improves S/N ratio 15 dB. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-820K, $19.95.**

AM Radio Transmitter Kit lets you set up your own AM station and broadcast crystal clear programming from your studio with *you* as the disc jockey or talk show host. Play music from CD player, tape deck or other source. Choose clear frequency from 530-1750 KHz. Standard line level or microphone input. Easy CD, tape deck or mike mixers connect. Audio level adjustment. 1¾x4x3½ inches. *Simple skill level.* Order **VEC-1290K, $29.95.**

The *GIANT* Book of Electronic Projects, Volume I.



Project book includes 19 exciting kits on this page. Has building tips, complete parts lists, parts placement and PC board layouts, test and alignment, operating instructions, in case of difficulty, theory and specs, schematics, cabinet layout and much, much more. Great school project book or gift for your favorite ham.

Order VEC-1901, $19.95.

Inspect and download our manuals from:

http://www.vectronics.com

Vectronics kits feature a professional quality epoxy glass PC board with solder mask and component legend, simple step-by-step instructions and highest quality components.

All metal cases for most kits, $14.95. Add "C" for case to model #. Example: "VEC-201KC". Has knobs, hardware, rubber feet and brushed aluminum-looking front panel decal.

Order Toll-Free 800-363-2922

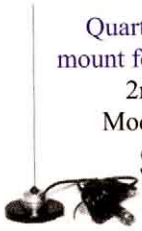
• **Fax**: (601) 323-6551 • **Tech**: (601) 323-5800

VECTRONICS, 300 Industrial Park Road, Starkville, MS 39759 USA • ***Add $6 s/h***

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

Quarter wave 2m mag mount for TM-261A or any 2m mobile/HT
Model # JTQMAG
$12.95



KENWOOD

Call, write, or email for a FREE catalog
Send $2 for Express service

External speaker for TM-261A
External speaker for TM-261A or radio with a standard mini plug. Model # HFS1
$6.95

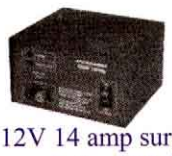
2 meter base antenna for TM-261A or any 2m mobile/HT
Cushcraft ARX2B
Frequency, MHz 135-160, SWR 1.2:1 Typical, Height 14 ft, Mast Size Range 1.0-1.25 in., Wind Load 0.5 ft², Weight 6 lbs.
$58.95

$164.95

Offer valid through 4/10/00 or until stock is depleted. Limit 2

2 meter 50 watt mobile

Kenwood TM-261A Mobile communications just got easier thanks to Kenwood's TM261A single bander – fully equipped and supremely user-friendly. High RF power output, rugged construction, 61 multi-function memory channels plus 1 call channel, Memory name function w/6 digit alphanumeric display, DTSS selective calling, Multi-scan capability, Dual menu system, Multi-function microphone w/backlit keys.



12V 14 amp surge power supply for TM-261A
Power supply for using TM-261A or any 2m 50w mobile as a base unit Pryamid PS14K
$44.95

Extra power cord for TM-261A and most all ADI, Alinco, Icom, Kenwood, Standard, Yaesu VHF/UHF rigs with the "T" 2 pin Molex connector.
Model #IC2000
$7.95

YAESU

HF w/DSP & Dual Rcvr

FT-1000MP EDSP, Dual in band receive, Selectable antenna jacks, Collins SSB Filter built-in

(FT-847)

HF/50/144/430 Mhz

FT-847 Features include 100 Watt output on HF / 6-Meter bands, while 2-Meter and 430 MHz bands feature a full 50 watts power output. DSP Filters (Notch, NR, BPF). With its high-tech design and revolutionary features, the FT-847 is truly the one radio that can do it all!

(FT-100)

FT-100 Breaking new ground in the field of micro-miniature transceiver design, the FT100 is the only miniature mobile transceiver providing coverage of the 160-6 meter bands plus the 144 Mhz and 430 Mhz bands.

