Official Journal of
ARRL
The national association for AMATEUR RADIO

QST

devoted entirely to
AMATEUR RADIO

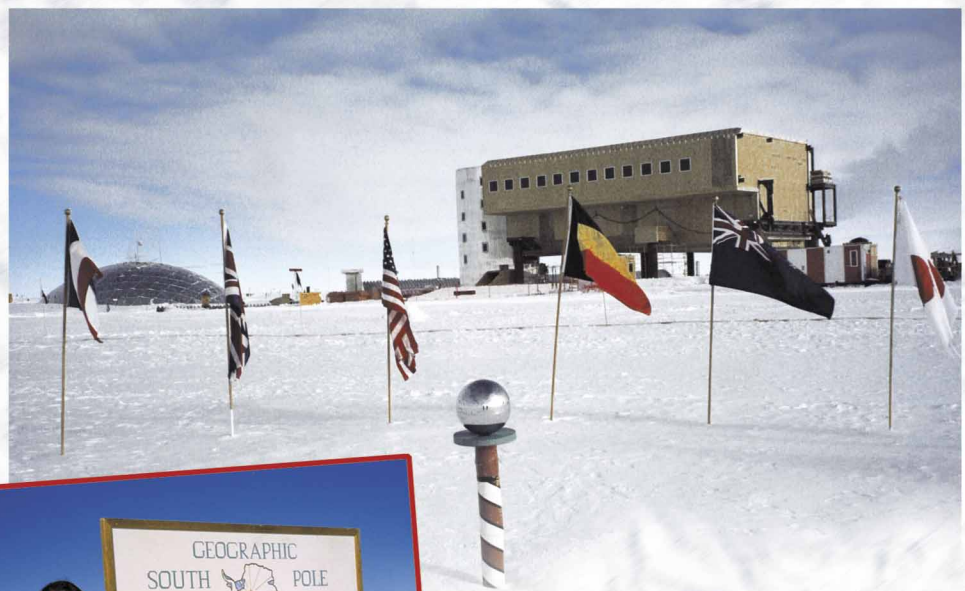
October 2001

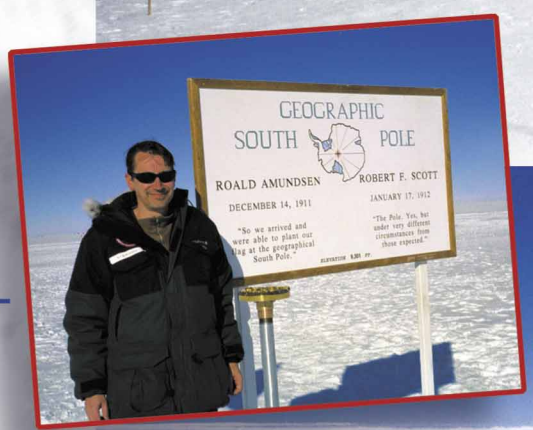
QST reviews • Ten-Tec 6N2 VHF multimode transceiver

The Micro M+ charge controller

An LPDA antenna for 2 meters

Uncle Albert's keyer





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QST *says this about the '2100H:*

"Those shopping for a wide variety of advanced features in an economically priced 2-meter mobile will find the ICOM IC-2100H worthy of serious consideration."– *QST, 1/99*

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Gordon West *says this about the '2800H:*

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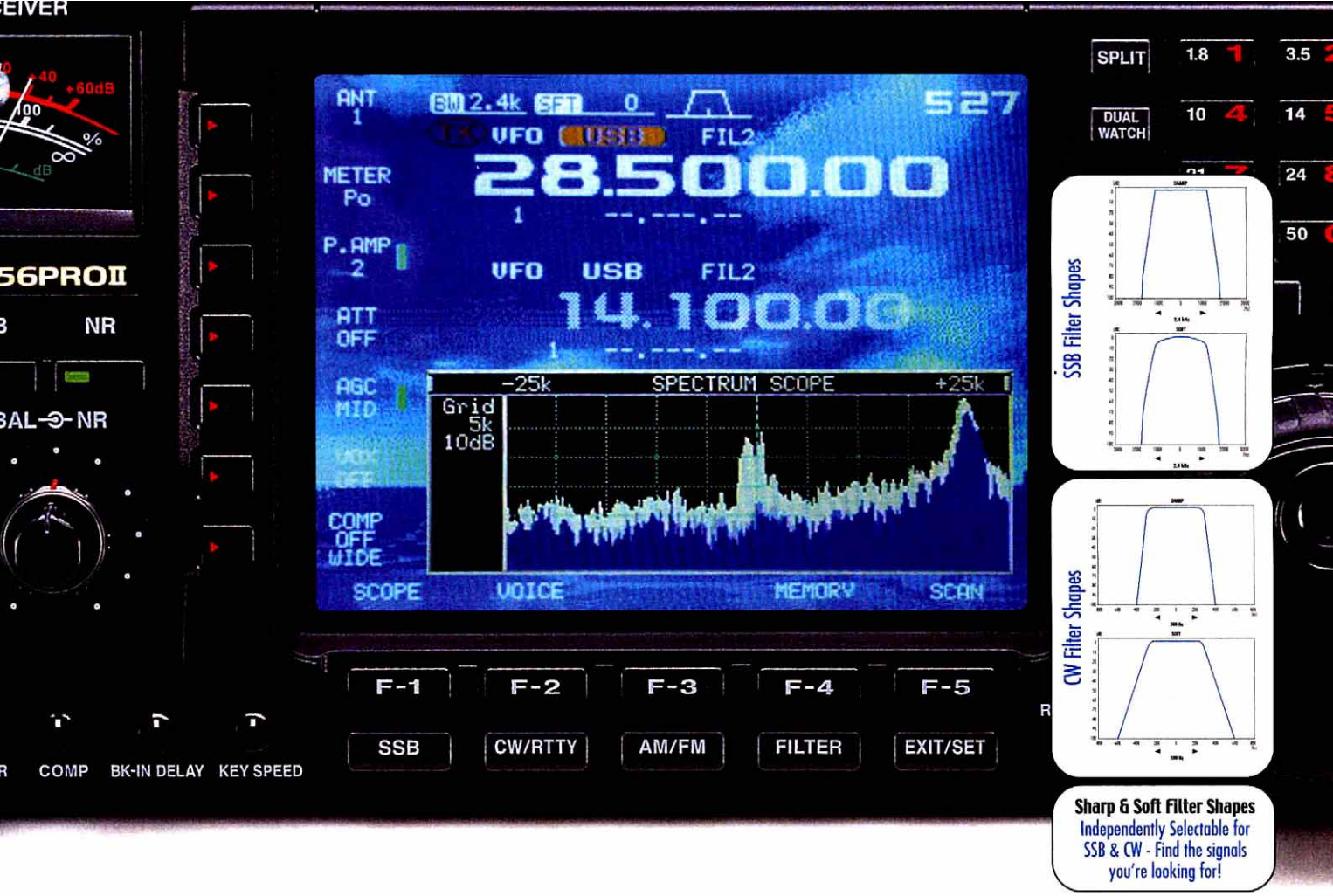

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Independently Selectable for SSB & CW - Find the signals you're looking for!

Pulling Signals Out Of The Air Just Got Easier.

The New IC-756PROII

This new HF/50 MHz all mode transceiver has the familiar look and feel of the '756PRO - but with the improvements and features that you requested most. Including selectable IF filter shape characteristics - sharp or soft shapes independently selectable for SSB and CW, improved 3rd IMD characteristics - making a dramatic improvement in receiver performance, one touch digital voice recorder playback - selectable even while displaying the bandscope, and much more. The 'PROII uses not only our latest digital technology, but also benefits from our superior experience in analog technology. To find out more about the 'PROII, see your authorized ICOM dealer today, visit www.icomamerica.com, or call our literature hotline at 425-450-6088.

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IC-756PROII Features
- Improved Third Order Intercept Point
- Improved Sensitivity Without Preamp
- Selectable IF Filter Shape
- Improved Noise Reduction
- Adjustable Level Noise Blanker
- Improved Bandscope Noise Floor
- Improved Audio Fidelity
- Enhanced Backlighting - better for dark rooms
- Enhanced 5" TFT Color Display

Digital User Features
- Digital & Voice modes store filter settings independently
- Compression no longer allowed in Digital Modes
- 1/4 Tuning Steps in Digital Mode
- Improved low-level volume control

Contester Features
- Fast, adjustable RIT clear
- SSB/CW "synchronous tuning"
- External control of Digital Voice Recorder Playback & Memory Keyer, selectable even while displaying the bandscope

The 'PROII has the familiar look and feel of the '756PRO - but with the improvements and features that you requested most!

This device has not been approved by the FCC. This device may not be sold or leased, or offered for sale or lease, until approval of the FCC has been obtained.

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- Analyzes and conditions battery packs.
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- Supports 1.2V to14.4V for NiMH & NiCD.
- Use optional holder for AA, AAA, C, D Battery cells.
- Digitally displays capacity.
- Digitally displays voltage.
- Digitally displays time.
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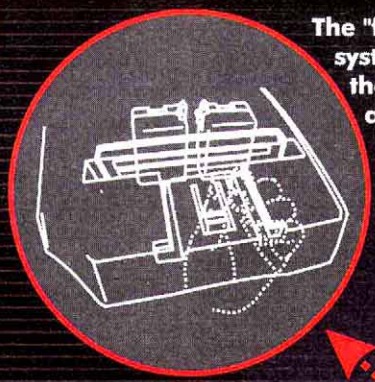

The "floating contact pins" system enables you to move the contact pins from left to right and top to bottom to charge almost any shape of battery pack.

Sample LCD read out during discharging, showing current voltage, time, and discharging capacity.

Sample LCD read out during charging. Shows current voltage, time, and charging capacity

FEATURES

- Analyzes and conditions battery packs.
- Supports Lithium Ion, NiMH and NiCD battery chemistries.
- Digitally displays capacity, voltage and time during charging and discharging.
- Supports a wide voltage range of 1.2V to 14.4V (1 to 12 cells) for NiMH & NiCD, and 3.6V to 14.4V (1 to 4 cells) for Lithium Ion.
- Special external charging connector allows you to charge a wide variety of batteries, including AA, AAA, C, D cells using optional battery holders.
- Intelligent microprocessor driven Negative Delta V detection, Zero Delta V and temperature sensor.
- Includes a light wight travel AC adapter (110/220V) and car kit.

SPECIFICATIONS

Detection: Negative Delta V, Zero Delta V, and tempture sensor.

Chemistry Supported: Li-Ion, NiMH, NiCD.

Voltage Supported: 1.2V to 14.4V (NiMH, NiCD), 3.6V to 14.4V (Li-Ion).

Rapid Charge Current: 800mAh +/-50mAh for NiMH & NiCD and 400 mAh max for Lithium Ion.

Trickle Charge Current: 70mA

Discharge Current: 300mA

Safety Timer: 13 Hours

Adapter: 100-240VCD 50/60Hz Auto switch to 24VDC 0.83A

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IC-R75

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30 kHz - 60.0 MHz

Commercial grade • synchronous AM detection (S-AM) • optional DSP with auto notch filter • all mode • triple conversion • twin passband tuning (PBT) • front mounted speaker • large display • well spaced keys and dials • 1000 memory channels • up to two optional filters • PC remote control with ICOM software for Windows®.

Limited time offers. See dealer for details.

"A versatile HF/6-meter receiver that offers a good measure of performance in a compact package. All mode capability for the ham and utility listeners and synchronous AM for the SWLs should make the IC-R75 a popular choice for a wide variety of radio enthusiasts." – QST, 1/00

IC-R10

Advanced performance and features

500 kHz – 1.3 GHz†

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

Excellent audio, tiny package

500 kHz – 1.3 GHz†

AM, FM, WFM • easy band switching • CTCSS decode • 400 memory channels • priority watch • MIL SPEC 810C/D/E • weather resistant • includes 2 AA Ni-Cds and charger.

IC-R3 VIDEO SCANNER

See and Hear all the action.

500 kHz – 2.45 GHz†

450 Memory Channels with Alphanumeric Names • CTCSS with Tone Scan • 4 Level Attenuator • Telescoping Antenna with BNC Connector • Four Way Action Joystick • Lithium Ion Power • 2" Color TFT Display with Video/Audio Output.

"Wide tuning range allows you to see and hear the excitement behind the scenes. Large easy to read color display for frequency settings and video reception. All in a compact easy to carry package. Perfect for sporting events and commercial uses."

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IC-PCR1000

The original "black box" is still best

100 kHz – 1.3 GHz†

AM, FM, WFM, USB, LSB, CW • unlimited memory channels • real time band scope • IF shift • noise blanker • digital AFC • "VSC" voice scan control (when activated, stops only on modulated signals) • attenuator • tunable bandpass filters • AGC function • S meter squelch • CTCSS tone squelch • large selection of tuning steps and scans • external speaker level control • DSP optional • download and demo the latest software for free at <www.icomamerica.com>

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

IC-PCR100

Much like its big brother, but for less

100 kHz – 1.3 GHz†

AM, FM, WFM • many of the same features and performance as the IC-PCR1000 • designed for Windows® 95 or 98 • download and demo the latest free, full version software today: <www.icomamerica.com>

IC-R8500

The experts choice

100 kHz - 2.0 GHz†

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"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

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October 2001 ♦ Volume 85 Number 10

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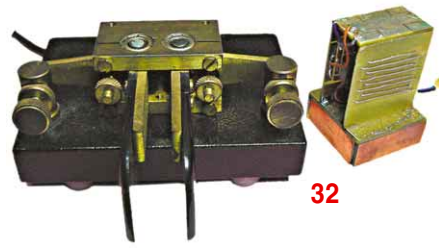
Technical



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News and Features

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QST Workbench

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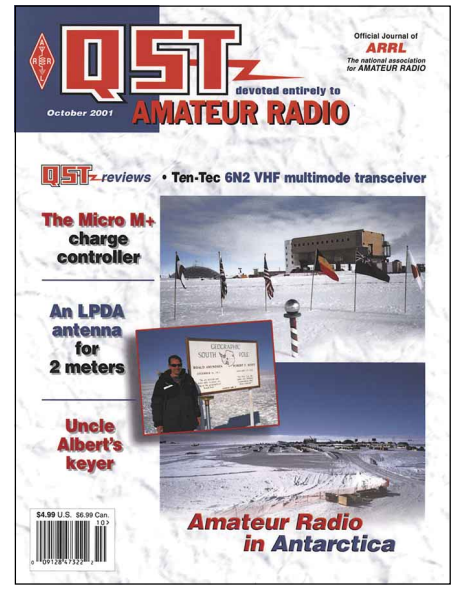
Operating

Departments



Our Cover:
Operating from the bottom of the Earth is a special experience, and the author is one of the few Amateur Radio operators who have had the privilege. Nick Powell's story begins on page 50.

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $39. Age 65 and over, with proof of age, $34. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the rate of $20. Life Membership, including a subscription to *QST* is available at $975.* Age 65 and over, $850.* Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Subscription rate for libraries and institutions is $39 per year. Single copies $5.

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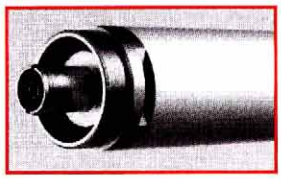
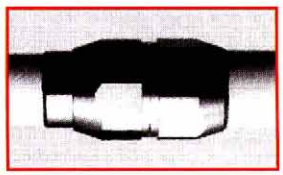
X500HA (UHF-Conn.)
X500HNA (Type-N Conn.)
Ruggedized Base/Repeater Antenna



COAX CONNECTION AT BASE END

HEAVY DUTY BASE/ RADIAL ASSEMBLY



STRONG JOINT COUPLINGS

X50NA

The X50NA is an excellent choice where ruggedness is required in a medium–gain, dual-band, base/repeater application.

Features

- Wide frequency bandwidth
- Heavy duty fiberglass radome
- Stainless steel mounting hardware and radials
- Type–N Cable connection
- Compact size for easy mounting/ installation

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 135 MPH (no ice)
Height: 5.6 feet

X500HNA

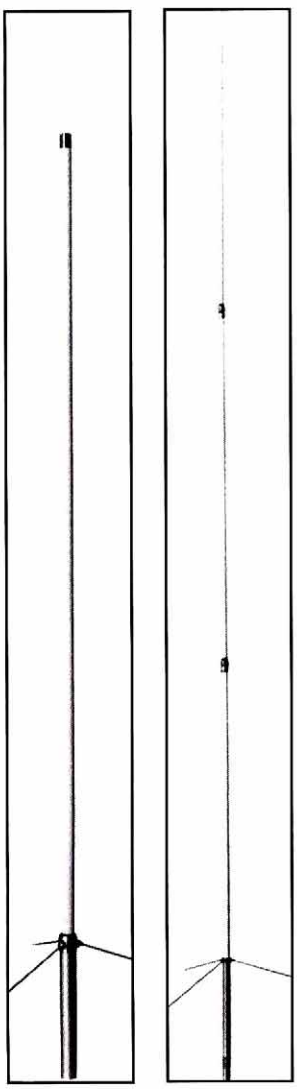
Diamond Antenna's best base station repeater antenna. Designed for strength and performance, the X500HNA is pretuned to achieve maximum gain in both the 2m and 70cm amateur bands.

Features

- Heavy duty fiberglass radome
- Overlapping outer shells for added strength
- Stainless steel mounting hardware and radials
- Strong–waterproof joint couplings
- Type–N Cable connection
- Wide band performance

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 90 MPH (no ice)
Height: 17.8 feet



X50NA ***X500HNA***

DIAMOND Mono-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
CP22E [1]	144	200	UHF	9.0	90
DPGH62 [1,6]	50	200	UHF	21.0	78
F22A	144	200	UHF	10.5	112
F23A	144	200	UHF	15.0	90
F718A [2]	440	250	N	15.0	90

DIAMOND Dual-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
X50A	144/440	200	UHF	5.6	135
X50NA	144/440	200	N	5.6	135
X200A	144/440	200	UHF	8.3	112
X510NA [3]	144/440	200	N	17.2	90
X510MA	144/440	200	UHF	17.2	90
X500HNA	144/440	200	N	17.8	90+
X700HNA	144/440	200	N	24.0	90
X2200A	144/222	150	UHF	11.5	112
U200	440/1240	100	N	5.9	135

DIAMOND Tri-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
U5000A	144/440/1240	100	N	5.9	135
V2000A [4,6]	52/144/440	150	UHF	8.3	110
X3200A [5]	146/222/440	100/200	UHF	10.5	112
X6000A	144/440/1240	100/60	N	10.5	112

1 Heavy duty aluminum construction.
2 F-718A: 440-450MHz., F718L: 420-430MHz.
3 X510NJ: 144-147/430-440MHz.
4 1/4λ. rated in dBi. Most requirement: 1.4"-2.4".
5 2m: 146-148; 100 watts
6 52-54MHz. only; DPGH62 adjustable from 50-54MHz.

BAND: 144=144-148MHz., 222=222-225MHz., 420=420-430MHz.,430=430-440MHz., 440=440 450MHz., 1240=1240-1300MHz.

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144
220
+440

Everything adds up: Kenwood's new FM Tribander (144/220/440MHz) offers dual-channel RX capability and prime performance in a superbly compact design.

- Receives 2 frequencies simultaneously even on the same band
- 0.1~1300MHz high-frequency range RX (B band)[1]
- FM/FM-W/FM-N/AM plus SSB/CW receive
- Bar antenna for receiving AM broadcasts
- Special weather channel RX mode
- 435 memory channels, multiple scan functions
- 7.4V 1550mAh lithium-ion battery (std.) for high output[2] and extended operation
- 16-key pad plus multi-scroll key for easy operation
- Built-in charging circuitry for battery recharge while the unit operates from a DC supply
- Tough construction: meets MIL-STD 810 C/D/E standards for resistance to vibration, shock, humidity and light rain
- Large frequency display for single-band use
- Automatic simplex checker
- Wireless remote control function
- Battery indicator • Internal VOX • MCP software

[1] Note that certain frequencies are unavailable. [2] 5W output

"Specifications subject to change without notice."

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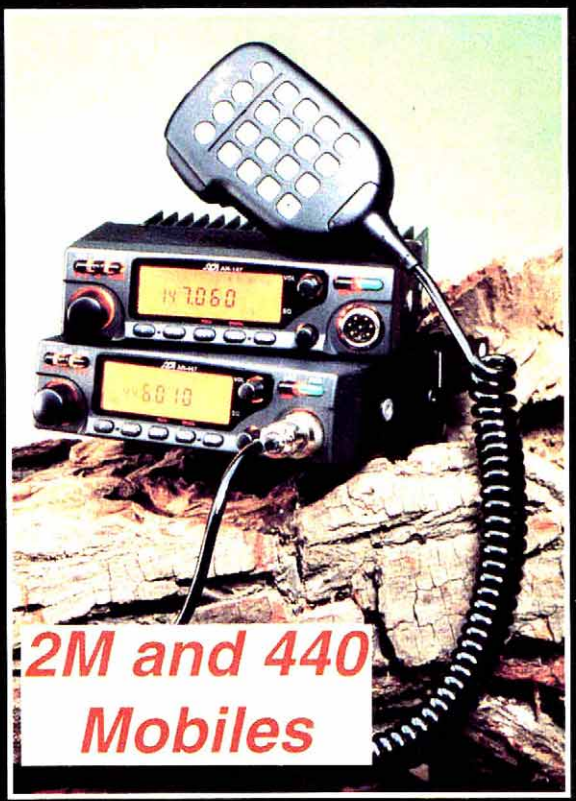

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"IT SEEMS TO US..."

Logbook of the World

Picture this. You're winding down after a satisfying evening of operating. You have said hello to a couple of old friends, caught a brief sporadic-E opening on 6 meters, picked up a new country on 17 meters, and nabbed a new IOTA island on 20. Better still, the LU you worked on 17 meters said you were a new state for him on that band—it's more blessed to give than to receive! There's just one more thing to do before you turn off the power in the ham shack and call it a night.

As you close your computer logging program a prompt appears on the screen: "Upload to *Logbook of the World*?" You click "Yes" and wait for a few seconds until you see "Upload Successful!" Then you shut down for a good night's sleep.

The next morning you visit the ARRL Web site. You check your personal Confirmation Database and find that three of the new grids you worked on 6 and the new 17-meter country are already confirmed. The IOTA island will take a bit longer, of course—they don't have a live Internet connection. Best of all, your new Argentine friend also shows as a confirmed contact; he already has claimed the credit he said he needed from you. You will send him a paper QSL anyway, via the bureau, because it's the first time the two of you have worked and you would like to have his card as a memento of your initial contact. In fact, you can afford a nicer printed card than you used to use because you don't have to send as many.

Or this. You have just finished an intense weekend of DX contest operating. Thanks to the contest logging software that has been in virtually universal use for a decade, the "paperwork" required to submit your entry will take just a few minutes to prepare—but the QSL cards for those 10-second contacts will dribble in for years via the bureau. Wouldn't it be nice if you could confirm the contacts for all those Japanese and German stations that want your county as easily as you will submit your contest entry? Thanks to *Logbook of the World*, soon you can.

Finally, try this on for size. The biggest DXpedition of 2003 has just reached the mainland after two weeks on an island and several days at sea. In a few minutes their log will be uploaded and you will immediately pick up several new credits toward your DXCC Challenge. You were worried that they might not participate in *Logbook of the World* for fear that it would reduce the flow of "green stamps" required to offset some of the cost of the expedition. Fortunately, an earlier expedition proved that would not be the case. Expeditions cannot charge for a confirmation; that's unethical. But if the confirmation is free via *Logbook of the World* they can charge for a special commemorative card, and DXers are happy to pay a reasonable amount for a tangible, permanent, personalized souvenir of a significant event.

These are just a few of the ways that the ARRL *Logbook of the World* will change Amateur Radio operating forever. The concept is simple: to collect data on as many Amateur Radio contacts from as many logbooks as possible, store the entries that match in a Confirmed QSO Database, and use the Database to provide immediate operating award credits for DXCC and many other awards programs. The difficult part was figuring out how to implement it so it would be both easy to use and secure, to ensure that only logbook entries from valid sources are accepted. After months of bouncing "what-ifs" off one another, the design team settled on the best approach and submitted its recommendations to two committees of the ARRL Board, Membership Services and Administration & Finance. The committees endorsed the recommendations, the Board unanimously voted to authorize staff to proceed, and the rest will be history.

We say "will be" because a lot of work remains. Software doesn't write itself. Logging software vendors will be updating their products to generate the files required for *Logbook of the World*. In return for their investment they should see a significant increase in the number of amateurs who use logging software. Volunteers are working on a library of software to help the logging software vendors interface their products with *Logbook*. In parallel, ARRL staff is working on the application software required to manage the huge database that *Logbook* will require. By this time next year, perhaps sooner, everything should be in place and *Logbook* will be a reality.

Our goal is a system that is secure as possible while being as transparent as possible to you, the end user. To some extent these are mutually exclusive goals. From many years of experience we know that DXCC participants in particular place a very high value on the integrity of the DXCC program. We're confident that *Logbook* will represent a great improvement in both integrity and ease of use over traditional QSO confirmation procedures, while at the same time dramatically reducing the cost of participation in awards programs.

Despite the advantages of an electronic confirmation system, the postcard-sized QSL card that has been around for 80 years will not disappear. As long as there are radio amateurs who value tradition, the QSL card will remain the final courtesy of an initial or particularly memorable contact. In other words, as long as there are radio amateurs.
—David Sumner, K1ZZ

[For more on *Logbook of the World*, see the "How's DX?" column on page 88.]

We're At Your Service

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

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Scholarships	Mary Lau	860-594-0230	foundation@arrl.org
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ARRL Directors

Atlantic Division
BERNIE FULLER, N3EFN
17668 Price Rd, Saegertown, PA 16433
(814-763-1529);
n3efn@arrl.org
Vice Director: William C. Edgar, N3LLR, 22 Jackson Ave., Bradford, PA 16701 (814-362-1250); n3llr@arrl.org

Central Division
GEORGE R. ISELY, W9GIG
736 Fellows Street, St Charles, IL 60174 (630-584-3510);
w9gig@arrl.org
Vice Director: Howard S. Huntington, K9KM, 25350 N Marilyn Ln, Hawthorn Woods, IL 60047 (847-438-3452);
k9km@arrl.org

Dakota Division
JAY BELLOWS, K0QB
997 Portland Ave, St Paul, MN 55104
(651-983-2420); k0qb@arrl.org
Vice Director: Twila Greenheck, N0JPH, 3333 Owasso Heights Rd, Shoreview, MN 55126 (651-483-1214);
n0jph@arrl.org

Delta Division
RICK RODERICK, K5UR
PO Box 1463, Little Rock, AR 72203
(501-988-2527); k5ur@arrl.org
Vice Director: Henry R. Leggette, WD4Q, 7335 Ginger Snap Cove, Memphis, TN 38125-4732
(901-757-0444); wd4q@arrl.org

Great Lakes Division
GEORGE RACE, WB8BGY
3865 Gibbs Rd, Albion, MI 49224
(517-531-4758);
wb8bgy@arrl.org
Vice Director: Gary L. Johnston, KI4LA, 3056 Hergott Dr, Edgewood, KY 41017-3377
(859-341-7477); ki4la@arrl.org

Hudson Division
FRANK FALLON, N2FF*
30 E Williston Ave, East Williston, NY 11596 (516-746-7652);
n2ff@arrl.org
Vice Director: Stephen A. Mendelsohn, W2ML, 318 New Milford Ave, Dumont, NJ 07628 (201-384-0570);
w2ml@arrl.org

Midwest Division
WADE WALSTROM, W0EJ
7431 Macon Dr, Cedar Rapids, IA 52411 (319-393-8982); w0ej@arrl.org
Vice Director: Bruce Frahm, K0BJ, PO Box DX, Colby, KS 67701
(785-462-7388); k0bj@arrl.org

New England Division
TOM FRENAYE, K1KI*
PO Box 386, West Suffield, CT 06093
(860-668-5444); k1ki@arrl.org
Vice Director: Mike Raisbeck, K1TWF, 85 High St, Chelmsford, MA 01824
(978-250-1235); k1twf@arrl.org

Northwestern Division
GREG MILNES, W7OZ
740 SE 24th Ave, Hillsboro, OR 97123-7286 (503-648-6990);
w7oz@arrl.org
Vice Director: Jim Fenstermaker, K9JF, 10312 NE 161st Ave, Vancouver, WA 98682 (360-256-1716); k9jf@arrl.org

Pacific Division
JIM MAXWELL, W6CF,
PO Box 473, Redwood Estates, CA 95044 (408-353-3911);
w6cf@arrl.org
Vice Director: Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (510-537-6704);
w6rgg@arrl.org

Roanoke Division
DENNIS BODSON, W4PWF
233 N Columbus St, Arlington, VA 22203 (703-243-3743);
w4pwf@arrl.org
Vice Director: Leslie Shattuck Sr, K4NK, 127 Henderson St, Greenville, SC 29611 (864-421-0732);
k4nk@arrl.org

Rocky Mountain Division
WALT STINSON, W0CP,
5295 E Evans Ave, Denver, CO 80222-5221 (303-770-3926);
w0cp@arrl.org
Vice Director: Warren G. "Rev" Morton, WS7W, 1341 Trojan Dr, Casper, WY 82609 (307-235-2799);
ws7w@arrl.org

Southeastern Division
FRANK M. BUTLER JR, W4RH*
323 Elliott Rd SE, Ft Walton Beach, FL 32548 (850-244-5425);
w4rh@arrl.org
Vice Director: Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125 (305-642-4139);
w4wyr@arrl.org

Southwestern Division
FRIED HEYN, WA6WZO*
962 Cheyenne St, Costa Mesa, CA 92626 (714-549-8516);
wa6wzo@arrl.org
Vice Director: Art Goddard, W6XD, 2901 Palau Pl, Costa Mesa, CA 92626 (714-556-4396);
w6xd@arrl.org

West Gulf Division
COY C. DAY, N5OK
RR1, Box 254, Union City, OK 73090-9726 (405-483-5632);
n5ok@arrl.org
Vice Director: Dr David Woolweaver, K5RAV, 2210 S. 77 Sunshine Strip, Harlingen, TX 78550 (956-425-3128);
k5rav@arrl.org

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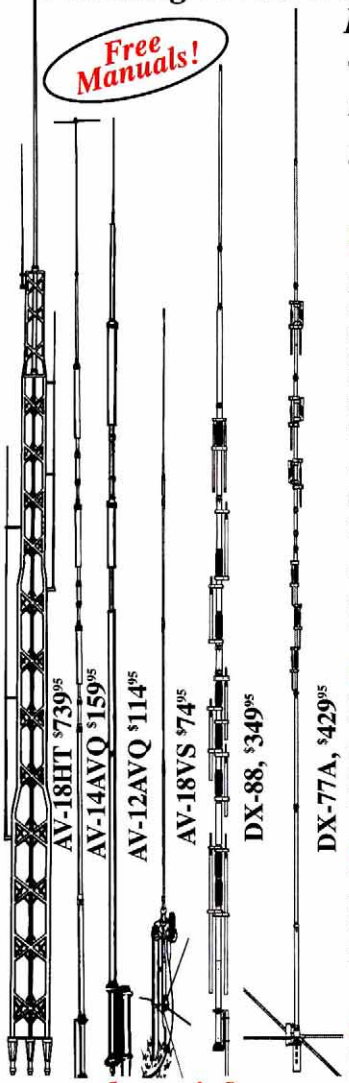

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They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

All handle 1500 Watts PEP SSB, have low SWR, automatic band-switching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.

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Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. With the addition of a base loading coil (LC-160Q, $99.95), it also provides exceptional 160 Meter performance.

The 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising and lowering.

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AV-12AVQ, $114.95. (10, 15, 20 Meters). 13 ft., 9 lbs. The AV-12AVQ also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $79.95.

AV-18VS, $74.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. High quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $79.95.

DX-88, $349.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs. All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $179.95. Ground Radial System, GRK-88, $81.95. Roof Radial System, RRK-88, $89.95.

DX-77A, $429.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs. *No ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$739.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$159.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$114.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$74.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$349.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$429.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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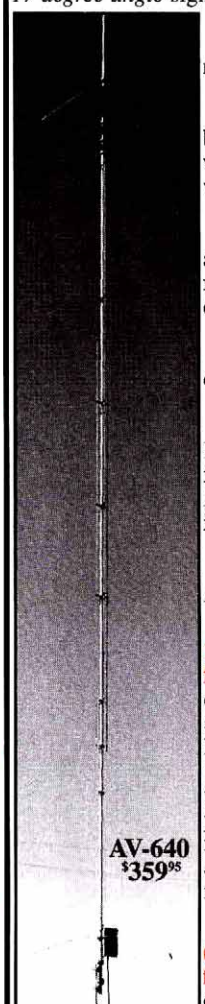

No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

Single coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

Sleek and low-profile

Low 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

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Handles 1500 Watts key down continuous for two minutes.

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AV-620, $269.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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Atlantic Division

Delaware	Randall K. Carlson, WB0JJX, 121 Scarborough Park Dr, No. 10, Wilmington, DE 19804 (302-655-6179); **wb0jjx@arrl.org**
Eastern Pennsylvania	Eric Olena, WB3FPL, RR5 Box 5687, Mohnton, PA 19540 (610-775-0526); **wb3fpl@arrl.org**
Maryland-DC	Tom Abernethy, W3TOM, 1133 Apple Valley Rd, Accokeek, MD 20607 (301-292-6263); **w3tom@arrl.org**
Northern New York	Thomas Dick, KF2GC, 4 Jenkins St, Saranac Lake, NY 12983 (518-891-0508); **kf2gc@arrl.org**
Southern New Jersey	Jean Priestley, KA2YKN, 7158 Chandler Ave, Pennsauken, NJ 08105 (856-662-3587); **ka2ykn@arrl.org**
Western New York	Scott Bauer, W2LC, 1964 Connors Rd, Baldwinsville, NY 13027 (315-638-7551); **w2lc@arrl.org**
Western Pennsylvania	John V. Rodgers, N3MSE, 803 S Main St, Butler, PA 16001-6326 (724-287-0424); **n3mse@arrl.org**

Central Division

Illinois	Bruce Boston, KD9UL, 815 E 3rd St, Beardstown, IL 62618 (217-323-2611); **kd9ul@arrl.org**
Indiana	Peggy Coulter, W9JUJ, 12330 SCR 200 E, Muncie, IN 47302 (765-288-0481); **w9juj@arrl.org**
Wisconsin	Donald Michalski, W9IXG, 4214 Mohawk Dr, Madison, WI 53711 (608-274-1886); **w9ixg@arrl.org**

Dakota Division

Minnesota	Randy "Max" Wendel, KM0D, 8539 Bryant Ave S, Bloomington, MN 55420-2147 (952-888-5953); **km0d@arrl.org**
North Dakota	Kent Olson, KA0LDG, 7702 Forest River Rd, Fargo, ND 58104-8004 (701-298-0956); **ka0ldg@arrl.org**
South Dakota	Roland Cory, W0YMB, 815 2nd Ave W, Mobridge, SD 57601 (605-845-2400); **w0ymb@arrl.org**

Delta Division

Arkansas	Bob Ideker, WB5VUH, 103 Duquesne Ct, Little Rock, AR 72223 (501-868-8847); **wb5vuh@arrl.org**
Louisiana	Mickey Cox, K5MC, 754 Cheniere-Drew Rd, West Monroe, LA 71291 (318-397-1980); **k5mc@arrl.org**
Mississippi	Malcolm Keown, W5XX, 14 Lake Circle Dr, Vicksburg, MS 39180 (601-636-0827); **w5xx@arrl.org**
Tennessee	O. D. Keaton, WA4GLS, 141 Medearis Dr, Old Hickory, TN 37138 (615-758-2329); **wa4gls@arrl.org**

Great Lakes Division

Kentucky	John D. Meyers, N4GNL, 110 Cory Ln, Butler, KY 41006-9740 (859-472-6690); **n4gnl@arrl.org**
Michigan	Richard Mondro, W8FQT, 800 Dover St, Dearborn Heights, MI 48127 (313-730-2111); **w8fqt@arrl.org**
Ohio	Joseph J. Phillips, K8QOE, 2800 Jupiter Dr, Fairfield, OH 45014-5022 (513-874-0006); **k8qoe@arrl.org**

Hudson Division

Eastern New York	Pete Cecere, N2YJZ, 378 Ohayo Mtn Rd, Woodstock, NY 12498 (845-679-9846); **n2yjz@arrl.org**
NYC-Long Island	George Tranos, N2GA, PO Box 296, Bellport, NY 11713, (631-286-7562); **n2ga@arrl.org**
Northern New Jersey	William Hudzik, W2UDT, 111 Preston Dr, Gillette, NJ 07933 (908-580-0493); **w2udt@arrl.org**

Midwest Division

Iowa	Jim Lasley, N0JL, PO Box 5, Chillicothe, IA 52548 (641-935-4337); **n0jl@arrl.org**
Kansas	Orlan Q. Cook, W0OYH, 12110 West 71st St, Shawnee, KS 66216 (913-631-0423); **w0oyh@arrl.org**
Missouri	Dale C. Bagley, K0KY, PO Box 13, Macon, MO 63552-1822 (660-385-3629); **k0ky@arrl.org**
Nebraska	Bill McCollum, KE0XQ, 1314 Deer Park Blvd, Omaha, NE 68108 (402-734-3316); **ke0xq@arrl.org**

New England Division

Connecticut	Betsey Doane, K1EIC, 92 Mohegan Rd, Shelton, CT 06484-2448 (203-929-7759); **k1eic@arrl.org**
Eastern Massachusetts	Phil Temples, K9HI, Apt. 808, 125 Coolidge Ave, Watertown, MA 02472-2875 (617-926-5986); **k9hi@arrl.org**
Maine	William Woodhead, N1KAT, 63 1st Ave, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**
New Hampshire	Al Shuman, N1FIK, PO Box 119, Goffstown, NH 03045-0119 (603-487-3333); **n1fik@arrl.org**
Rhode Island	Armand E. Lambert, K1FLD, 144 Summer St, Woonsocket, RI 02895 (401-762-0536); **k1fld@arrl.org**
Vermont	Bob DeVarney, WE1U, 33 Harborview Rd, Apt 802, S Burlington, VT 05403; **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, 21440 Falling Water Cir, Eagle River, AK 99517 (907-243-5856); **kl5t@arrl.org**
Eastern Washington	Kyle Pugh, KA7CSP, W 5006 Houston Ave, Spokane, WA 99208 (509-327-5039); **ka7csp@arrl.org**
Idaho	Michael Elliott, K7BOI, 11286 West Hickory Dale Dr, Boise, ID 83713-1028 (208-376-3458); **k7boi@arrl.org**
Montana	Darrell Thomas, N7KOR, 743 33rd Ave NE, Great Falls, MT 59404 (406-453-8574); **n7kor@arrl.org**
Oregon	William Sawders, K7ZM, 19821 Ponderosa St, Bend, OR 97702 (541-389-6258); **k7zm@arrl.org**
Western Washington	Harry Lewis, W7JWJ, 10352 Sand Point Way NE, Seattle, WA 98125 (206-523-9117); **w7jwj@arrl.org**