6M, 2M, 70cm in a HT!

VX-5R Yaesu, the world leader in amateur radio is pleased to announce the world's smallest durable tri band handheld transceiver on earth the "new" VX-5R

HF Economy rig

FT-840 Compact high performance HF transceiver. Direct digital frequency synthesis. Clean transmitter output (100 watts). Wide receiver dynamic range. Quality construction

VHF/UHF Mobile

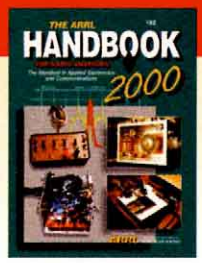
FT8100R Compact Dual Band Mobile. 110 Memory Channels. Enhanced Smart Search. Crossband Repeat. 1200/9600 bps Packet Compatible

ARRL Publications

Ordering Hours 8 AM - 8 PM
Eastern time Mon.-Fri.

Toll-free 1-888-277-5289

BOOKCASE



Handy References

The ARRL Handbook—77th edition!
Known fondly for generations as "The Amateur's Bible," today **The Handbook** is every ham's choice for reference and projects. 1,200 pages in 30 chapters make this book THE standard in applied electronics and communications. Order No. 1832 ..... **$32**

2000 ARRL Handbook CD Ver. 4.0. Find it Fast! Search and view the complete text of the 2000 ARRL Handbook. Project templates included. For Windows and Macintosh. Order No. 1840 ... **$39.95**

North American Repeater Atlas—1998/99 Order No. 6869 .... **$12**

NEW!

The 2000-2001 ARRL Repeater Directory. Up-to-date listings for thousands of FM voice and ATV repeater frequencies. Original, handy pocket-sized design—ready to go wherever you go!
Order No. 7911 ..... **Coming in April!** **$8**

TravelPlus for Repeaters™ CD-ROM—1999/2000 Edition. Access the entire **ARRL Repeater DataBase** in ways you never imagined! Plot your route on US and Canada highway maps, and print a list of repeaters for your next trip. Supports real-time tracking so you can view maps with your current position, route, grid square and repeaters within the range you specify! Order No. 7385 ..... **$39.95**

FREE!

TravelPlus ™ Commuter Mug with TravelPlus CD-ROM purchase (New orders, only. $10 sold separately. Order No. 7784).

The Radio Amateur's World Atlas. Booklet of full-color maps showing country boundaries, call-sign prefix boundaries, CQ zones, states and provinces, and more. Order No. 5226 ..... **$9.95**

ARRL's FCC Rule Book. **New Edition—Coming Soon!**

ARRL Circular Frequency Chart. Locate your frequency privileges with ease! Colorful chart includes handy operating aids.
Order No. 6826 ..... **SALE $5** ..... ~~$7.95~~

The ARRL Net Directory 1999-2000 edition.
Order No. 7393 ..... **$4**

The ARRL VHF/UHF Radio Buyer's Sourcebook. Order No. 6184 ..... **$12**

The Best of the New Ham Companion. From the popular ***QST*** column. Order No. 6001 **$12**

Operating/SWL

The ARRL Operating Manual. **New Edition—Coming Soon!**

New Book!

Stealth Amateur Radio. Adventure into the world of hidden stations and invisible antennas. You can operate from anywhere!
Order No. 7571 ..... **$14.95**

DXing on the Edge—The Thrill of 160 Meters. Operating tips and fascinating history. Book with audio CD! Order No. 6354 ..... **$29.95**

Personal Computers in the Ham Shack. Learn how you can enhance your enjoyment of ham radio with computers.
Order No. 5714 ..... **$15.95**

The ARRL RFI Book. Real Answers and Real Cures to your radio frequency interference problems. Order No. 6834 ..... **$20**

RF Exposure and You. Meet the new FCC RF exposure regulations. It's not complicated! Step-by-step worksheets and tables included. Order No. 6621 ..... **$15**