Pacific Division

East Bay	Andy Oppel, N6AJO, 1308 Burbank St, Alameda, CA 94501-3946 (510-523-3953); **n6ajo@arrl.org**
Nevada	Jan Welsh, NK7N, 59 Constitution Ave, Henderson, NV 89015-5702 (702-565-0242); **nk7n@arrl.org**
Pacific	Ronald Phillips, AH6HN, HCR 2 Box 6637, Keaau, HI 96749 (808-982-6513); **ah6hn@arrl.org**
Sacramento Valley	Jerry Boyd, K6BZ, PO Box 252, Igo, CA 96047 (530-396-2256); **k6bz@arrl.org**
San Francisco	Leonard Gwinn, WA6KLK, 2960 Blackhawk Dr, Willits, CA 95490-9704; **wa6klk@arrl.org**
San Joaquin Valley	Donald Costello, W7WN, 1900 N Ashby Rd, No. 9, Merced, CA 95348 (209-383-5739); **w7wn@arrl.org**
Santa Clara Valley	Glenn Thomas, WB6W, 502 Walnut Dr, Milpitas, CA 95035-4133 (408-263-9450); **wb6w@arrl.org**

Roanoke Division

North Carolina	John Covington, W4CC, PO Box 217122, Charlotte, NC 28221(704-577-9405); **w4cc@arrl.org**
South Carolina	Patricia Hensley, N4ROS, 164 N Main St PO Box 70, Richburg, SC 29729-0070 (803-789-5810); **n4ros@arrl.org**
Virginia	Carl Clements, W4CAC, 4405 Wake Forest Rd, Portsmouth, VA 23703 (757-484-0569); **w4cac@arrl.org**
West Virginia	Hal L. Turley, KC8FS, 657 Forest Circle, S Charleston, WV 25503 (304-744-5949); **kc8fs@arrl.org**

Rocky Mountain Division

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

Southeastern Division

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

Southwestern Division

Arizona	Clifford Hauser, KD6XH, 8741 N Hollybrook Ave, Tucson, AZ 85742 (520-744-9095); **kd6xh@arrl.org**
Los Angeles	Phineas J. Icenbice Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186); **w6bf@arrl.org**
Orange	Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (909-687-8394); **w6ubq@arrl.org**
San Diego	Tuck Miller, NZ6T, 3122 E 2nd St, National City, CA 91950 (619-434-4211); **nz6t@arrl.org**
Santa Barbara	Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

West Gulf Division

North Texas	Larry Melby, KA5TXL, 8841 Lavalle Ln, Dallas, TX 75243 (214-348-5283); **ka5txl@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	Clay Emert, K5TRW, 109 Pasodale Rd, El Paso, TX 79907-6009 (915-859-5502); **k5trw@arrl.org**

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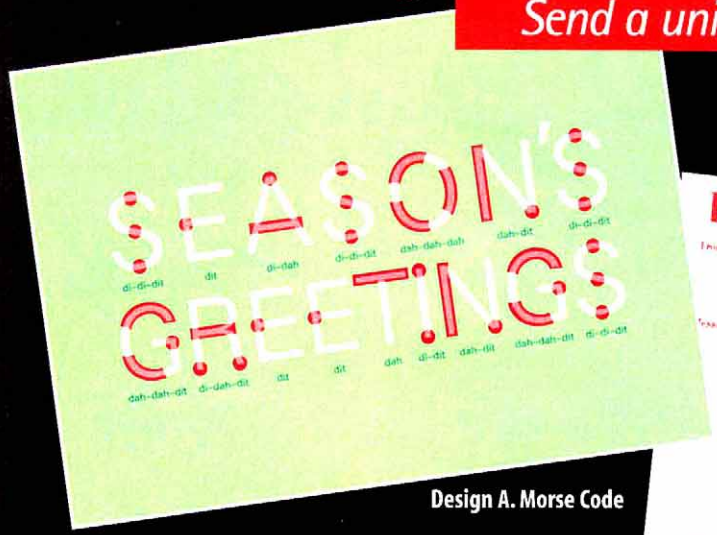
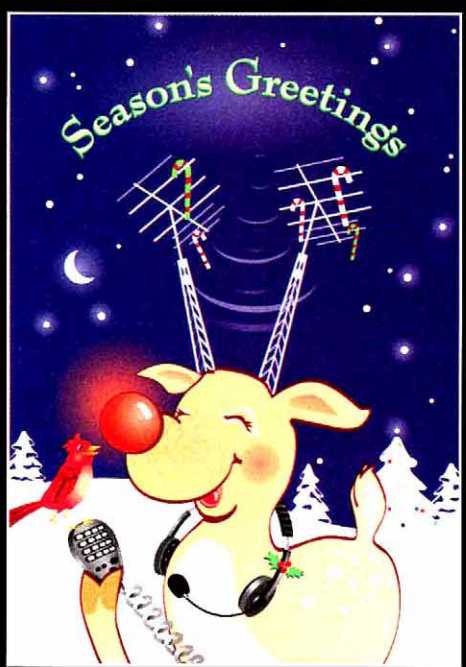


Design A. Morse Code

Reverse side for all cards



Design B. Radio Rudolph

Design C. Mobile Santa

Design D. Holiday Hams

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Affordable Multi-Mode 6 Meters

You just got your ham ticket, the club has been looking at increasing 6 Meter activity or it's just time to get away from 2 meters. You look at the ads, check the bank account and figure, maybe next year...Not anymore!

Need a reliable rig for 6-meter band openings or public service and emergency operations? Wondering why you have to pay for bands you don't plan to or can't use with your present license?

We have the answer.

Ranger Communications again sets the standard for value with a multi-mode, 6 Meter transceiver that is long on performance and short on price. The RCI-5054DX is perfect for the newly licensed ham who wants to try his hand at local FM operation as well as the experienced DX enthusiast who wants an economical SSB or CW 6 meter rig featuring a quiet receiver, all-mode squelch, extensive shielding and the performance and reliability that up to now you could only get with the multi band "high dollar" rigs.

The RCI-5054DX covers the full 6 meter band with an output power of 10W RMS or 25W PEP. Like the popular RCI-2950DX 10 & 12 Meter rig, the RCI-5054DX also has programmable repeater split (up to ±2 MHz in this model), optional CTCSS tone, 10 frequency memory and two programmable scanning modes. Add a large easy to read display and you have the perfect rig for home, mobile or field day. At a suggested retail price of only $329.00, the RCI-5054DX is an excellent buy for new or old hams alike.

Come see the new RCI-5054DX at the Ham Radio store near you. Don't know where? Call us Toll Free for help in finding the dealer nearest you.

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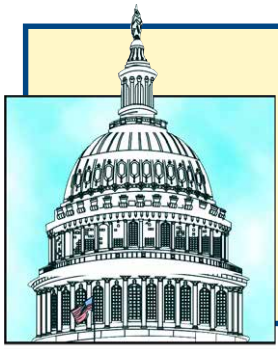

DC Currents

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.

ARRL Members Needed to Help with CC&R Effort

Have you ever been denied the ability to put up an antenna, or to operate a radio transmitter, or had any other restriction on your Amateur Radio activities because you live in a housing development or condominium complex governed by private land use regulations? (These are often referred to by lawyers and real estate professionals as *CC&Rs*.) As a result of requests from members, the ARRL Board of Directors, at its July meeting, adopted a goal of trying for legislative action that helps overcome the unreasonable restrictions of CC&Rs that prohibit or restrict Amateur Radio antennas.

Like any other telecommunications issue, this one, upon closer inspection turns out to quite entangled with many issues affecting a wide range of commercial telecommunications services. These include wire-line telephone, cellular and PCS phones, and over-the-air-receiving-devices, all seasoned by the politically hot-pepper issue of private property rights, and, of course, a great deal of confusion on Capitol Hill over the whole thing.

In order to build awareness in Congress that CC&Rs really have become a problem for many in the Amateur Radio community, and to backstop our efforts to meet with elected representatives and their staff on Capitol Hill, letters from ARRL members to their representatives have become increasingly important. In the meantime, we continue to prowl the halls of Congress in search of supporters!

If you are affected by a CC&R, or know someone in your Congressional district who is, and you want to help out, please adapt our sample letter to your own situation and consider sending it to your member of Congress. By the time you read this, there will be a sample of the letter on *ARRLWeb* to save you some time. If you decide to write to your member of Congress, it would help ARRL's Office of Legislative Affairs to receive a copy of the letter you send. To find your Senator's mailing address check the following URL: **www.senate.gov/contacting/index.cfm**. To find your Representative's, check this URL: **www.house.gov/writerep/**.

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United States House of Representatives
Washington, DC 20515
or
Office of (Name)
United States Senate
Washington, DC 20510

_____, 2001

The Hon _____
_____House (or Senate) Office Building
Washington, DC 20515

Re: Congressional Assistance In FCC Matter

Dear Representative _____:

I am writing to ask for your assistance in a matter that is important to our Congressional District.

In our Congressional District and in our State, the Amateur Radio Service provides emergency communication where existing communication may be disrupted by flood, hurricane, tornado, earthquake, brushfire, or other disasters. FEMA, the American National Red Cross, the Salvation Army and other groups have letters of agreement with our national association, the American Radio Relay League (ARRL) to cooperate when disaster strikes. Both Congress and the FCC have repeatedly noted the strong Federal interest in promoting Amateur Radio communication (See, for example, P.L. 103-408 and P.L. 100-594).

But an unexpected anomaly in a growing number of private land use agreements is making the communication capability offered by Amateur Radio unavailable in a growing number of communities. Because of certain "boilerplate" clauses in real estate purchase agreements in some new housing developments, legitimate licensed Amateur Radio operators are being denied the right to put up even the most unobtrusive antenna, sometimes even if the antenna is completely hidden!

Last year the ARRL filed an Application for Review (RM-8763) with the Federal Communications Commission requesting that the FCC clarify its "reasonable accommodation" policy regarding private land use regulation of Amateur Radio antennas. So far, the FCC has not acted promptly or favorably in this matter.

As one of your constituents who is an Amateur Radio licensee, I am requesting your assistance and possible intervention.

Here's why: In 1985, the FCC balanced the interests of town land use authorities to maintain local zoning by requiring them to exercise "reasonable accommodation" to requests from Amateur Radio homeowners to install some form of antenna on their own property, thus acknowledging limited federal interest in permitting Amateur Radio licensees to set up antennas. 47 C.F.R. §97.15(b).

The policy has been very successful and has generally led to tasteful yet effective installations as towns and residents work together reasonably. But so far, the FCC has been reluctant to apply that same national policy to private land use regulations. ARRL's requests that the Commission revisit the issue and reconsider its have repeatedly been denied.

The ARRL's request is modest and does not expand existing policy. It would require only that homeowner associations make "reasonable accommodation" (the same flexible and not intrusive standard required of towns) for antennas for Amateur Radio homeowners in subdivisions. It intrudes far less on the authority of planned communities than do other Federal policies governing telecommunications facilities, and recognizes the legitimate concerns of homeowner associations.

If you would like more information from me or our national association, please contact me at the address below, or contact ARRL's legislative liaison Steve Mansfield at ARRL headquarters in Connecticut at 860 594-0240.

Yours very truly,
Your name, Amateur Radio Call Sign _____
Street Address
City, State, ZIP

Spectrum Bill Shining or Declining?

♦ While spectrum reform in favor of Amateur Radio has always been a long shot, whether several sessions ago or this legislative session, House and Senate bills have generally remained non-controversial and certainly non-partisan. There has always been sufficient interest to keep us crashing back into the scrum during each session as we gather supporters (cosponsors) and get a "foot in the door" on The Hill.

However, each session the odds against Congress actually moving the bill forward through the two houses and onto the President's desk seem to waver, even as the evidence accumulates (see related articles on pages 80 and 81 of this issue) that such a bill may actually be necessary to Amateur Radio.

But whatever the odds, and no matter how many buckets of money are being poured into lobbying by the large commercial telecommunications providers in protection of (or in search of) their own spectrum, the Amateur Radio Spectrum Protection Act, S.549 introduced in the Senate by the kindness of Idaho Senator Michael Crapo (R-ID) and HR.817 introduced in the House by Amateur Radio's friend Representative Michael Bilirakis (R-FL-9th), has gathered more cosponsors since we discussed it here previously.

In spite of this perceptible forward motion, hopeful hams must keep in mind that the topic of "spectrum" may be another of the so-called "third rails" of politics these days (like Social Security, Medicaid and other topics too technical and complicated for more than a few members of Congress to understand). Even so, HR 817, when we last reported its status, had only 20 cosponsors. As we write this, it has 34, although the tally on the Senate bill, S. 549, remains at 7 as we move toward the end of this session of Congress. As we have observed here before, whichever version of the Amateur Radio Spectrum Protection bill happened to pass, it would merely require the FCC to provide "equivalent replacement spectrum" if any Amateur Radio spectrum were to be reallocated to another service. Currently, the FCC can reallocate portions of Amateur Radio bands with few constraints other than the burdens of the regulatory process (in which ARRL has more often than not successfully challenged such reallocation). Staff members on The Hill with whom we have spoken still indicate the cards, letters and phone calls from ARRL members could be more abundant, and might help. For more background information and a sample letter, visit *ARRLWeb*, **www.arrl.org/govrelations/arspa.html**.

Cosponsors of the Amateur Radio Spectrum Protection Bills

In addition to the support of the original sponsor, Florida Republican Congressman Michael Bilirakis, HR 817 currently has 34 cosponsors. The Representatives signed onto the bill are:

John E. Baldacci (D-ME-2nd)
Tammy Baldwin (D-WI-2nd)
David E. Bonior (D-MI-10th)
Dan Burton (R-IN-6th)
Sherrod Brown (D-OH-13th)
Steve Buyer (R-IN-5th)
John Conyers, Jr (D-MI-14th)
Nathan Deal (R-GA-9th)
Normal Dicks (D-WA-6th)
John T. Doolittle (R-CA-4th)
Sam Farr (D-CA-17th)
Paul E. Gillmor (R-OH-5th)
Virgil H. Goode, Jr (I-VA-5th)
Doc Hastings (R-WA-4th)
Joe Hoeffel (D-PA-13th)
Johnny Isakson (R-GA-6th)
William L. Jenkins (R-TN-1st)
Walter B. Jones, Jr. (R-NC-3rd)
Mike McIntyre (D-NC-7th)
Gary G. Miller (R-CA-41st)
Dennis Moore (D-KS-3rd)
George R. Nethercutt, Jr (R-WA-5th)
Anne Northrup (R-KY-3rd)
Deborah Pryce (R-OH-15th)
Ronnie Shows (D-MS-4th)
Fortney Pete Stark (D-CA-13th)
Charles W. Stenholm (D-TX-17th)
Ted Strickland (D-OH-6th)
Lee Terry (R-NE-2nd)
Karen L. Thurman (D-FL-5th)
Patrick J. Tiberi (R-OH-12th)
Edolphus Towns (D-NY-10th)
Dave Weldon (R-FL-15th)
Dave Whitfield (R-KY-1st)

In addition to the original sponsor, Idaho Senator Michael Crapo, current sponsors of S. 549 include:

Daniel K. Akaka (D-HI)
Thad Cochran (R-MS)
Susan M. Collins (R-ME)
Larry E. Craig (R-ID)
Jesse Helms (R-NC)
Bob Smith (R-NH)
Olympia J. Snowe (R-ME)

Media Hits

• Fred Towers, WB4KXS, sent us a clipping from the *Richmond* (VA) *Times Dispatch* reporting on the efforts of Andrew Slater, KG4GNL, his father Parke Slater, KG4GLU, and friends Tony Day, N1KPL, and Chris Waters, KG4OQN, to use their own Amateur Radio operating event to call attention to the plight of the Chesapeake Bay lighthouse on New Point Comfort, VA. According to the story, the group weathered clouds of mosquitoes and foul weather to stick with their goal of "making contacts far and wide." The lighthouse has stood on the little island since 1805.

• A picture of Bob Airhart, W6RTS and his gorgeously appointed and well organized ham shack is featured at the top of an article in the *Union Democrat* (Sonora, CA). Airhart, of Groveland, CA talks about the "magic" of being able to communicate long-distance using your own wit and equipment. Mentioned in the article are Airhart's daughter, KE6AXP, and members of the Tuolumne County Amateur Radio and Electronics Society (TCARES) including Bob Irwin, K6YV; P. T. Brown, KG6FEY; Carl Croci, NI6Z; Dean Hoisington, KG6GBZ, and Paul Hoisington, WA6AWL. The article was followed up by a published letter to the editor from NI6Z (President of TCARES), who thanked the paper for its fine coverage and invited the public to participate in one of the club's Saturday morning breakfast meetings.

• The *Miami Herald* recently focused on the role of Amateur Radio in providing early hurricane warnings to the state of Florida through the integration of an Amateur Radio network into a complex network of computers, satellites, research ships, data buoys and other high tech gear. The group operates under the club call sign W4EHW. Mentioned in the article was program coordinator Julio Ripoll, WD4JR. A followup story a few days later discussed how important local hams are to emergency communication in the district. Included in the story were Dan Zuckerman, WQ3G, Lee Ciereszko, N4TCW, Joe Chwick, AC4TV, Ivan Flores, KG4MNZ and Ernesto Diaz.

• William Wornham, NZ1D, reports that Massachusetts hams received favorable publicity in the *Fitchburg Sentinel and Enterprise* after they acted promptly and reported the progress of severe thunderstorms that threatened the final stages of a major bicycle race that was part of the Saturn USPRO Cycling Tour.

If you send a clipping or note to DC Currents, be sure to include the name of the publication the clip is from and the date it appeared. If you would like to jot in the margins call signs of those named in the clipping, we'd appreciate it, especially where nicknames are used.

VHF MULTI MODE

IF-DSP from TEN-TEC

$695

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Real innovation in a multi-mode VHF transceiver was long overdue. Introducing the Ten-Tec model 526 "6N2" VHF transceiver. Amateur radios' first IF-DSP multi-mode VHF rig. For a long time, there have been no affordable choices for either 6 or 2 meters in a single band VHF multi-mode transceiver. Active hams planted the idea with us - why not offer a single rig that has BOTH 6 and 2 meters, without sacrificing performance? Multi-mode HF/VHF rigs have been around for years, at over a thousand dollars and with compromised performance on the VHF bands at best. The "6N2" provides serious multi-mode VHF performance in a small, take-anywhere package at a significantly lower price than HF/VHF multi-mode transceivers. Why buy another HF rig to get VHF coverage, when you already own one?

Ten-Tec's years of experience designing DSP radio equipment for amateur, commercial, and military applications comes together to deliver a VHF multi-mode transceiver to meet performance demands of weaker signal VHF operators. Let's take a look:

- SSB, CW, and FM transceive operation on both 6 and 2 meters. Extended receive range from 136 - 174 MHz on 2 meters.
- 35 IF-DSP bandwidth filters are built in. No extra filtering to buy! Instantly select the best one for band conditions with the twist of a knob.
- Can be used as your main 2-meter FM rig. 100 memories, repeater splits, CTCSS tone encode are all built in. Memories will retain mode, tone, and split information. You can even program (and scan!) memories for different modes. Memory lockout function allows skipping constantly busy channels while scanning.
- Two SO-239 antenna connectors, one per band, allow you to leave antennas for both 6 and 2 meters connected. Separate amp keying lines allow connection of separate linear amplifiers for each band.
- 20 watts output power, front panel knob adjustable. Front panel meter does double duty as S-meter on receive and power output meter on transmit.
- Separate low level drive connection from 144 MHz for UHF and microwave transverters.
- All-mode squelch useful for FM repeaters or for quiet monitoring of SSB calling frequencies. Never miss a band opening again!
- Portable operation is a snap. The "6N2" is small and light enough to be carried anywhere. Only 4 1/2 pounds! Current drain is minimal - only 400 mA @ 13.8 VDC on receive.

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

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

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

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

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

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

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

Call your dealer for your best price!

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

HAM IV

$529.95
Suggested Retail

T-2X

$619.95
Suggested Retail

CD-45II

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AR-40

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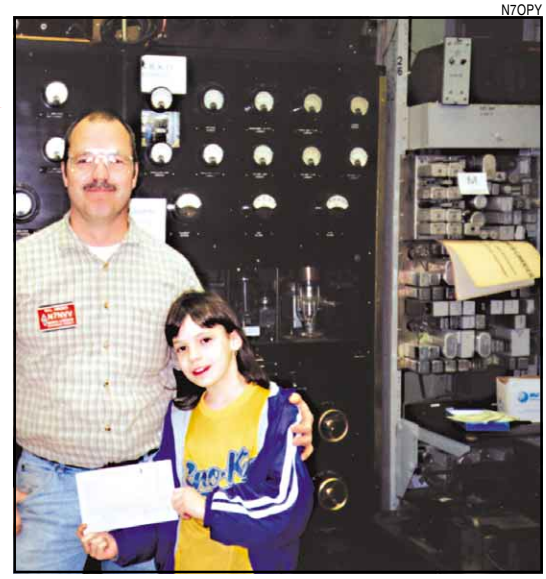
UP FRONT IN QST

Ever wonder where those RF-depleted antennas wind up? Marden Pride, WB1GGI, has discovered what could be their final resting place in Raymond, New Hampshire.

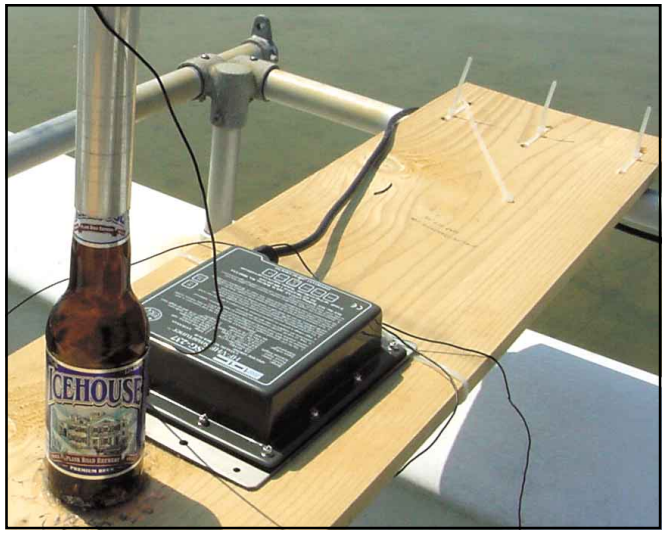
N7OPY



No, this isn't our shack. . . . Katherine Amsden, KD7MUE, proudly shows off her newly earned Technician class license certificate. Proud dad Will, N7NVV, is Snohomish County (Washington) ARES Emergency Coordinator. Katherine passed her test at Seattle's Vintage Telephone Equipment Museum.

Cat vertical works where traditional antennas are *verboten*. Steve Michaels, N4RNM, of Panama City, Florida, found himself up against antenna restrictions, but he devised a creative solution. His antenna consists of a 35-foot element of aluminum tubing mounted on what he terms a "derelict 12-foot Hobie Cat catamaran." It is base-fed with an SGC-237 auto-tuner and, Steve reports, works amazingly well on 160 through 6 meters. There are four 50-foot "radials" under water to couple the tuner to the salt-water ground plane. As the president of the homeowners association, Steve decided not to test the strength of the association's Declaration of Covenants by installing a vertical in his yard. Finding no restriction on burying wiring in the yard or on common property, Steve buried the 12-V power to the tuner and RG-214 cable underground down to the beach. CÎonnectors at the beach allow Steve to use inexpensive (cheap to replace when saltwater penetrates) RG-58 to span the 20 feet or so out to the boat.

The connectors at the beach also permit Steve to disconnect the antenna when those famous Florida thunderstorms pop up. The area where the boat is anchored is a tidal flat, so part of the time it sits on a hard sandy bottom. When the tide is in, water depth is about 1 foot. Performance at high tide vs low? Makes no difference, Steve reports.



Details of the base insulator and tuner of N4RNM's vertical cat antenna.

The antenna-support catamaran rests peacefully just off the beach in Panama City, Florida.

My rotator's busted—nuts! When my prop-pitch rotator slowed to a creep then froze solid, I panicked—and then called Steve the Tower Climber, K7LXC, who had reworked it 3½ years ago. "What do ya see?" I called up to him. "You will *not* believe this," he yelled back. "Here—catch!" and tossed down a small missile. I *didn't* believe it—an acorn—a bucketload of them, in fact. The mast-mounted paddle stop for one microswitch had compressed the acorns against the bottom-limit microswitches with such force that the hard, molded plastic switches were shattered. What acorns we have here in W6-land!

Most likely suspect: the California Scrub Jay, known for its custom of storing acorns in cracks and crevices. Until Steve hauled them down, there were about 14 pounds of acorns up there, or about 2150 individual nuts! I've started giving them out at conventions.—*Jack Troster, W6ISQ*

K7LXC

The acorns are visible through the indicator gear opening. The jays forgot one thing: The acorns are easier to get in than to get out!

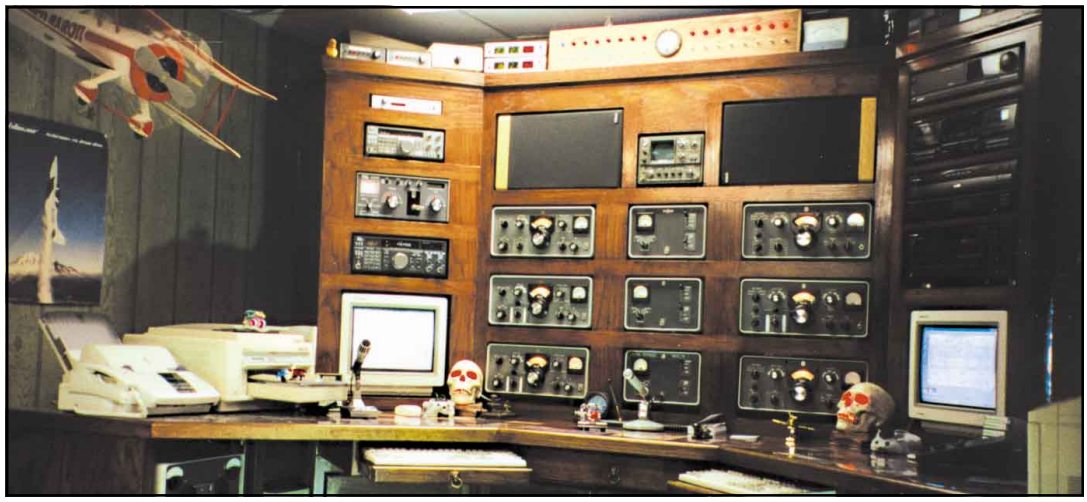
K7LXC

The cache of acorns, resting comfortably for the time being, in the box housing my rotator.

They talked to a spaceman. Bob Conder, K4RLC, set up a portable HF station on the beach at North Myrtle Beach, South Carolina, for Kids Day in June, and it will be a day his two kids remember for a long time. Bob recounts: "When I took the photo, Lauren and Boo had just talked with Kent, op for W5RRR at NASA/Johnson Space Center. He advised the kids to 'keep your eyes on the stars and follow your dreams.' He then talked about going to Mars. Six-year-old Boo had eyes as big as saucers and told everybody, 'I talked to a spaceman!'"

CLIFFORD HAUSER, KD6XH

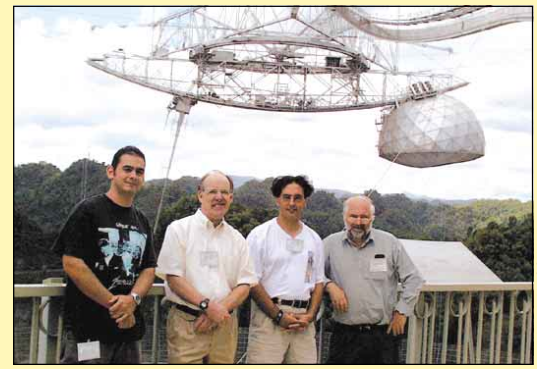
Soldering 101. Concentrating to the max, a student builds a breadboard mini code-practice oscillator under the tutelage of Hualapai ARC President Robert Kimbrell, AC7BN. The session took place at the third annual Educational Fair sponsored by the Mohave County (Arizona) Educational District. The club set up WB6RER (the call sign of the late cowboy actor Andy Devine), giving students the chance to learn about the living conditions, customs and languages of the hams they contacted. The event was so successful that the School Board has already asked the club to return next year.



Console yourself—Norman Wolfe, KL7IVK, of Fort Atkinson, Wisconsin, did, and here are the results! His Collins gear (only): 75S-3B receiver, 75S-3C (he's got two of them), 312-B4 station console (three), 32S-3 transmitter (two), 32S-3A transmitter and 30S-1 linear.

Big Dish: In June, about 60 radio astronomy students and teachers from eminent radio observatories around the world gathered at the Arecibo, Puerto Rico radiotelescope site for two days of radio-related instruction and three days devoted to astronomy. Frequencies covered included 70 cm (430 MHz, where the Arecibo dish studies planets) to millimeter waves (up to 850 GHz).

The silver dome contains three floors of equipment to support the feeds for all the bands except 430 MHz, which is the line feed at the left (looks like a rod that captures waves arriving from the spherical surface below and ensures that everything arrives at the receiver in phase). The platform is held by 10-inch-thick steel cables and is so steady that there is no movement whatsoever when you are on it. —*Peter Vekinis, KC1QF/LX1QF*

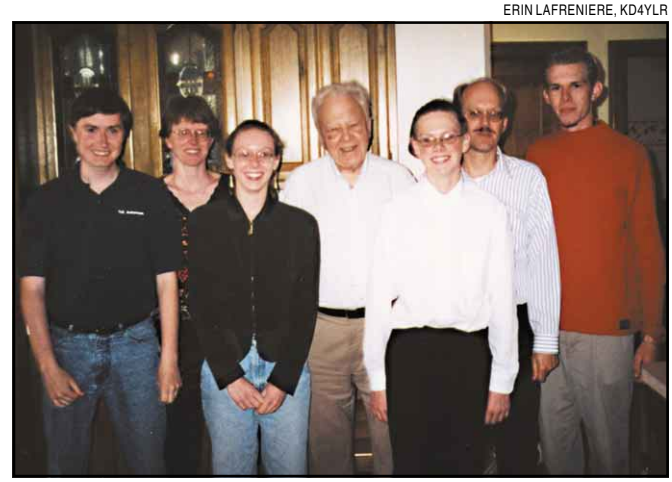


DANIEL ALTSCHULER

With the prime focus in the background are (left to right): Homero Cersosimo, WP3HN; Rick Fisher, KE8DH; Peter Vekinis, KC1QF/LX1QF and Darrel Emerson, AA7FV/G3SYS. Hams not pictured included Jim Condon, AD4YM and Michael Nicholls, KC2HUL.

Hospitality, C31-style: While on vacation in Spain in June, Richard Musicer, N6CR, took a three-day side trip to Andorra with his family (along with G0DCF and his wife). He reports: "The beautiful countryside was only bettered by the wonderful warm reception given us by Unio de Radioaficionats Andorrans President Joan, C31US (left), and Michel, C31MO." The photo was taken at the URA Headquarters and club station at Andorra la Vella.

ERIN LAFRENIERE, KD4YLR



Three generations of hams in this family. This extensive ham family got together recently for a family portrait. Left to right, surrounding Harold Burck, W8QVX, of Algonac, Michigan: Don, VA3DJL; Cheryl, KC8CNG; Erin, KD4YLR; W8QVX; Harrison, KC8REV; Tom, KB8PCK, and Craig, N8ZXA. Erin and her husband, Don, met on the air.

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HAMVENTION 2001

♦ I was a very fortunate Danish ham because I was able to attend Hamvention 2001. Hamvention 2001 was a great experience for me, being the first time in my very long "ham-life" I had the opportunity to attend. I traveled the whole long way from Copenhagen to Dayton and return just to attend this event. The expense was well spent because the Hamvention was definitely the highlight in my "ham-life." I have been a ham since 1948.

Being a member of ARRL for nearly 30 years it was great to meet and get eyeball contact for the first time with ARRL officers and to shake hands with president Jim Haynie. I visited the ARRL booth and browsed through many of the fine publications. Very sorry that my budget did not allow me to buy them all.

I met many friendly and nice hams during the Hamvention and specially I want to thank W8GAR, Dave Franklin, who kindly took care of my transportation from the motel and to the Hara arena.

The indoor exhibition and the outdoor flea market were overwhelming. I have never in my "ham-life" seen so much ham stuff. The old saying, "If you can't find it at the Hamvention it probably does not exist" is very true.

The PSK31 forum gave me the necessary push so now I am operating PSK31 on 14070 kHz. I also operated the event station W8BI and tried to make contacts with OZ-hams, but the conditions were poor.

The Hamvention is the radio amateur's Mecca, so all hams should if it is possible attend once in their lifetime.—*Ib Pforr-Weiss, OZ5PF, Kokkedal, Denmark*

INTRIGUED

♦ I was intrigued with the July "Returning to Amateur Radio" letter from Ray Meyer, WA0KNP. I too have recently returned to Amateur Radio after an extended absence. I first obtained an amateur license in 1957 and last renewed it in 1967. A growing young family and exciting adult electronic toys at work got in the way of continued activity in ham radio.

I took the exam in March and then applied for, and received, my old call, W7GGI, a month later. As soon as I had my old call back, I applied for ARRL membership and after 30 years *QST* again arrives in my mailbox. I purchased a used Kenwood TS-430S and an antenna tuner, and put up a "stealth" antenna under the eaves of my house. And I have discovered that all of those old junk boxes in the back corner of the garage are worth something after all.

I find that Amateur Radio is still much the same great group of people. In other ways things have sure changed. Who would have thought that text messages could be sent with only 31 Hz of bandwidth (PSK31)! Or that a powerful home computer could be a part of a ham station, that the Internet would be a key source of information, or that we would have to be concerned about human exposure to RF radiation. When I was last involved, ham radio, SSB and repeater stations were in their infancy and I sure had never heard of a non-resonant antenna!

I just sent in a $100 order for books from ARRL and am thinking very seriously about taking the Extra exam. I am excited about again being involved in ham radio and am looking forward to making new friends.—*Art Brown, W7GGI, Auburn, Washington*

DISAPPOINTED

♦ I thought I would pass along a few first impressions of my first 10 months in Amateur Radio. I received my license in August 2000.

During the late summer of 2000, I would spend an hour or two each evening outdoors with a 2-meter H/T. Over the course of three to four weeks I received two replies to my calls on my local repeaters.

During my first chat using my 2-meter mobile I was talking to one of our local "super hams" and was "joined/interrupted" by no less than three other hams, all wanting to talk to the other party, and I was rotated out of the conversation immediately.

While driving home one evening in October, I attempted to make a contact on four different repeaters and made six or seven calls without receiving an answer. Two minutes after my last call on the local big machine, a super ham gave his call sign and got no fewer than three replies immediately. The only thing that kept me from removing my radio the moment I arrived home was the fact that it was cold and dark outside. My wife endured two hours of my feedback about ham radio.

While driving to Michigan from Maine in January, I received no answers to any calls made in five states and Ontario. While in Michigan for 2 days, I received no replies (three different repeaters).

During April, I was so angry that I began keeping a "NO CONTACT" log. Between April 3 and 12 I made over 60 calls on several local repeaters before receiving a reply on the 12th.

Sometime during April or May I made a call on the local big repeater. A ham got on and asked if anyone had used the repeater. I gave my call sign again. He then asked if anyone wanted to use the repeater (he did not ask me or use my call sign). I answered that I was mobile and was just standing by for a chat/contact. He ignored me again and called a third person who answered immediately and the two of them began passing third party (I believe, ARRL) traffic.

I have spent several sessions at home with my H-T (including this evening) and have received no replies other than one from my boss who lives nearby and one from a friend whom I made a "date" with on the Internet to chat on the radio. This evening I made six to eight calls on two different repeaters and received no replies. One of these repeaters is the local big machine that I heard traffic on just prior to my attempts at making a contact.

This is a strange conundrum. When I passed my test and joined my local club I was welcomed with open arms, congratulated, had my hand shaken, etc, etc, etc. When I key the microphone, I am met with silence 98% of the time.

I have talked to some very nice people once in a great while and I enjoy operating my radio. I admit to being enthusiastic last year, and I began studying code and for my General; but I put all that away after paragraph four occurred.

I am beginning to feel that amateur radio's biggest problem is its most experienced practitioners. They seem to give a large amount of lip service to recruiting, writing editorials about treating new hams right, protecting the hobby, etc, but fall short at the microphone.—*Steven E. Cornett, KB1FOP, Auburn, Maine*

WHY NOT 222?

♦ I want to respond to David Sumner's column, "It Seems to Us," in the July 2001 issue of *QST*.

I have been an amateur radio operator

since 1990 and I have operated on 10 meters, 2 meters and 70 cm. I have always wanted to operate on 220 MHz—so I appreciated his article. I feel his column hits the nail on the head when it comes to reasons why I don't operate on the band. The price for 220 MHz radios is high and there are not many brands to choose from. A tri-band radio is not the answer because the price will be too high.

In the February 1999 issue of *QST* Steve Hageman came up with a 2 meter receiver/scanner which could be PC controlled. I have built it—buying his PIC chip and the circuit board from FAR. (I have about $60 invested in this receiver, adding junk box parts.) I have also seen numerous kits for HF PSK31. I know Ten-Tec carries kits but they are complex for the simple builder.