QRP Power shows just how much fun it is to operate with 5 W or less. Order No. 5617 ..... **$12**

Hints and Kinks for the Radio Amateur. Best tips, suggestions and projects from the popular ***QST*** column. Order No. 6095 ... **$12**

"Try ARRL Companion Books!" **All the basics—perfect for beginners:**

Your VHF Companion. Order No. 3878 ..... **$10**
Your Mobile Companion. Order No. 5129 ..... **$12**
Your Packet Companion. Order No. 3959 ..... **$10**
Your Ham Antenna Companion. Order No. 5110 .. **$10**

The ARRL DXCC List (October '99 ed.) Order No. 7598 ..... **$3**

Computer Software Library

ARRL Periodicals CD-ROM is a compilation of all ***QST***, ***QEX*** and ***NCJ*** issues on one CD. ..... **$19.95 per set.**

1998 Edition, Order No. 7377 ***1996 Edition,*** Order No. 6109
1997 Edition, Order No. 6729 ***1995 Edition,*** Order No. 5579

QST View CD-ROM includes back issues of ***QST*** in convenient, space-saving CD-ROM format. ..... **$39.95 per set.**

QST View Collection. Includes all 11 CD-ROM sets! Order No. QSTV ~~$439.45~~ ..... **Only $373.45**

SAVE!

$39.95 per set!

Years 1990-94 Order No. 5749	1965-69 Order No. 6451
1985-89 Order No. 5757	1960-64 Order No. 6443
1980-84 Order No. 5765	1950-59 Order No. 6435
1975-79 Order No. 5773	1940-49 Order No. 6648
1970-74 Order No. 5781	1930-39 Order No. 6710
	1915-29 Order No. 7008

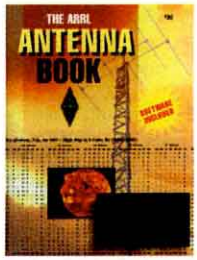
QEX Collection CD-ROM. For Communications Experimenters! Includes all issues from ARRL's technical journal, *QEX*, from its beginning in 1981 through 1998. Order No. 7660 ..... **$39.95**

NCJ Collection CD-ROM. Contesters! Enjoy all the back issues of ARRL's popular contesting journal, *NCJ* from 1973 through 1998. Order No. 7733 ..... **$39.95**

Buckmaster's HamCall CD-ROM. Features latest US and extensive international listings. Updated regularly. Order No. 7849 ..... **$49.95**

The Radio Amateur Callbook CD-ROM. Over 1,550,000 US and international call sign listings, and prefix maps. Updated regularly. Order No. 7792 ..... **$49.95**

Antennas and Transmission Lines



The ARRL Antenna Book is the definitive source for information on state-of-the-art antenna and transmission line theory and construction. Order No. 6133 ..... **$30**

The ARRL Antenna Book CD 1.0. Easy to use, fully-searchable CD-ROM for Windows and Macintosh. The entire book—every word and every page—**PLUS 70,000 pages of propagation tables!**
Order No. 7229 ..... **$39.95**

ARRL Antenna Compendium Volume 6. All-new articles on HF antenna designs, low-band antennas and operating, propagation, VHF/UHF antennas, transmission lines, tuners and more! CD-ROM included. Order No. 7431 ..... **$20**

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**

ON4UN's Low-Band DXing. Antennas, Equipment and Techniques for *DXcitement* on 160, 80 and 40 Meters. Order No. 7040 ... **$28**

ARRL's Wire Antenna Classics. Order No. 7075 ..... **$14**

Vertical Antenna Classics Order No. 5218 ..... **$12**

License Study Materials

Upgrade Today! Upgrade Today! Upgrade Today!

Use these license materials for written exams given before April 15, 2000.

Beginning April 15, there will be three license classes—Technician, General, and Amateur Extra—and a single Morse code requirement—5 WPM. It's anticipated that the new Amateur Extra exam will combine the important elements of the current Advanced and Extra exams. Only minor changes are expected in the new General exam. The new Technician exam is expected to incorporate questions from the present Novice and Technician question pools.