I would like to see in QST *a 220 MHz transceiver that is easy to build.* It could be a one channel rig that could be set to one local repeater or two channel rig with 1 repeater and 1 simplex channel. With microchip technology it should not be too difficult. DC Kits and other parts companies carry narrow band FM transmit and receiver chips. Something of the design and simplicity of those 300 mW 49 MHz handie-talkies would not be bad. I wouldn't mind having to buy a PIC controller or a circuit board from FAR. If the price is kept below $100 then maybe people would go for it. *It would beat buying a $400+ tri-band radio just to get the 220 MHz band.* Most people already have rigs for 2 meters and 440 MHz which they hope will last awhile. I am not in the market for a new rig of that expense that soon. I would certainly build a kit, though.

I have also read some old *QST*s and saw Doug DeMaw's Pip-Squeak rigs for 2 meters and 220 MHz and the Pip-Squeak II. It would be nice to create a Pip-Squeak III in his honor.—*Alvin Mahler, N5VZH, Raceland, Louisiana*

[Editor's Note: See DeMaw, D., W1CER, "An FM Pip-Squeak for 2 Meters," *QST*, Mar 1971; McCoy, L., W1ICP, "Converting the Pip-Squeak to 220 MHz," *QST*, Feb 1972; and DeMaw, D., "The Pip-Squeak Gets Smaller," *QST*, Sep 1972.]

♦ David Sumner's "It Seems to Us" column about 222 MHz in the July issue was excellent. 1.25 meters is a good band and quite underutilized. But what about the other band he mentioned—23 cm? This is another much underutilized band.

On 23 cm you seldom hear a non-amateur signal. Impulse noise is almost nonexistent. Propagation is different enough from the lower bands to make it interesting. There is enough weak signal activity to make you feel like you get your money's worth from your equipment.

Here in the St Petersburg area, we have two active 23 cm FM repeaters. Both give coverage comparable to the lower frequency repeaters in the area. A small antenna is quite efficient. This makes 23 cm a good handi-talkie band. Mobile flutter is a low buzz on this band. There are plenty of repeater pairs.

Twenty-three centimeters is a great band to operate. We need more activity. —*Buddy Morgan, WB4OMG, Treasure Island, Florida*

IT'S THE FREQUENCIES

♦ Congratulations on the article in July *QST*, "Protecting our Bands." I've been saying for some time that the League was selling itself short in not playing up what is being done in defence of amateur radio.

I've had the privilege of seeing Paul Rinaldo at work at the ITU meetings, and the respect he (and Larry Price and Ken Pulfer) command from administrations is impressive. This means that the administrations listen to what is said by these guys, and that helps our cause.

Maybe *QST* doesn't get this message to the nonmembers, but everyone should remember, even if they only use the repeater, that if you don't have frequencies, you don't have ham radio—and in the end, it's ITU and the WRCs that decide on frequencies.

If I got nothing else from my League membership, I'd still consider it a bargain for the work done at ITU.—*Peter E. Chadwick, G3RZP, Wiltshire, UK*

TNX NN3SI VOLUNTEERS

♦ On a recent business trip to Washington, DC, I had the honor of being a guest operator at the amateur radio exhibit, NN3SI, at the Smithsonian's Museum of American History. I had the delightful experience of meeting one of the volunteers who works at the exhibit, Stan Schretter, W4MQ. Stan allowed me to operate the station at the exhibit for 2½ hours. He made me feel at home and made the experience one I will never forget.

The operators at the exhibit explain amateur radio to those who are not involved in the hobby, encouraging them to get their license. They hand out ARRL publications describing amateur radio and how to get involved in the hobby. Stan and the other volunteers provide a great service to the community and the amateur radio service. They are true ambassadors for the hobby. I urge any operator visiting Washington to take time out of their schedule and be a guest operator. I would like to recognize Stan, and all the other volunteers at NN3SI, for their devotion to amateur radio and quest for educating other people about the hobby.—*Tom Czaja, KG9EE, Mequon, Wisconsin* QST

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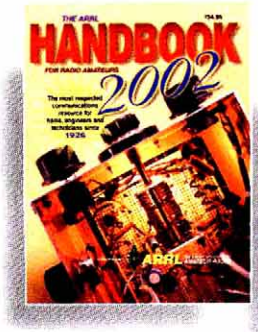

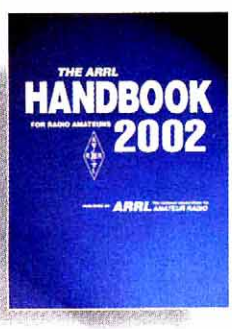

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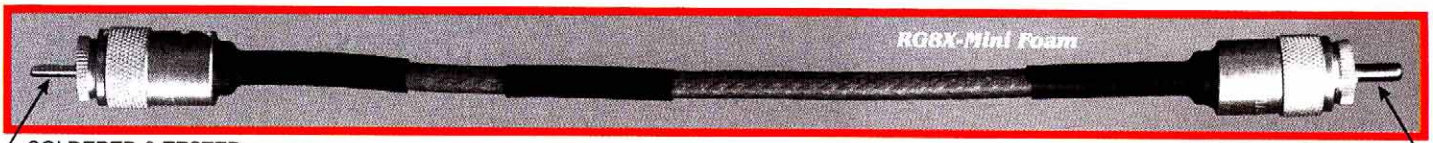

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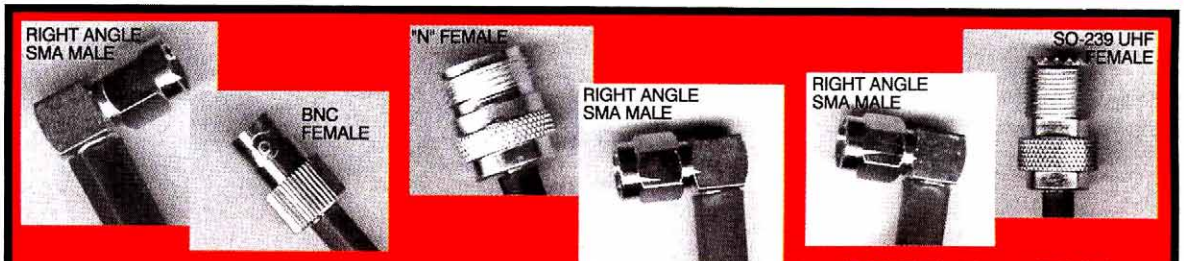

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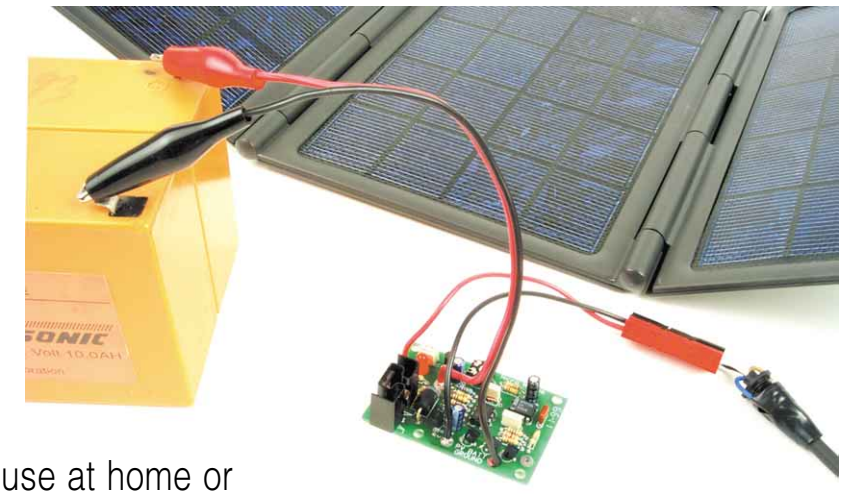
By Mike Bryce, WB8VGE

The Micro M+ Charge Controller



Current capacity of up to 4 A, positive line switching so all grounds tie together, standby current of less than 1 mA and more features make the Micro M+ the ideal photovoltaic charge controller for use at home or in the field. It's an easy-to-build, one-evening project that just about anyone can master.

The Micro M proved a very popular project.[1] It seems hams really do like to operate their rigs from solar power while in the outback. Many hams find solar power to be very addictive. I had dozens of requests for information on how to increase the current capacity of the original Micro M controller. The original Micro M would handle up to 2 A of current. The PC board traces and blocking diode limited the design to this current capacity. I also wanted to improve the performance of the Micro M while I was at it. Because the Micro M switched the negative lead of the solar panel on and off, the negative lead of the solar panel had to be insulated from the system ground. While that's not a problem with portable use, it may cause trouble with a home station where all the grounds should be connected. Here's what I wanted to do:

- Reduce the standby current at night
- Increase current handling capacity to 4 A
- Change the charging scheme to high (positive) side switching
- Improve the charging algorithm
- Keep the size as small as possible, but large enough to build.

The Micro M+

I called the end result the Micro M+. You can assemble one in about an hour. Everything mounts on one double-sided PC board. It's small enough to mount inside your rig yet large enough so you won't misplace it. You can stuff four of them in your shirt pocket! And, you need not worry about RFI being generated by the Micro M+. It's completely silent and makes absolutely zero RFI!

The Micro M+ will handle up to 4 A of current from a solar panel. That's equal to a 75-W solar panel.[2] I've reduced the standby current to less than 1 mA. I've also introduced a brand new charging algorithm to the Micro M+. All the current switching is done on the positive side. Now, you can connect the photovoltaic (PV) array, battery and load grounds together.

A complete kit of parts is available as well as just the PC board. The complete kit, including the PC board and all parts is $30.[3] The Micro M+ is easy to build, making it a perfect first-time project.

[1]Notes appear on page 31.

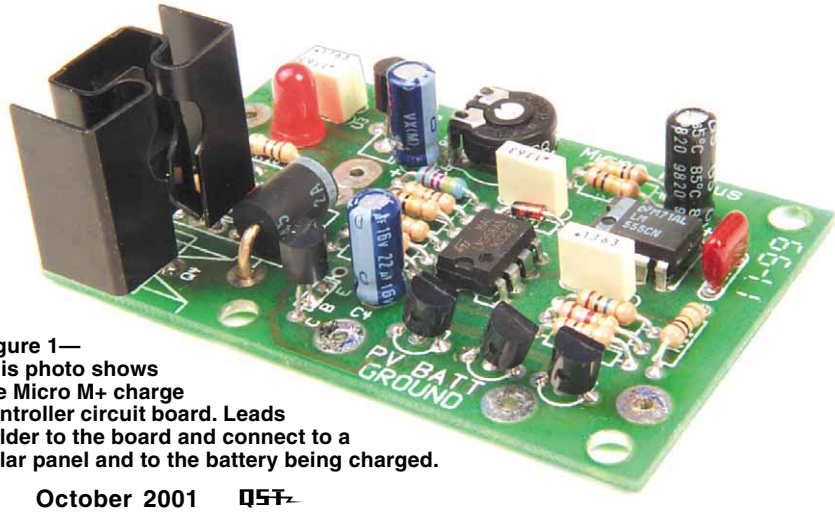


Figure 1—
This photo shows the Micro M+ charge controller circuit board. Leads solder to the board and connect to a solar panel and to the battery being charged.

Here's How it Works

Figure 1 shows the complete Micro M+, while Figure 2 shows the schematic diagram. Let's begin with the current handling part of the Micro M+. Current from the solar panel is controlled by a power MOSFET. Instead of using a common N-channel MOSFET, however, the Micro M+ uses an International Rectifier IRF4905 P-channel MOSFET. This P-channel FET has a current rating of 64 A with an RDS_{on} of 0.02 Ω. It comes

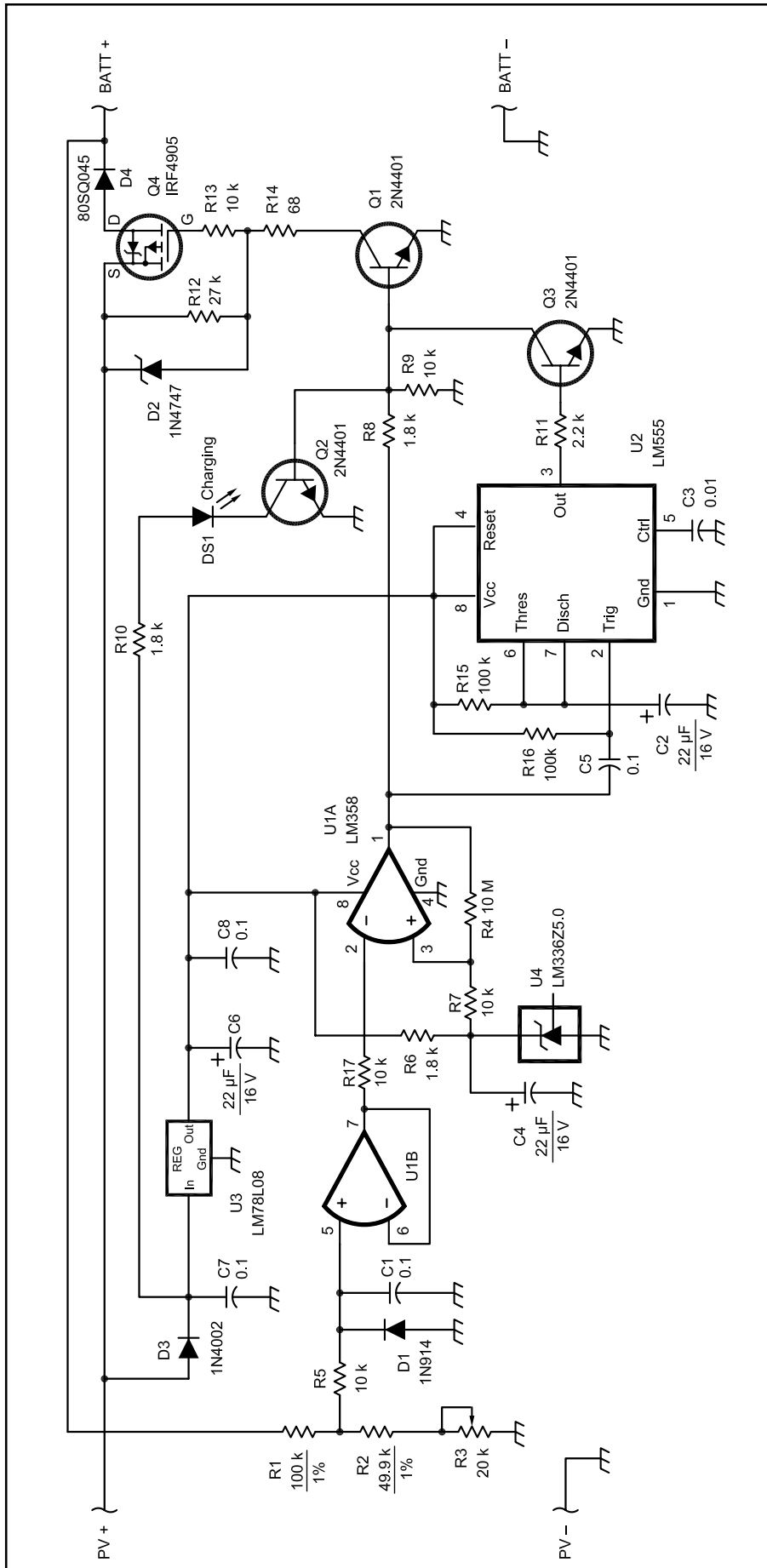


Figure 2—The schematic diagram of the Micro M+ charge controller.
C1, C5, C7, C8—0.1 µF.
C2, C4, C6—22-µF, 16-V electrolytic.
C3—0.01 µF.
D1—1N914, small signal silicon switching diode.
D2—1N4747, 20-V, 1-W Zener.
D3—1N4002, silicon rectifier diode.
D4—80SQ045, 45-V, 8-A Schottky diode.
DS1—LED, junkbox variety.
Q1, Q2, Q3—2N4401 NPN small-signal transistor (2N2222 or 2N3904 will also work).
Q4—IRF4905 P-channel MOSFET in TO-220 case. You will also need a small clip-on heat sink for this case.
R1—100 kΩ, 1%.
R2—49.9 kΩ, 1%.
R3—20-kΩ trimmer.
U1—LM358AN, dual op-amp.
U2—LM555AN timer.
U3—LM78L08, 8-V regulator.
U4—LM336Z-5.0, 5.0-V Zener diode in TO-92 case. The adjust terminal allows control of the temperature coefficient and voltage over a range. The adjust terminal is not used for the Micro M+.

in a TO-220 case. Current from the solar panel is routed directly to the MOSFET source lead.

N-channel power MOSFETs have very low RDS_{on} and even lower prices. To switch current on and off in a high side application, the gate of an N-channel MOSFET must be at least 10 volts higher than the rail it is switching. In a typical 12-volt system, the gate voltage must be at least 22 volts to ensure the MOSFET is turned completely on. If the gate voltage is less than that required to fully enhance the MOSFET, it will be almost on and somewhat off (the MOSFET is operating in its linear region). The device will be destroyed at high current.

To produce this higher gate voltage, some sort of oscillator typically is used to charge up a capacitor via a voltage doubler. This charge pump generates harmonics that may ride on the dc flowing into the battery under charge. Normally, this would not cause any problem, and in most cases, a filter or two on the dc bus will eliminate most of the harmonics generated. Even the best filter won't get rid of all the harmonics, however. To compound the problem, long wire runs to and from the solar panels and batteries act like antennas.

The P-channel MOSFET eliminates the need for a charge pump altogether. To turn on a P-channel MOSFET, all we have to do is pull the gate lead to ground! Since the Micro M+ does not have a charge pump, it generates *no RFI*!

Now, you may be wondering, if the

Using the Micro M+ with the Yaesu FT-817

With the introduction of the new Yaesu FT-817 all mode, all band QRP transceiver, more and more of us will be using solar power in the field. The Micro M+ was designed to use a 12-V solar panel to charge a 12-V battery. The Yaesu FT-817 can operate from 12 V supplied externally or from an internal 9.6-V NiCd battery. The NiCd battery may be charged when the battery is installed in the radio. Or, if you want, it can be charged separately from the 817 via a solar panel and the Micro M+ controller.

To use the Micro M+ to charge this NiCd pack, you'll have to change the value of resistor R2 from 49.9 kW 1% to 82.5 kW 1%. This will allow the logic to switch correctly at 11.6 V, the voltage of a fully charged 9.6-V NiCd battery. This assumes you use the standard of 1.45 V per NiCd cell. With the new value for R2, there's plenty of adjustment in the state-of-charge trimmer to allow you to fine-tune the state-of-charge.

Since the NiCd battery is rated at only 9.6 V, this throws the power point of the solar panel in the trash. A typical 5-W solar panel is rated at 290 mA at 17.1 V. Because of the lower battery voltage, there will be more than the 290 mA of current flowing. However, if the panel is designed to produce 5 W, that's all it will do. As the voltage goes down, the current will increase, up to the Isc (current short circuit) of the panel. The panel will not produce any more current than it was designed for.

P-channel MOSFET is so great, why have you not seen them in applications like this before? The answer is twofold. First, the RDS_{on} of a P-channel MOSFET has always been much higher than its N-channel cousin. Several years ago, a P-channel MOSFET with an RDS_{on} of 0.12 ohms was considered very low. At that time an N-channel MOSFET had an RDS_{on} of 0.009 ohms. Suppose you want to control 10 A of current from your solar panel. Using the N-channel MOSFET above we find the MOSFET will dissipate less than a watt of power. On the other hand, the P-channel MOSFET will dissipate 12 W of power! Current generated by our solar panels is way too expensive to have 12 W of it go up as heat from the charge controller.

The second factor was price. The P-channel MOSFET I described above would have sold for $19 each. The N-channel would have been a few dollars.

The Micro M+ never draws current from the battery. The solar panel provides all the power the Micro M+ needs.

In the last year or so the RDS_{on} of the P-channel MOSFET has fallen to 0.028 ohms. The price, while still a bit on the steep side, has dropped to about $8 each.

With the P-channel MOSFET controlling the current, diode D4—an 80SQ045 Schottky—prevents current from the battery from flowing into the solar panel at night. This diode also provides reverse polarity protection to the battery in the event you connect the solar panel backwards. This protects the expensive P-channel MOSFET.

Zener diode D2, a 1N4747, protects the gate from damage due to spikes on the PV line. Resistor R12 pulls the gate up, ensuring the power MOSFET is off when it is supposed to be.

The Micro M+ Likes to Sleep

The Micro M+ never draws current from the battery. The solar panel provides all the power the Micro M+ needs. At night, the Micro M+ goes to sleep. When the sun rises, the Micro M+ will start up again. As soon as the solar panel is producing enough current and voltage to start charging the battery, the Micro M+ will pass current into the battery.

To reduce the amount of standby current, diode D3 passes current from the solar panel to U3, the voltage regulator. U3, an LM78L08 regulator, provides a steady + 8 V to the Micro M+ controller. Bypass capacitors C6, C7 and C8 are used to keep everything happy. As long as the solar panel is producing power, the Micro M+ will be awake. At sundown, the Micro M+ will go to sleep. Sleep current is on the order of less than 1 mA.

Battery Sensing

The battery terminal voltage is divided down to a more usable level by resistors R1, R2 and R3. Resistor R3, a 20-kΩ trimmer, sets the state-of-charge for the Micro M+. A filter consisting of R5 and C1 helps keep the input clean from noise picked up by the wires to and from the solar panel. Diode D1 protects the input of the op-amp in the event the battery sense line were connected backward.

An LM358 dual op-amp is used in the Micro M+. One section, U1B, buffers the divided battery voltage before passing it along to the voltage comparator, U1A. Here the battery sense voltage is compared to the reference voltage supplied by U4. U4 is an LM336Z-5.0 precision diode. To prevent U1A from oscillating, a 10-MΩ resistor is used to eliminate any hysteresis.

As long as the battery under charge is below the reference point, the output of U1A will be high. This saturates transistors Q1 and Q2. Transistor Q2 conducts and lights LED DS1, our CHARGING LED. Q1, also fully saturated, pulls the gate of the P-channel MOSFET to ground. This effectively turns on the FET and current flows from the solar panel into the battery via D4.

As the battery begins to take up the charge, its terminal voltage will increase. When the battery reaches the state-of-charge set point, the output of U1A goes low. With Q1 and Q2 now off, the P-channel MOSFET is turned off, stopping all current into the battery. With Q2 off, the CHARGING LED goes dark.

Since we have basically eliminated any hysteresis in U1A, as soon as the current stops, the output of U1A pops back up high again. Why? Because the battery terminal voltage will fall back down as the charging current is removed. If left like this, the Micro M+ would sit and oscillate at the state-of-charge set point.

To prevent that from happening, an LM555 timer chip, U2, monitors the output of U1A. As soon as the output of U1A goes low, this low trips U2. The output of U2 goes high, fully saturating transistor Q3. With Q3 turned on, it pulls the base of Q1 and Q2 low. Since both Q2 and Q1 are now deprived of base current, they remain off.

With the values shown for R15 and C2, charging current is stopped for about four seconds after the state-of-charge has been reached.

After the four second delay, Q1 and Q2 are allowed to have base drive from U1A. This lights up the charging LED and allows Q4 to pass current once more to the battery.

As soon as the battery hits the state-of-charge once more, the process is repeated. As the battery becomes fully charged, the "on" time will shorten up while the "off" time will always remain the same four seconds. In effect, a pulse of current will be sent to the battery that will shorten over time. I call this charging algorithm "Pulse Time Modulation."

As a side benefit of the pulse time modulation, the Micro M+ won't go nuts if you put a large solar panel onto a small battery. The charging algorithm will always keep the off time at four seconds allowing the battery time to rest before

being hit by higher current than normal for its capacity.

Building Your Own Micro M+

There's nothing special about the circuit. The use of a PC board makes the assembly of the Micro M+ quick and easy. It also makes it much easier if you need to troubleshoot the circuit. You can build the entire circuit on a piece of perfboard if you want.

The power MOSFET must be protected against static discharges. A dash of common sense and standard MOSFET handling procedures will work best. Don't handle the MOSFET until you need to install it in the circuit. A wrist strap would be a good idea to prevent static damage. Once installed in the PC board, the device is quite robust.

A small clip-on heat sink is used for the power MOSFET. If you desired, the MOSFET could be mounted to a metal chassis. If you do this, make sure you insulate the MOSFET tab from the chassis.

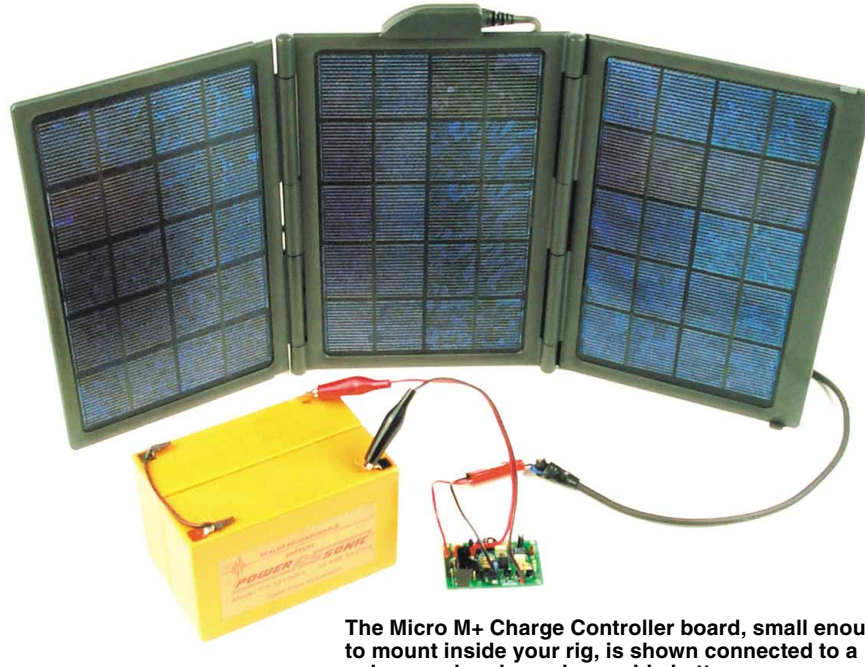
If you plan on using the Micro M+ outside, then consider soldering the IC directly onto the board. I've found that cheap solder-plated IC sockets corrode. If you want to use an IC socket, use one with gold-plated contacts.

Feel free to substitute part values. There's nothing really critical. I do suggest you stick with 1% resistors for both R1 and R2. This isn't so much for the close tolerance, but for the 50-PPM temperature compensation they have. You can use standard off-the-shelf parts for either or both R1 and R2, but the entire circuit should then be located in an environment with a stable temperature.

Adjustments

You'll need a good digital voltmeter and a variable power supply. Set the power supply to 14.3 V. Connect the battery negative and power supply negative leads together at a circuit-board ground point. Connect the PV positive and battery positive lead, and the power supply positive leads together. The charging LED should be on. If not, adjust trimmer R3 until it comes on. Check for +8 V at the V_{cc} pins of the LM358 and the LM555. You should also see + 5 V from the LM336Z5.0 diode.

Quickly move the trimmer from one end of its travel to the other. At one point the LED will go dark. This is the switch point. To verify that the "off pulse" is working, as soon as the LED goes dark quickly reverse the direction of the trimmer. The LED should remain off for several seconds and then come back on. If everything seems to be working, it's time to set the state-of-charge trimmer.



The Micro M+ Charge Controller board, small enough to mount inside your rig, is shown connected to a solar panel and a rechargeable battery.

Now, slowly adjust the trimmer until the LED goes dark. You might want to try this adjustment more than once as the closer you get the comparator to switch at exactly 14.3 V, the more accurate the Micro M+ will be. Here's a hint I've learned after adjusting hundreds of Micro M+ controllers. Set the power supply to slightly above the cutoff voltage you want. If you want 14.3 V, then set the supply to 14.5 V. I've found that in the time it takes to react to the LED going dark, you overshoot the cutoff point. Setting the supply higher takes this into account and usually you can get the trimmer set to exactly what you need in one try. That's all you need to do. Disconnect the supply from the Micro M+ and you're ready for the solar panel.

Odds and Ends

The 14.3-V terminal voltage will be correct for just about all sealed and flooded cell lead-acid batteries. You can change the state-of-charge set point if you want to recharge NiCds or captive sealed lead-acid batteries.

Keep the current from the solar panel within reason for the size of the battery you're going to be using. If you have a 7-amp hour battery, then don't use a 75-W solar panel. You'll get much better results and smoother operation.

The tab of the power MOSFET is electrically hot. If you plan on using the Micro M+ without a protective case, make sure you insulate the tab from the heat sink. A misplaced wire touching the heat sink could cause real damage to both the Micro M+ and your equipment. A small plastic box from RadioShack works great.

More Current?

Well yes, you can get the Micro M+ to handle more current. You must increase the capacity of the blocking diode and mount the power MOSFET on a larger heat sink. I've used an MBR2025 diode and a large heat sink for the MOSFET and can easily control 12 A of current.

Battery Charging Without a Solar Panel?

Yes, that's possible, too. The trick is to use a power supply for which you can limit the output current. A discharged lead acid battery will draw all the current it can from the charging source. In a solar panel setup, if the panel produces 3 A, that's all it will do. With an ac powered supply, the current can be excessive. To use the Micro M+ with an ac powered supply, set the voltage to 15.5 V. Then limit the current to 2 or 3 A.

No matter if you're camping in the outback, or storing photons just in case of an emergency, the Micro M+ will provide your battery with the fullest charge. The Micro M+ is simple to use and completely silent. Just like the sun!

Notes

[1]"The Micro M," Sep 1996 *QST*, p 41.

[2]A 75-W module produces 4.4 A at 17 V. The Micro M+ can easily handle the extra 400 mA.

[3]A complete kit of parts is available from SunLight Energy Systems, 955 Manchester Ave SW, North Lawrence, OH 44666. A complete kit including all parts and PC board is $30 plus $4 US Priority mail. Visa, MasterCard accepted. Tel 330-832-3114; www.seslogic.com/.

By Sam Ulbing, N4UAU

Uncle Albert's Touch Pad Keyer

Are conventional "compact" keyers still too big? Want to build a small, durable keyer with no moving parts that runs on a single lithium coin battery? Build the touch pad paddles and use them with your present keyer, or build the tiny keyer circuit to accompany your favorite paddles. This project is an experimenter's delight!

Above: Uncle Albert's Touch Pad Keyer, with touch pads, battery and circuit, can be made as small as the finger pads of a standard paddle!

One of the fun things about experimenting with ham radio electronics is that the final result isn't always what you had in mind at the start. That's definitely the case with this project. I wanted to build the world's smallest "surface-mount keyer" because I was impressed with the performance of my "World's Smallest Code Practice Oscillator."[1] But very early in the design I realized that the size of a keyer isn't limited by the electronic parts, but by the size of the power supply, paddles and the user's fingers. I could easily build a keyer on a PC board that's less than one inch square, but if I needed four AA batteries and I used my regular paddles, I would still have a large keyer (see Figure 1). Instead of looking for smaller ICs, I wound up looking for low-voltage/low-power ICs and a way to reduce the size of truly functional paddles.

Touch pads solved the paddle dilemma and, thanks to modern MOSFETs, they are easy to build. As you can see from the title photo, my touch pad keyer (paddles, batteries and circuitry) is barely larger than the finger pads on the paddles. Some of my other versions are even smaller!

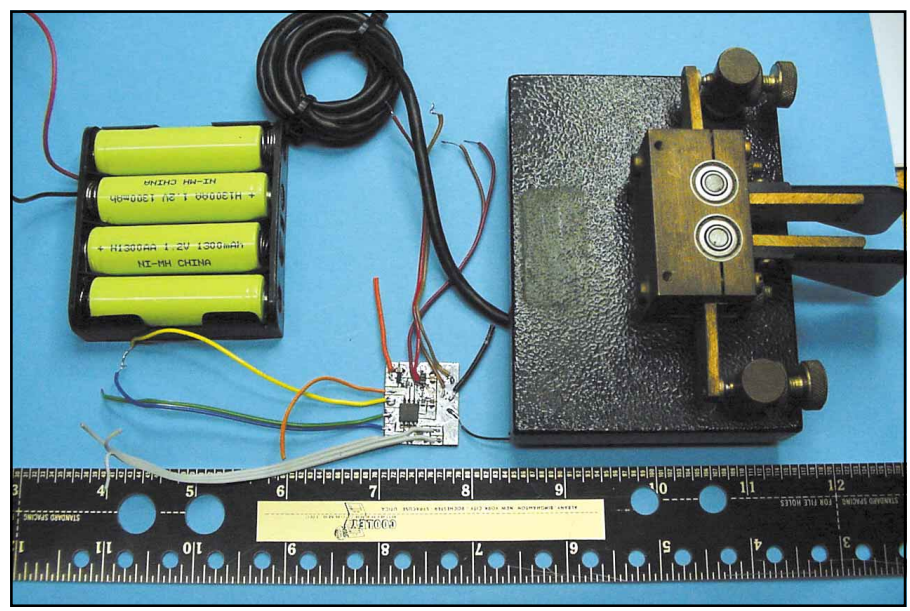


Figure 1—A small circuit with large paddles and batteries is *not* a small keyer!

I wanted to use a state-of-the-art 8-pin CMOS microprocessor (such as a PIC chip) because of its small size, minimal current drain and low-voltage functionality. Although I have programmed microprocessors for two previous keyer projects, I didn't have the equipment, nor did I want to spend the time to learn the PIC programming language. Fortunately, Steve Elliott, K1EL, had a nice PIC-based keyer IC and, when I asked him if he would be willing to cook up a surface-mount version for my "record attempt," he enthusiastically agreed. You don't have to use this preprogrammed PIC; there are other choices available that can be

[1]Notes appear on page 38.

adapted to this keyer. See the sidebar, "Selecting a Keyer IC."

The Circuit

Figure 2 shows the schematic for my keyer—the K10 keyer circuit by K1EL, adapted for this project. Changes include using the low-current version (PIC12LC672) rather than the standard version (PIC12C672) of the microprocessor, the addition of a bulk capacitor and a voltage-based MOSFET that replaces the current-based output transistor. The low-current microprocessor operates at a lower voltage and uses half of the current of the standard version. The bulk capacitor absorbs current pulses, extending the life of the high-impedance battery. It is important that this capacitor be a low-leakage type because it is always connected across the battery. Using an output MOSFET instead of a transistor reduced current demand by 30%. In addition, Steve changed the code to allow a quicker transition to sleep mode to further reduce power consumption, and he adjusted the sidetone frequencies to include some higher pitches to match the frequency response curve of the Piezo transducer.

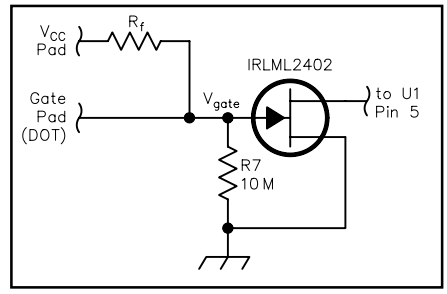


Figure 3—Finger resistance equivalent circuit.

Pins 5 and 6 are the dot/dash inputs. They are activated when these pins go *low*. Although pin 6 has an internal pull-up to keep it normally high, pin 5 needs an external pull-up, R1. Pin 7 is the input for an A/D converter that is built into the IC. This converter allows programming flexibility because it can measure the input voltage and perform actions based on that voltage. Steve chose to use it for three additional message memories (for a total of 4) and as a driver for a speed-control potentiometer. My keyer design doesn't use the speed pot because of its size and there are other ways to vary speed. The voltage at pin 7 is set by the voltage divider comprised by R2 and R4, R5 or R6. The pin voltage is normally held at V_{cc} by R2, but when one of the memory pads is pushed, the voltage divider causes the voltage to drop, which is detected by the microprocessor.

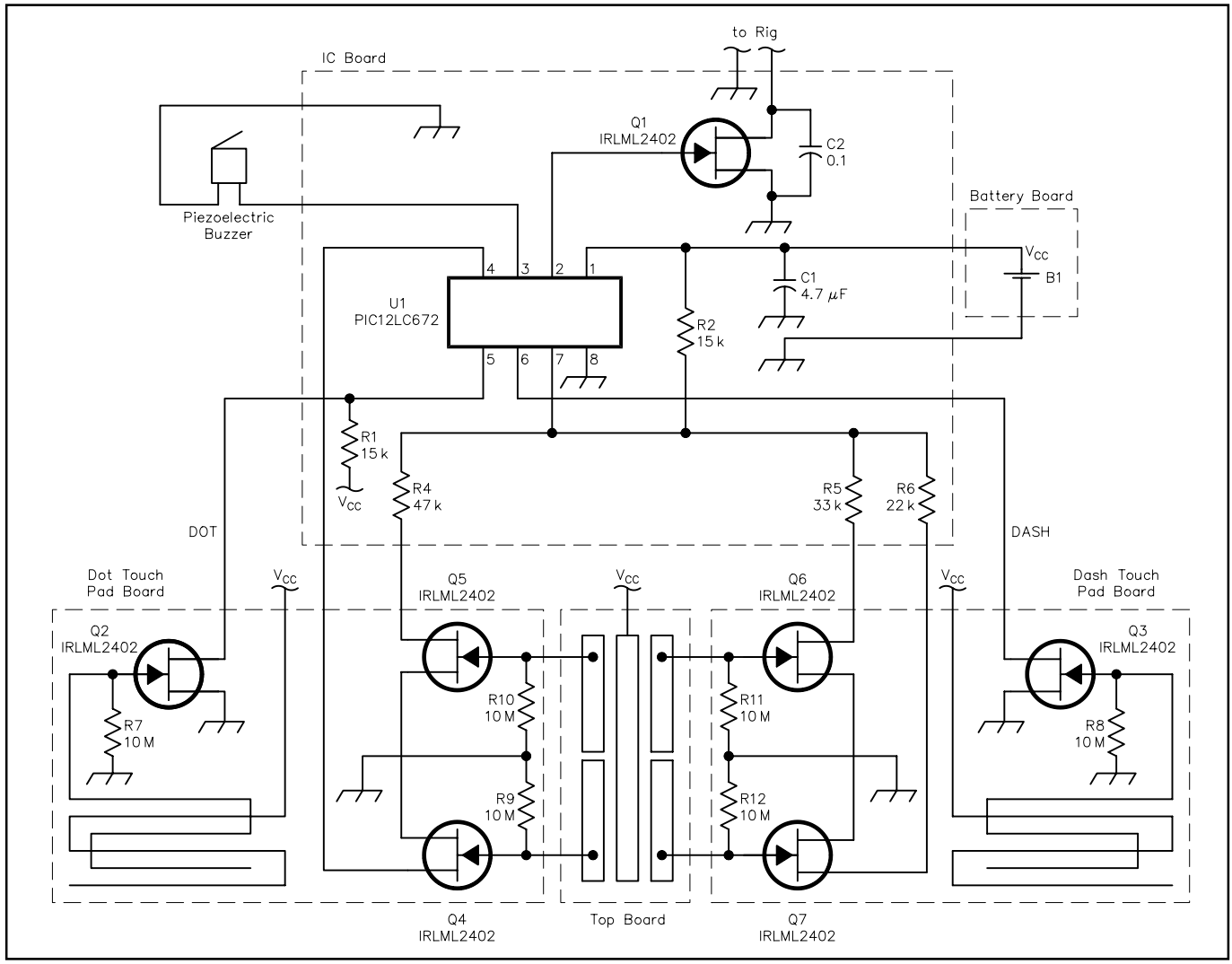


Figure 2—The keyer schematic showing the location of the parts on the various boards. DigiKey part numbers are shown in parentheses. Contact DigiKey at 800-344-4539, or on the Web at www.digikey.com. R3 is not shown; it is not needed when Q1 is a MOSFET.