Until new license manuals are available, present study materials should be adequate for exam preparation after April 15. Contact ARRL if you have any questions!

Now You're Talking!: All You Need to Get Your Ham Radio Technician License. A complete study guide for your first license.
Order No. 5978 ..... **$19**

The ARRL's Tech Q&A—Your Quick & Easy Path to a Technician Ham License. Question-and-answer-format study guide for the new Novice and Technician license exams.
Order No. 6222 ..... **$12.95**

Theory Tutor for Amateur Radio. Use your computer to prepare for the Technician and Novice written exams. Requires *Windows.* 3.5-inch diskettes. Order No. 7326 ..... **$39.95**

ARRL Technician Class Video Course. Order No. 6192 .... **$99**
With Computerized Exam Review Software (Windows).
Order No. 6206 ..... **$129**

ARRL General Class Video Course. Includes Morse Academy software. Order No. 6885 ..... **$99**
With Computerized Exam Review Software (Windows).
Order No. 6877 ..... **$129**

ARRL Advanced Class Video Course. Order No. 5227 ..... **$99**
With Computerized Exam Review Software (Windows).
Order No. 5315 ..... **$129**

General Class License Manual. Order No. 6761 ..... **$14**
Advanced Class License Manual. Order No. 4947 ..... **$12**
Extra Class License Manual. Order No. 5390 ..... **$12**
Ham Radio Made Easy may be the only beginner-level book with "attitude." Order No. 5374 ..... **$15.95**

Understanding Basic Electronics is for beginners and those who want to brush up on electronics principles.
Order No. 3983 ..... **$20**

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

ARRL Radio Designer 1.5 CD-ROM. Create computerized models of audio, radio and electronic circuits. See how they work before you begin building. Order No. 6796 ..... **$150**

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**

The ARRL Electronics Data Book is an aid to the radio amateur or RF design engineer. Includes valuable tables and charts for formulas and semiconductor pin-out diagrams, plus many popular circuits and building blocks. Order No. 2197 ..... **$15**

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

NEW!

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 Phase 3D. 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/**

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), 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).

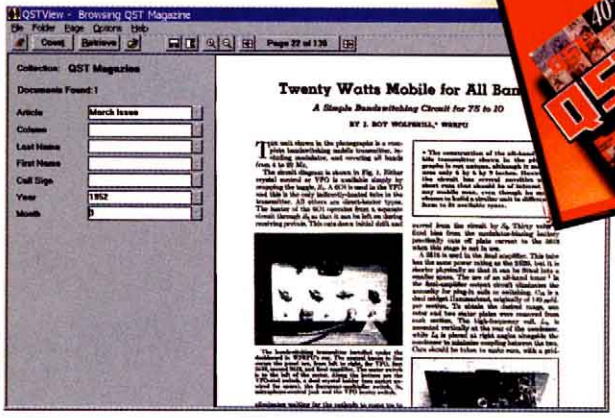
Amount of Order	Add	Amount of Order	Add
$10.00 or less	$3.00	40.01 - 50.00	7.00
10.01 - 20.00	4.00	50.01 - 75.00	8.00
20.01 - 30.00	5.00	Over $75.00	9.00
30.01 - 40.00	6.00	CD-ROM only	4.00

We accept the following major credit cards: American Express, MasterCard, Visa and Discover. Prices and product availability are subject to change without notice.

BC 4/2000

"With ARRL CD-ROM Collections, you have information at your command!"