B1—Lithium coin-cell battery.
C1—4.7 µF ceramic (PCC1842CT).
C2—0.1 µF ceramic (311-1142-1-ND).
Q1-Q7—IRLML2402 (RLML2402CT-ND).
R1, R2—15 kΩ (P15KACT).
R4—47 kΩ (P47KACT).
R5—33 kΩ (P33KACT).
R6—22 kΩ (P22KACT).
R7-12—10 MΩ (311-10MECT).
U1—PIC12LC672 (preprogrammed from K1EL. See text.).
Piezoelectric buzzer, low voltage.

Selecting a Keyer IC

Having built two keyers from scratch, I know that developing code for the microprocessors is very time consuming and often frustrating. I determined early that I would only attempt this project if I could find a "commercial" CW keyer IC to use.

One that I considered was my very own Remote Keyer described in the July/August 2000 *QEX*. I did not use it because the IC could not meet the requirements I had set out for the project. It was too large at 20 pins and it needed 5 V.

I selected the K10 keyer chip by K1EL because it was PIC based, was small and because Steve, K1EL, was willing to modify it to meet the voltage and power requirements I wanted. I had first built this project using one of his original keyers with two lithium batteries and found that it worked well and used relatively little power. The article discusses the changes Steve made to optimize his chip for this project.

Another possible choice would be the TiCK-series chips available from Embedded Research at **www.frontiernet.net/~embres/tick-emb.htm**. You'll need to adapt my circuit for the TiCK pin configuration according to the information provided from Embedded Research.

The granddaddy of keyer chips was the Curtis 8044ABM, but this IC is no longer manufactured. Even so, they still pop up at flea markets and elsewhere. Some Amateur Radio parts vendors may even have a few tucked away. If you find one, see the ARRL Technical Information Service page on the Web at **www.arrl.org/files/infoserv/tech/curtis.txt** for pin-out information. A current replacement is the Curtis 8045ABM, available from MFJ (**www.mfjenterprises.com**).

Pin 4 is the "Command" input and action is initiated when this pin is taken low. Pin 4 actually performs a number of functions, including memory storage and speed changes, as well as command inputs. (See the sidebar, "Main Features of the Keyer IC," for command functions.) Pin 3 outputs a tone to a piezoelectric buzzer and is normally used to signal the IC's response to input commands but can also be used as a sidetone if you want to use the training features of the chip. Q1 is the output MOSFET that keys a solid-state rig.[2]

Q2 and Q3, which perform key roles, are high-impedance MOSFET buffers for the touch pad inputs. IC1's dot/dash pins have impedances around 20 kΩ, which is much too low to permit direct touch keying because of the relatively high resistance of human skin. Q2 and Q3 are held low (normally off) by 10 MΩ resistors R7 and R8. Pressing the dot touch pad inserts the finger resistance between V_{cc} and the gate of Q2, which provides a voltage determined by Equation 1 (Figure 3 shows the equivalent circuit). Q2 and Q3 are those "neat MOSFETs" I discovered when doing my series on surface-mount devices.[3] They conduct when a voltage greater than 1.6 V is applied to the gate. This means that a finger resistance, R_f, of less than 8 MΩ will turn on the MOSFET and trigger the keyer. Most people's finger resistance is less than 2 MΩ[4] so only a light touch is needed.

$$V_{gate} = V_{cc}(R7/(R7+R_f)) \qquad \text{Eq 1}$$

Main Features of the Keyer IC

- Speeds from 5 to 59 WPM.
- 95 stored characters can be divided among four memories in any configuration.
- Keying modes include straight key and Iambic A and B.
- Variable element weighting in 32 steps.
- Paddle-swapping command for multi-user convenience.
- Adjustable sidetone.
- Two code practice modes.
- Low power consumption—no on/off switch required.
- Small size.

Changing Keyer Conditions

- Press and hold the Command Pad until the keyer responds with an "R," then input a command.
- Press and hold the Command Pad, touch a dot or dash paddle before the keyer sends "R" to "fast change" the speed up or down in increments of 2 WPM.
- Press a memory pad after keyer responds with "R" to "fast load" that memory.
- Press and quickly release the Command Pad to send the contents of memory 1.
- Press and quickly release M2, M3 or M4 to send the contents of that memory.
- If you enter an illegal command the keyer responds with "?."

Keyer Command List

This partial list of the commands gives an idea of the capabilities of the keyer. A full data sheet is available at the author's Web site at **n4uautoo.home.sprynet.com**, or the K1EL Web site at **www.k1el.com**.

A—Turn sidetone on/off.
C—Set speed of command input and output.
K—Toggle straight key/Iambic keyer functions.
L—Load memory while transmitting.
M—Load memory off line.
P—Start receive code practice mode.
Q—Query current speed settings.
R—Review a message without transmitting.
S—Set sending speed from 5 to 59 WPM.
T—Sends a constant tone for tuning.
U—Sets auto spacing between letters (very useful when storing messages).
V—Start transmit code practice mode.
W—Change element weighting.
Z—Change sidetone frequency.

The Power Supply

The keyer operates from 2.5 to 5.5 V and typically draws less than a milliamp when running and 2 microamps when sleeping. Because of these low power demands, the keyer runs on a single lithium coin battery.[5] I chose to use a size 2032 battery, which is relatively large but has a 200 mAh capacity. If the keyer is used for hour-long QSOs each day (transmitting half of the time), the battery should last for more than a year.

The Touch Pads

Touch pads offer several advantages over paddles. They're smaller, much more robust and have no moving parts. In addition, they're easy to home-brew (no machine shop required) and much less expensive. You can drop this keyer on the floor and it will still work. I don't recommend doing this routinely, but if you do that just once with a set of paddles you'll almost certainly be shopping for new ones.

The design was influenced by several factors. First, the pads had to make good electrical contact with the fingers when lightly touched. A light touch is critical to keying smoothly and swiftly. Second, because of the high impedances involved, the PC board resistance between the V_{cc} pad and the MOSFET gate pad had to be very large so it wouldn't cause the keyer to trigger because of dirt, humidity, etc. I made the touch pads on single-sided PC boards, drilled a series of holes in the board and ran #24 solid solder-coated wire to form a grid. One wire goes to V_{cc} and the other goes to the gate of the buffer MOSFET (see Figure 4). When my finger contacts the wires, the resistance between them is reduced.

Two design features help to ensure a low resistance. First, the wires are above

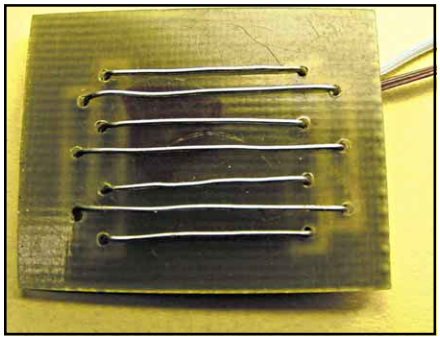


Figure 4—A touch pad as seen from the touch side.

the surface of the PC board so they tend to press into the skin more than if I had used traces etched into the copper clad. Second, the fingers make contact with the wires in several places at the same time, causing a parallel resistance condition that reduces the overall resistance. This design also minimizes false triggering because of surface conductivity. The wires make poor contact with the PC surface and the wires are small but the spacing is large. (Other touch pad designs are described in the sidebar, "Experimenting with the Keyer," if you want to experiment.)

Experimentation showed that finger orientation was important to me, and that my fingers don't always make contact at exactly the same spot every time I touch the pad. The first pads I built were on horizontal pieces of PC board because they were easy to build and sturdy (but sent poorly). Clearly, my "finger-brain coordination" preferred vertical paddles spaced about 3/4-inch apart and positioned about 1/2-inch above the table. This suggested the configuration shown in Figure 5; the IC board and piezo are between the vertical touch pads and the base section contains the battery.

An interesting design requirement arose in the process of testing the touch pads. They worked fine most of the time, but would occasionally stop sending. Because this happened when I was operating off line, I knew it wasn't RFI. Investigation showed that the problem was caused by body resistance and capacitance when my non-sending hand was touching the base section, which was connected to ground via solder joins. To eliminate this problem, I isolated the base from ground by making cuts in the foil on the top of the battery board where the touch pads connect. (See the sidebar, "Effects of the Body for the Intellectually Curious," for an analysis of this effect.)

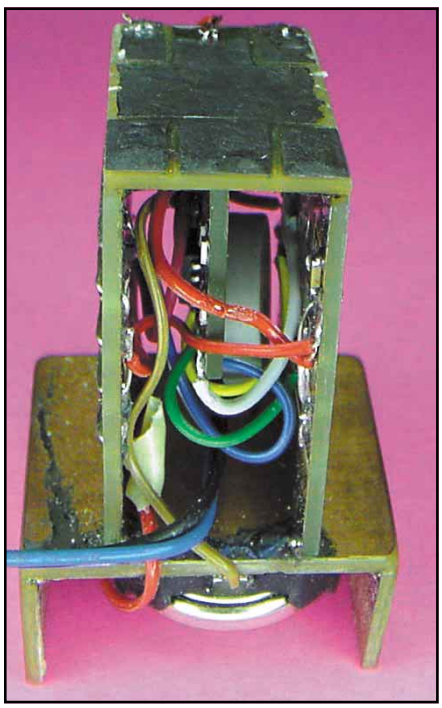


Figure 5—Shown here is the U-shaped touch pad section mounted on the top of the base section. All parts are in place. Note that the IC board and piezo buzzer are located between the touch pad boards.

Layout and Construction

Construction of the keyer is novel because the entire assembly is made from PC board material. There are no boxes, screws or fasteners. Instead, all of the boards are soldered together. Soldering PC boards together might seem like a new approach, but I first learned about it a number of years ago when reading an article by Doug DeMaw[6] on making RFI-tight enclosures. I made all my prototypes using a hacksaw, my Dremel method[7] of cutting traces in the foil and the Dremel drill accessory to drill the holes. A kit of parts is available.[8]

The keyer is made from seven pieces of PC board (see Figure 6). The layout and parts-mounting details I used are available as JPG files on *ARRLWeb* (**www.arrl.org/files/qst-binaries/layout.zip**). The two boards for the touch pads are single sided and the rest are double sided. There are three sections: the IC circuit board, the touch pad section and the base section. The base section

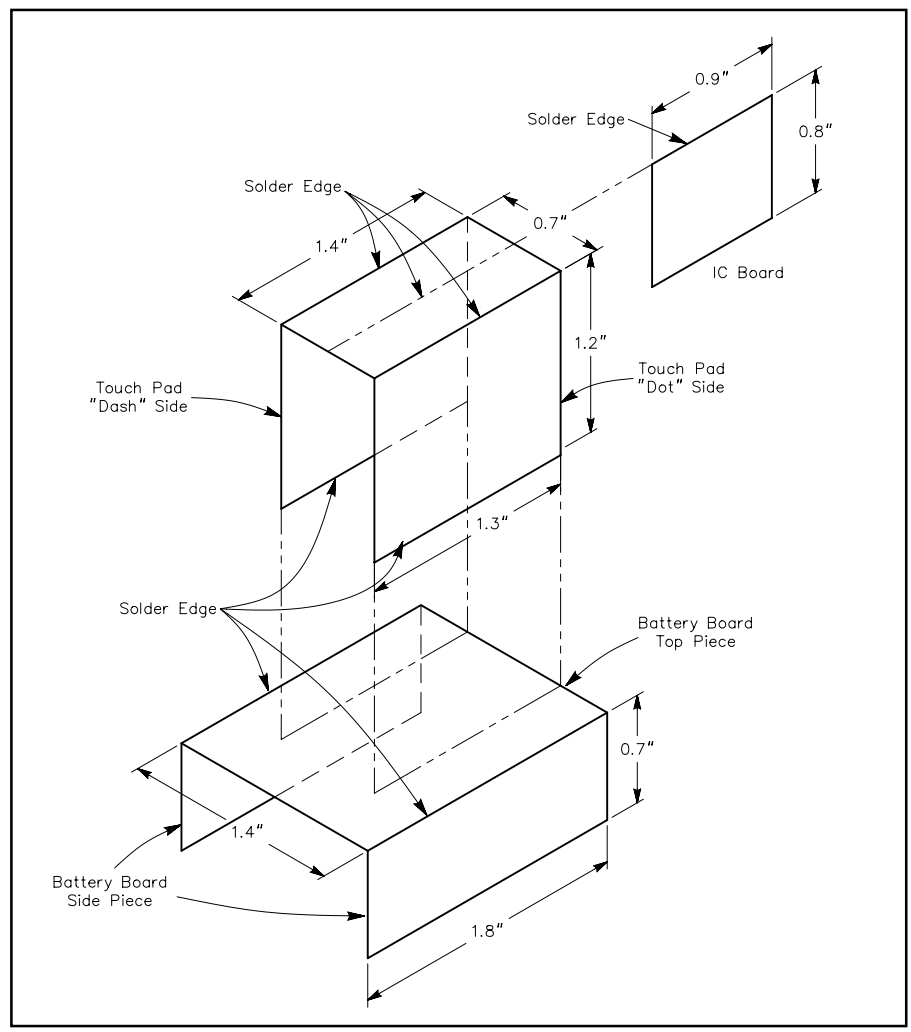


Figure 6—Assembling the seven boards to form the keyers.

Experimenting with the Keyer

Standalone Paddles

The keyer's touch pads will work with any modern keyer. A friend, ND7K, built a version using two AA batteries to power the MOSFETs (and add weight to the paddles). The batteries ought to last a lifetime as the MOSFETs draw no power when off and less than a microamp when the paddles are touched.

Cutting Touch Pads with a Dremel Tool

I built a set of touch pads by cutting them into the foil with a Dremel tool. The pads worked fine but exhibited occasional problems. At first I thought the problems were RFI related, but further experimentation showed that the problem was probably related to moisture or dirt between the fingers of the pads. Increasing the space reduced the problems substantially. This is an area for more investigation.

A Low-Impedance Touch Pad Keyer

To key the microprocessor directly from its dot and dash inputs, the resistance between the inputs and ground must be 5 kΩ or less. A bare finger will not key the circuit. I was puzzled by how to make the touch pad work directly with my finger when my wife, KD4DZX, found the solution. She wanted me to wrap some food in aluminum foil. Aluminum foil has a very low resistance and I found that I could wrap it around my finger and, when I touched the pads, the keyer worked! I had good tactile feedback because the foil was so thin and flexible. Further, because of the low resistance involved, I could simply use my Dremel tool to cut the touch pads and the memory pushbuttons directly into the copper foil.

The low-impedance version affords a more compact layout. If you hold this keyer in your left hand, bare fingers will not key the keyer so it doesn't matter if they contact the touch pads as it does with the high-impedance version. Additionally, body effects will be nil because of the low resistance involved.

If you don't mind a raised eyebrow or two, there are other ways to reduce finger resistance; here are a few I tried (not recommended for group Field Day settings): Aluminum duct tape (used for heating vents) cut into small pieces and stuck to my fingers worked well; I also tried using guitar picks to hold the tape but found them to be too rigid. A wire wrapped around my finger didn't work very well because it tended to be below the skin level. A bandage made conductive with aluminum tape, or a latex glove coated with shellac and graphite powder seemed to offer some promise. There are many more possibilities to try. Figure A shows a low-impedance keyer in action with "aluminum foil resistance reducers."

Making the Keyer even Smaller

It would be easy to mount parts on both sides of the PC board to greatly reduce the size of the IC board. If you substitute a surface-mount LED and resistor for the Piezo, you can make a keyer circuit that's about the size of a postage stamp. Combining that with a smaller battery and bare wires for the touch pads could produce an extremely small keyer. (I experimented using a surface-mount LED in place of the Piezo and found it easy to recognize the microprocessor's responses when the Command speed was set to 15 WPM or less.)

Using the Keyer with Standard Paddles

Because of its small size and power demands, the keyer is worthwhile even if you don't want to use the touch pads. If you simply want to use the keyer circuit, it's possible to mount all of the parts except the memory buttons underneath a standard paddle. See Figure B.

RFI Thoughts

RFI hasn't been a problem for me, but if your variant has RFI trouble, you could add a small capacitor between the MOSFET gates and ground. Keep in mind that the capacitor will need to be around 1000 pF or less because of the long time constant involved with the 10 MΩ resistor.

Ideas for Field Day Use

It should be possible to power the keyer from a small solar panel—a great alternate power use for Field Day. The touch pads can probably be used for a long time when powered by a charged capacitor (if you use one with low leakage). Would a small loop antenna, a diode and a storage capacitor extract enough power from the Field Day ether to provide the few milliwatts needed to run the keyer?

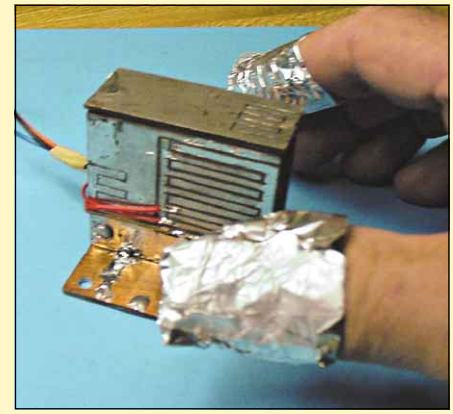


Figure A—Low-impedance keyer with aluminum foil "impedance reducers."

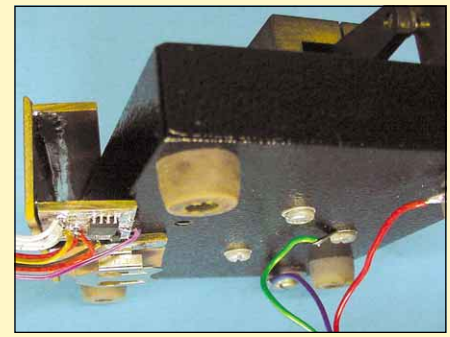


Figure B—The keyer mounted on a Kent Paddle. Build the circuit on a U-shaped set of boards to fit your paddle. The circuit board and battery board will fit under the paddle and only the pushbuttons and piezo buzzer will be visible on top.

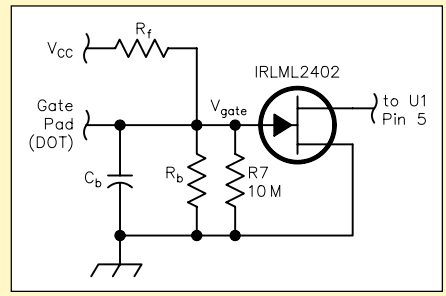
holds the battery and provides a stable base. Because the keyer is small and lightweight, you must hold it firmly in your left hand so it doesn't move as you touch the paddles. I used two pieces of PC board for the sides of the base plate, but you could use standoffs if you prefer.