QST View



Imagine having back issues of ***QST*** magazine at your fingertips! Each ***QST View*** CD-ROM includes all the **ads, articles, columns** and **covers**—scanned to provide a black-and-white image that can be viewed on your computer screen or printed. **Every Page.** Easy-to-use software included on the CD allows you to:

- **search for articles by title and author**
- **select specific year and issue, and**
- **browse individual articles or columns**

Microsoft *Windows* required

SAVE when you order the entire *QST* View Collection. Includes all 11 CD-ROM sets!
QSTV ~~$43~~ 45 **Now $373.45**

QST View CD-ROM sets

Years	Order No.
1915-29	#7008
1930-39	#6710
1940-49	#6648
1950-59	#6435
1960-64	#6443
1965-69	#6451
1970-74	#5781
1975-79	#5773
1980-84	#5765
1985-89	#5757
1990-94	#5749

ONLY $39.95* PER SET
*plus shipping/handling

ARRL Periodicals CD-ROM

An entire year of reading on one space-saving CD-ROM!—

- **SEARCH** the full text of every *QST*, *QEX* (*the Forum for Communications Experimenters*) and *NCJ* (*The National Contest Journal*) published during one year.
- **SEE** every word, photo, drawing and table—including color images!
- **PRINT** what you see.

Requires Microsoft *Windows*

ARRL Periodicals CD-ROM sets:

Year	Order No.
1998	#7377
1997	#6729
1996	#6109
1995	#5579

JUST $19.95* PER SET!
*plus shipping/handling

QEX and NCJ Collection CD-ROM

QEX and NCJ Collections

Back issues from these journals have been scanned to provide black-and-white images that can be read on your computer screen or printed. All the articles, ads, columns and covers are included. **Search—Select—Browse—it's all there!** System Requirements: Pentium or equivalent IBM-compatible PC, and Microsoft Windows 95, 98 or NT 4.0.

The QEX Collection CD-ROM
For Communications Experimenters! Includes all ***QEX*** issues from 1981 through 1998.
ARRL Order No. 7660 **$39.95***

NEW!
The NCJ Collection CD-ROM
Contests, scores and more! Includes all ***NCJ*** issues from 1973 through 1998.
ARRL Order No. 7733 **$39.95***

***Shipping/Handling:** US orders add $4 for one CD-ROM, plus $1 for each additional CD ($9 max.). US orders shipped via UPS. International orders add $1.50 to US rate ($10.50 max.). Shipping via surface mail.

Order Toll Free
1-888-277-5289

ARRL 225 Main Street, Newington, CT 06111-1494 USA tel: 860-594-0355
fax: 860-594-0303 e-mail: pubsales@arrl.org World Wide Web: http://www.arrl.org/ QT12/99

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!*

May Issue Focus:	Dayton/ARRL Nat'l Convention	Deadline: March 23, 2000
June Issue Focus:	Field Day and Portable Operation	Deadline: April 20, 2000

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

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$769
HF2V, 2 Band Vertical	$199
HF5B, 5 Band Minibeam	$429
HF6VX, 6 Band Vertical	$269
HF9VX, 9 Band Vertical	$329
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$119
RMKII, Roof Mount Kit	$139
STRII, Roof Radial Kit	$109
TBR160S, 160m Kit	$109

More Bencher/Butternut–call

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$149
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

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X300A	$129/159
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

GAP ANTENNAS

Please Call for Delivery Info

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

CUSHCRAFT ANTENNAS

X7/X9	$569/819
XM240	$599
R6000/R7000	$269/369
A50-3S/5S/6S	$89/139/219
AR2/ARX2B	$45/65
AR270/AR270B	$69/99
ARX270U/ARX270N	$219/219
13B2/17B2/26B2	$119/199/329
719B/729B	$115/179
A270-6S/A270-10S	$59/79

Please call for more Cushcraft items

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/7/9	$80/99/109
2M12/2M5WL	$145/179
2M5-440XP, 2m/70cm	$149

420–450 MHz

420-450-5/420-450-11	$119/84
432-9WL/432-13WL	$159/209
440-18/440-21ATV	$109/129

Satellite Antennas

2MCP14/2MCP22	$155/209
436CP30/436CP42UG	$209/249

M2 ANTENNAS

50–54 MHz

6M5/6M7	$189/269
6M2WLC/6M2.5WLC	$399/529

10/12/15/17/20m HF

10M4DX, 4 El. 10m	$379
12M4DX, 4 El. 12m	$379
15M4DX, 4 El. 15m	$419
17M3DX, 3 El. 17m	$379
20M4DX, 4 El. 20m	$499

More M2 models in stock–please call

MFJ ANTENNAS

259B Antenna Analyzer	$219
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

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

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7el	$519
C3S	10/12/15/17/20m, 6 el	$459
C3SS	10/12/15/17/20m, 6 el	$449
C4	10/12/15/17/20/40m, 8 el	$660
C4S	10/12/15/17/20/40m, 7 el	$569
C4SXL	10/12/15/17/20/40m, 8 el	$839
C4XL	10/12/15/17/20/40m, 9 el	$929
C19XR	10/15/20m, 11 el	$849
C31XR	10/15/20m, 14 el	$1119
C36XR	10/15/20/40m 13 el	$1449

Please call for more Force 12 items

FORCE 12–MONOBAND

EF410	10m, 4 element	$249
EF415	15m, 4 element	$379
EF420	20m, 4 element	$499
EF240	40m, 2 element	$539
MAG810	10m, 8 element	$619
MAG615	15m, 6element	$719
MAG520	20m, 5 element	$869
MAG620	20m, 6 element	$1119
MAG340	40m, 3 element	$899
MAG280B	80m, 2 element	$1829

Please call for more Force 12 items

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

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

ANTENNA ROTATORS

M2 OR-2800P	$1095
Yaesu G-450A	$239
Yaesu G-800S/SDX	$319/399
Yaesu G-1000SDX	$479
Yaesu G-2800SDX	$1069
Yaesu G-550/G-5500	$289/499

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

US TOWER

MA40/MA550	$659/1055
MA770/MA850	$2359/3649
TMM433SS/HD	$1139/1379
TMM541SS	$1499
TX438/TX455	$1069/1319
TX472/TX489	$2649/4599
HDX538/HDX555	$1379/1919
HDX572	$4139

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

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

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'	$859/1289
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!

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" / .18"	$65/110
15 FT x .12" / 17 FT x .18"	$95/180
20 FT x .12" / .18	$120/199
12 FT x .25" / 24 FT x .25"	$189/359

PHILYSTRAN 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: 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

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 ..... In Stock!

The Yaesu FT-1000MP is a competition class HF transceiver featuring advanced DSP, automatic antenna tuner, built-in power supply, RS-232 interface, and more!

FT-1000 / FT-1000D ..... In Stock!

The FT-1000 is a competition class HF transceiver featuring true dual RX, automatic antenna tuner, 200 watts RF output, and a huge bank of crystal IF filters.

Quadra System ... Lower Price!

Solid state amplifier featuring 1 kW output, high power antenna tuner, and more!

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-707 ..... Entry Level Price!

The Icom IC-707 is an all mode HF transceiver featuring a front panel mounted speaker, AGC, 20 dB attenuator, 32 memory channels, 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-821H ..... In Stock

The Icom IC-821H is an all mode 2m/70cm dual band transceiver. Great for satellite use, the radio offers dual RX, dual frequency display, tone encode, 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-100 ..... Yaesu Special!

The Yaesu FT-100 is an ultra-compact all mode transceiver for HF/6m/2m/70cm operation. The radio features a removable control panel, digital signal processing, CW memory keyer, built-in RS-232 interface, tone encode, 200 memory channels, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-840 ..... New Lower Price!

The Yaesu FT-840 is an all mode HF transceiver with 100 watt output, optional FM unit.

IC-W32A ..... New Lower Price!
IC-Q7A ..... Icom Special!
IC-T7H ..... Icom Special!
IC-T8A-16 ..... Icom Special!
IC-T81A ..... New QuadBand HT!
IC-T2H ..... Amazing Low Price!

IC-207H ..... Icom Special!

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-2100H ..... Great Low Price!

The Icom IC-2100H is a rugged 2m mobile transceiver featuring CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color, multiple scan modes and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

G-2800SDX $1069

Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000SDX $479
G-800S/SDX $319/399
G-450A $239
G-5500 ..... $499
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 ..... New Lower Price!
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

FT-50RD
This durable, multi-featured 5 Watt Dual Bander is manufactured to rigid MIL-810 standards. Featuring wideband frequency coverage;* CTCSS/DCS operation, Dual Watch, 112 memory channels, and Digital Voice Storage.

FT-11R
This compact 2M Handheld features 150 memory channels (75 if Alphanumeric), 10-memory DTMF Autodialer, Automatic Battery Saver (TX/RX), backlit Keypad, and are available in 1.5 Watt and 5 Watt versions.

FT-23/33R
These ultra-compact, 5 Watt VHF FM Handhelds feature rugged die-cast aluminum cases, 10 memory channels, optional CTCSS, and multiple scan modes. The FT-23R (2M) and the FT-33R (222 MHz) are easy to operate, and give outstanding performance.

FT-411E
The affordable FT-411E is compact and durable. This 5 Watt VHF FM Handheld features a die-cast case, 40 memory channels, 10 DTMF memories, built-in VOX, CTCSS, and multiple scan modes.

FT-51R
This full-featured 5 Watt Dual-Band Handheld includes dual receive, 120 memory channels (80 if Alphanumeric), Auto Tone Search, Spectra Scope, and V/V, U/U and V/U operation.

FT-10/40R
These single-band handhelds are manufactured to MIL STD 810 specifications, featuring either 30 or 99 memories, CTCSS/DCS operation, Dual Watch, and are available in 2.5 Watt or 5 Watt versions, with four keypad options.

VX-1R
The pocket-sized VX-1R is small in size only. Featuring Smart Search,™ DCS/CTCSS, Dual Watch, ARTS,™ wide-band coverage (76–999* MHz plus AM BC). The VX-1R provides 291 memory channels, and puts out ½ Watt (1 Watt w/optional E-DC-15 DC Adapter).

* Cellular Blocked

VR-500
This miniature Handheld Receiver provides FM, AM, SSB and CW reception on 100 kHz–1300 MHz, with 1091 memory channels, Smart Search,™ versatile Dot Matrix display, Band Scope, and Dual Watch.

VX-5R
Although Yaesu's newest Tri-Band Handheld Transceiver is the world's smallest, it offers the performance of a full-size unit. The VX-5R operates on the 50 MHz, 144 MHz and 430 MHz bands with 5 Watts of power output, along with ultra-wide receive coverage of the VHF and UHF spectrum, plus AM medium- and short-wave broadcast reception. The VX-5R is military rated, so its durable, lightweight design allows you to take it anywhere. It is equally suited to walking through the concrete jungle as it is to forging the raging rivers of a real one. Along with a temperature display, the optional barometer pressure sensor unit gives a read-out of barometric pressure and altitude.

TOUGH GUYS.

When you're small, you get picked on. Isn't that how it goes? Well not in Yaesu territory, because not only do we design compact handhelds for efficiency, but we give these clever little guys plenty of muscle. Yaesu handheld transceivers have earned the bragging rights for being the smallest handhelds with the most durable water resistant casings ever created. And packed inside the brawn are engineering accomplishments in performance that are unmatched in the industry. Our high-tech handheld transceivers provide clean power output on the VHF and UHF bands and offer revolutionary features that allows these tough guys to continually outperform the competition. Learn more about Yaesu products on the web at www.yaesu.com

YAESU ...leading the way.

An APRS® transceiver built for tomorrow's communication needs with advanced features available today.

TM-D700A DATA COMMUNICATOR 144/440MHz FM Dual Bander

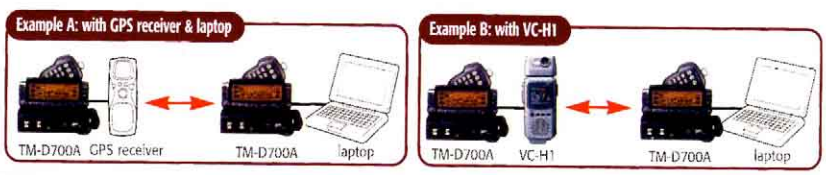
Conspicuous with its extra-large amber & black display, Kenwood's new TM-D700A is fully equipped to make the most of the exciting opportunities offered by SSTV, GPS and APRS® (the Automatic Packet/Position Reporting System that is rapidly gaining popularity worldwide), and other innovative features. This mobile transceiver with built-in TNC offers a wide range of data communications options, including simple packet operation using the AX.25 protocol. You can also send and receive SSTV images using Kenwood's VC-H1. Ham radio is truly entering a new era.

APRS® (Automatic Packet/Position Reporting System)

- **Position/directional data**
  With an NMEA-0183 compatible GPS receiver you can transmit position data for automatic calculation of distance, current speed and heading. Last 4 digits can be masked for position ambiguity. Manual input of latitude/longitude is also possible.
- **Versatile messaging**
  Transmission of position data can be accompanied by a choice of programmable status text (up to 28 characters), position comments (15 settings), icons and bulletins. For added messaging flexibility, individual alpha messages (up to 64 characters) can also be sent.
- **Station list**
  Store received APRS® data in up to 40 station reports.
- **Grid square locator**
  Position data is displayed on the grid square locator for visible reference.
- **BCON TX interval (0.2/0.5/1/2/3/5/10/20/30 min.)**
- **Packet path selection for Digipeat**
- **Weather station & PHG data reception**
- **Digipeat station and DIGI function capability**
- **Auto Message Reply**
- **Audible APRS® message receive (call sign) notification (requires VS-3)**
- **Waypoint position data output**

FEATURES

◗ Full Dual-band operation: VHF x VHF/VHF x UHF/UHF x UHF ◗ Wide-band receive: 118-524, 800-1300 MHz (excluding cellular blocked + frequencies) ◗ Detached panel (extension cable and panel holder supplied) with extra-large (188 x 54 dots) backlit LCD and multifunction key display (reversible) ◗ Improved key operation announcement with optional VS-3 voice synthesizer ◗ Built-in 1200/9600bps TNC compliant with AX.25 protocol and KISS mode ◗ Simplified packet monitoring ◗ SSTV functions with Fast FM for transmission of images in just 14 secs (approx.) and dual receive for voice and image transmissions (two frequencies simultaneously) ◗ 200 memory channels with 8-character memory name input ◗ Up to 10 programmable memory scan banks ◗ Easy-to-use menu system similar to the TH-D7A ◗ Built-in DCS (Digital Code Squelch) and CTCSS encode and decode ◗ CTCSS tone frequency scan ◗ DCS code scan ◗ 9600bps PC-based packet communications for chat, BBS ◗ DX packet cluster monitoring ◗ Cross-band repeater ◗ Wireless remote controller ◗ 1750Hz tone burst ◗ D-sub 9 pin terminal (for PCs) ◗ GPS input terminal (NMEA-0183) ◗ Visual band scope ◗ Mute function ◗ Memory control program available via Internet access ◗ New backlit microphone with alphanumeric message input.



ISO 9001
JQA-1205
Communications Equipment Division
Kenwood Corporation
ISO9001 Certification

KENWOOD
Amateur Radio Products Group

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. Box 22745, 2201 E. Dominguez St., Long Beach, CA 90801-5745, U.S.A.
Customer Support/Brochures (310) 639-5300
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8 99ARD-1952/QST

INTERNET
Kenwood News & Products
http://www.kenwood.net
Kenwood Bulletins
ftp://ftp.kenwood.net