I built the electronic circuit on a separate board (IC circuit board) instead of combining it with one of the touch pad boards. This allows for a flexible layout (helpful when experimenting) and offers some insurance for home-brewing the PC board. If I made an error cutting the board I would only have to redo it and not the touch pads as well. I mounted all the parts on the same side of the board because it's easier to integrate the circuit board with the rest of the keyer. Building the IC board requires straightforward surface-mount construction techniques and is fairly easy to do with my Dremel method.[9]

The touch pad section consists of three boards. The sense wires are run through holes in the single-sided boards and soldered in place on the foil side. Exact placement of the wires isn't critical, but it's important that they lie flat on the board, as any high spots will tend to make your keying less precise. The high-impedance buffer parts are mounted on the foil side. These boards get soldered to the top board, which has the command and

Effects of the Body for the Intellectually Curious

By using a simplified circuit, it's possible to analyze the effects of the body on the touch pads. If you don't touch ground with your non-sending hand, the key circuit looks like that shown in Figure 3; Equation 1 gives the voltage at the MOSFET gate. If you touch ground, your body resistance is inserted between the MOSFET gate and ground, in parallel with the 10 MΩ resistance. In addition, the body acts as a capacitor. This forms an equivalent circuit as shown in the drawing.



Body effect equivalent circuit (simplified).

You can easily see and calculate the resistance and capacitance effects of your body with a DVM and a stopwatch. Connect the DVM between ground and the MOSFET gate pad. Lightly touch your finger to the pads. If you're not also touching ground, the voltage on the gate should jump instantly to around 3 V. If you are touching ground you will see the observed voltage slowly increase to a value less than 3 V. Press harder and the voltage rises more quickly and to a higher value than if you touch it lightly. As I said, this project has room for a lot of experimenting!

Not touching ground when keying:
Battery voltage 3.25 V
Gate voltage when finger touches pads = 3.0 V
R7=10 MΩ

From Eq 1: R_f (finger resistance) = 833 kΩ

Touching ground when keying:
Battery voltage = 3.25 V
Gate voltage (maximum after several seconds) = 1.90 V
Time for voltage to start keyer working (at 1.66 V) = 2 seconds
R_f (as determined from above) = 833 kΩ
R_b (body resistance) = 1170 kΩ (use Eq 1 and ignore effect of the 10 MΩ resistor because R_b is much less)
The keyer turns on at 1.66 V, which is 87% of the final voltage of 1.9 V. Eighty-seven percent is approximately two time constants (from the *ARRL Handbook*). Because a time constant is defined as: $T = R_aC_a$, we calculate C_b (body capacitance) = 5 µF

This means is that the voltage at the gate will be lower when touching ground because of the low body resistance. The body capacitance delays the MOSFET "turn on time"—so the circuit works, but not fast enough to send code. R_f, R_b and C_b all depend on the pressure applied to the pads. The effect is more noticeable for a light touch and for lower values of V_{cc}.

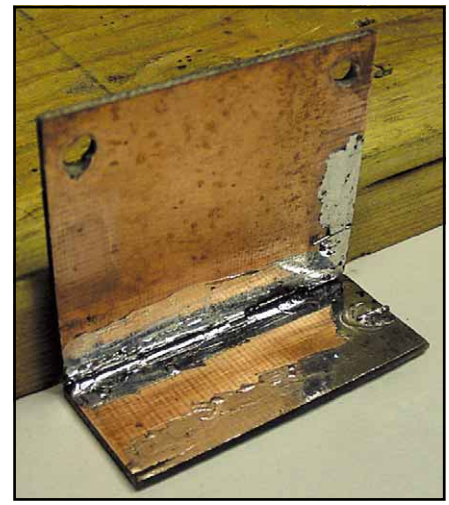


Figure 7—Use a poor ham's 90° jig when soldering the boards.

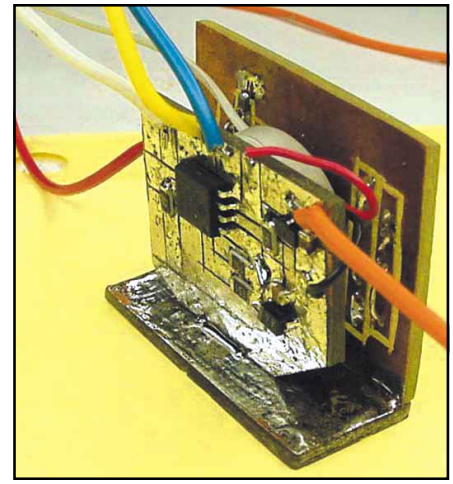


Figure 8—Soldering the IC board to the top board between the touch pad boards.

memory push pads, to form a U shaped, three-sided box. The push pads work in the same fashion as the touch pads, but because a light touch isn't important for them, they are simply rectangular pads cut in the foil. It's important that the keyer sit squarely on the table, which means that the parts need to be cut and soldered squarely. To help square things up I placed mine next to a board while soldering (see Figure 7).

The battery section is made from three pieces of double-sided board—a top and two sides. The battery holder is on the underside of the base top. I mounted the side pieces just slightly in from the edge of the board and soldered them to the battery board on both sides with quite a bit of solder for strength. Be sure to orient the battery holder so the battery can slide in and out of the open side! If you drill a small hole in the battery board behind the battery, you can route the wires through it, which will make the layout neater and provide strain relief for the wires to the rig.

To solder the board edges together, clean the PC board and lightly solder coat the edges.[10] The idea is to get enough solder to tack the two boards together, but not so much that they don't sit flush. After tinning, position the board, touch the iron to the joint and you should get a tack point. Do this at both edges and then go back and add a bit more solder to strengthen the joints. If you make a mistake and need to unsolder a pair of boards, a single-edge razor blade works well to separate the parts. Work it between the parts as you heat the solder and hold it there until the solder cools. I strongly recommend using just a little solder at the corners of the boards to hold them in place until you are certain that the keyer is working correctly.

Soldering the touch boards and the IC board together has to be done in the proper order. Some wires need to be connected to each board before assembling the boards because of the tight clearances involved (see Figure 8). I suggest you do a "dry run" before you actually solder the parts together so you can see which wires will be impossible to reach once the parts are assembled. Handle this section gently until it's soldered to the base.

Solder the battery holder to the underside of the base top and attach the sides. Solder the touch pad subassembly to the base (you only need to tack solder the four corners) and connect the power wires to the battery.

Operating the Keyer

The keyer operates in a fashion similar to most modern keyers. (Some of its

features are shown in the sidebar, "Main Features of the Keyer IC."[11]) Because of its low current drain, no ON/OFF switch is needed. When you stop sending, the keyer goes into a sleep mode that draws only 2 µA. Touch a touch pad or push pad and the keyer instantly wakes up. Because power is always supplied to the keyer, it retains all of its settings and memories. You simply have to sit down and start sending. To change the keyer's operating conditions, use the Command push pad as described in the sidebar.

You can use the keyer as a straight key by issuing the "K" command and then turning the keyer on its side so you can tap the dash pad, which acts as the straight key input. To me, the feel is much like using a straight key.

The keyer allows a total of 95 Morse code characters to be stored in its four memories. The partitioning is flexible, so each memory "message" can be from 0 to 95 characters, as long as the total isn't greater than 95. Thus, if you choose to use only two memories you still have a total of 95 characters to work with.

In addition, the keyer offers two practice modes to help you with your Morse code proficiency. In receive practice mode the keyer will send five-letter character groups for you to copy. In transmit practice mode it will send a letter, pause for you to send the letter yourself, and indicate whether you sent it correctly.[12]

If you already have a keyer that you enjoy, you can build just the touch pads and use them to operate it. I hope you try this project and make several versions of it—like I did! Experimenting with new technology is fun and educational! Isn't that what ham radio is all about? I would love to see the innovative designs you come up with.

Notes

[1]"World's Smallest Code Practice Oscillator," *QST*, Feb 2001.

[2]Modifications necessary to use the circuit for tube based rigs are shown in the K1EL data sheet for the K10 at his Web site (**www.k1el.com**).

[3]I like to use surface-mount parts because they incorporate state-of-the-art technology. These simple MOSFETs are a good example. Since I found them and used them in Part 4 of my surface-mount project (see footnote 7, I have used them in two other projects because of their unique characteristics! Why are they so "neat"? Most MOSFETs need 5 V or more to turn on, so they wouldn't work in this project. It's also possible to use a comparator for this job, but comparators draw current and will cause the battery to drain much more quickly. The MOSFETs draw essentially *no* current.

[4]You can check this out by holding the two probes of an ohmmeter between your fingers and reading the resistance. Note that because of its high input impedance, the meter may take a while to settle on a final reading. If you have dry skin the reading may be quite high. Using a little hand cream will usually substantially reduce skin resistance.

[5]You can also build a touch pad keyer using the standard 12C672 IC that K1EL sells, but you will need to make sure the voltage stays above 3 V and expect your batteries to run down faster.

[6]"Experimenting for the Beginner," *QST*, Sep 1981, p 11.

[7]"Surface Mount Technology: You Can Work With It," *QST*, Apr-May-June-July 1999.

[8]A kit of parts is available from the author. For the keyer section, it includes the keyer board (IC Board #1) and all the parts in the parts list for that board plus the piezo, small gauge hook up wire and fine solder. For the touch pad section it includes a single etched and drilled PC board containing the boards and side pieces. In addition it includes solid tinned wire for the touch pads, four MOSFETs (Q2, Q3, Q4, Q5), four 10-MΩ pull-down resistors and a lithium 20-mm size battery holder. The board is supplied as a single board about 1.2 inches wide and 6 inches long and requires a hacksaw to separate the pieces. The cuts are marked and only involve cutting the width of the board. Use of a mitre box insures a square cut. See photos on my Web page. Price for the kit is $30. If you wish to build just the touchpads, the cost is $16. Prices include postage in the US and Canada. Shipping overseas add $1.50. Florida residents please add 7% sales tax. Payments should be made by a US or international money order, a check payable by a US bank, or Western Union money transfer. Credit cards are not accepted. Send to Sam Ulbing, 5200 NW 43rd St, Ste 102-177, Gainesville, FL 32606.

[9]I recommend first doing some projects with bigger parts if you have never worked with surface-mount parts before.

[10]If you are working with a non-solder-coated board, lightly sand and flux the edges so the solder will adhere.

[11]See Steve's Web page or mine for a full data sheet.

[12]Because the buzzer audio output is rather low, an audio amplifier like my *SMALL* audio amplifier (Jun 1996 *QST*, p 40) could be a useful addition especially if you are using the learning feature with a group of hams. Another way to increase the volume of the piezo is to make a Hemholz resonator for it as described in Part 4 of my surface mount article (see Note 7).

Sam Ulbing, N4UAU, holds a BEE and an MBA from Cornell University. Soon after he became a ham in 1988, Sam started contributing project articles to QST, QEX and 73 Amateur Radio Today, many of them focusing on Morse code, his favorite mode of communication. Since his first project using surface-mount parts in June of 1996, he has become fascinated with using these parts for Amateur Radio projects. This project is his first cooperative effort with another ham. He hopes to have the opportunity to do similar articles in the future because he believes that the benefits of combining the skills and knowledge of several project builders will make it possible to develop more sophisticated Amateur Radio projects. You can contact Sam at 5200 NW 43rd St, Suite 102-177, Gainesville, FL 32606; **n4uau@arrl.net**; **n4uautoo.home.sprynet.com**.

NEW PRODUCTS

SYMETRIX DEBUTS AUDIO PROCESSING WEB SITE FOR HAMS

◊ In response to a growing interest in communications audio processing, Symetrix, a veteran manufacturer of audio processors for the broadcast market, has created an area on its web site dedicated to helping hams improve their sound and increase their overall modulation. The site focuses on Symetrix voice processors (such as the Model 528E, shown here), which are well-suited for use in RF environments. Reached from **www.symetrixaudio.com**, the ham radio section features product descriptions, operator testimonials, photos, and links to broadcast dealers that will extend their services to the Amateur Radio market.

DSP BLASTER 2.5 RELEASED

◊ *DSP Blaster* provides real-time DSP filtering and spectral analysis using your PC and sound card. The program uses digital signal processing to provide highpass, lowpass, bandpass, peaking, automatic-notch, noise-reduction, and coherent CW filters, as well as automatic gain control. *DSP Blaster* uses 100% assembly language to implement optimized, floating-point algorithms. The program requires a 486 PC or better, math coprocessor, VGA, mouse, 16-bit non-PCI Creative Labs sound card, and *DOS* 3.0 or later. *DSP Blaster* will run as a *DOS* application under *Windows*. To order, send $75, check or money order, to Brian Beezley, K6STI, 3532 Linda Vista Dr, San Marcos, CA 92069.

Next New Products

By David G. Mello, W1DGM

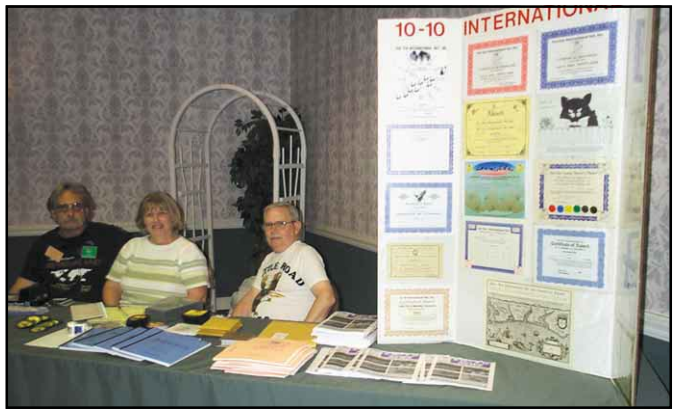
10-10 International Holds Eighth Biennial Convention

The hospitality sign is out.

The breadth of activities and the 241 10-meter enthusiasts at the eighth biennial 10-10 International Net Convention held July 12-14 in Worcester, Massachusetts, served as a solid reminder that Cycle 23 is still very much with us. On the other hand, 10-10 members are among the most enthusiastic of hams, regardless of sunspots. Those who registered represented 38 chapters from 33 states and 4 countries—the US, the UK, Germany and Canada. It was hosted by the Battle Road Chapter of Massachusetts.

ARRL Executive Vice President David Sumner, K1ZZ—a long-time 10-10 member with the membership number of 4852—addressed the Board of Directors. "10-10 and ARRL share a lot of common ground," Sumner said later. "Both organizations want to encourage activity on 10 meters and to preserve the allocation. It was a great personal pleasure for me to welcome the 10-10 Board and convention to New England." Other ARRL officials on hand included ARRL New England Division Director

Members follow intently as Ruth Bartholomew, N0KDB, conducts the W6OI "parking lot net."



ARRL Volunteer Examiner Ed Emco, W1KT, Linda Gross, KA6SPS, and convention manager Ken Harmon, K1IEQ, offer pins and memorabilia. On display are examples of certificates that caught the eye of 10-10 paperchasers.

Always state-of-the-art, the Battle Road chapter shows off its emergency communications vehicle.

Tom Frenaye, K1KI, and Southwestern Division Director Fried Heyn, WA6WZO, and his wife, Sandi, WA6WZN.

Volunteers greeted attendees at the Worcester Holiday Inn and escorted them to the convention room where much of the activity would take place. There were tables for each chapter that registered. Chapter members exchanged cards, exhibited mementos of their area of the country and conducted eyeball QSOs. One chapter offered framed photos of their neighborhood—maritime scenes of Chesapeake Bay. At another table one could purchase such convention memorabilia as cloisonné pins and of course the ubiquitous T-shirt.

The Parking Lot Net

Friday evening, after dinner, it was time for a curious ritual—the parking lot net. One table in the convention room was set aside as the official operating position for W6OI, the convention station. Net

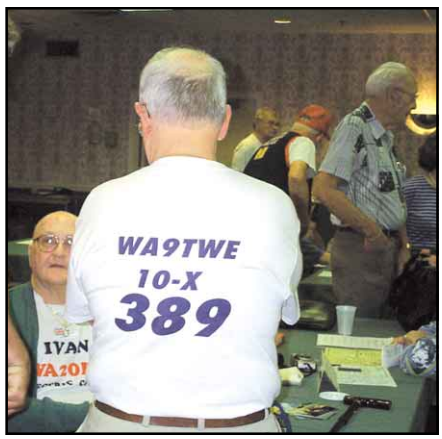
History of 10-10 International

The 10-10 International Net can be credited to Irv Hunter, K6PWO. In the sixties, because of poor propagation, and the resulting lack of interest, many amateurs abandoned ten meters. This mass exodus was cause for concern on the part of a lot of 10-meter enthusiasts. They reasoned that this lack of activity might cause the FCC to consider reassigning this portion of the radio frequency spectrum to some other service.

In March 1962, Hunter and other hams living near his hometown of Glendora, California got together at a picnic to consider forming an Amateur Radio organization to promote active use of the 10-meter band. The net would meet at 10 AM local time on 10 meters every day except Sunday. The name quickly became "10-10 Net." The organization grew slowly at first, but by 1975 there were 10,000 members, and the word International was added.

10-10 Today

The 10-10 International Net is a not-for-profit entity incorporated under the laws of the State of California. More than 72,000 10-10 numbers have been issued worldwide. Membership is open to any amateur who has 10-meter operating privileges. Each member is assigned a unique 10-10 number that is retained for life. When a member dies his number remains in the membership records and roster. For more information on 10-10 International, see **www.10-10.org/**.

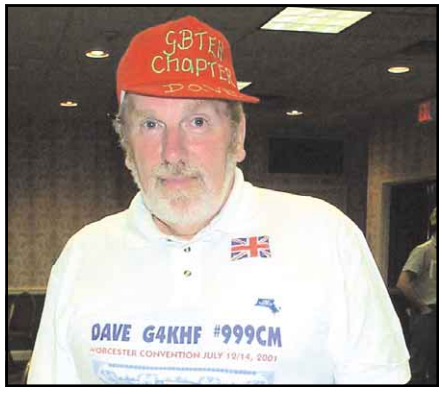


If there are more than 72,000 10-10 numbers, maybe, just maybe, WA9TWE has bragging rights.

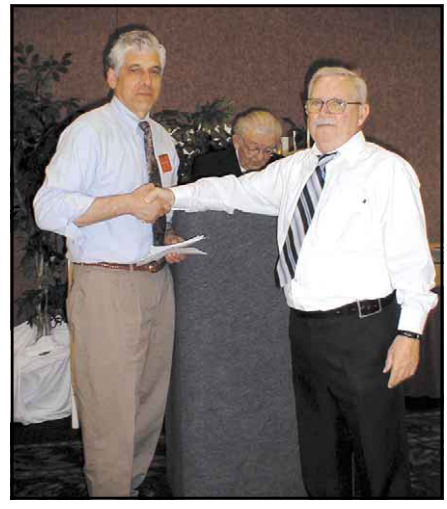
Elfi Herre, DF3TE, and Werner Theis, DH1PAL, enjoy their first stateside 10-10 convention.

Members of the Flying Tigers Chapter of Rhode Island swap cards.

Doris Slye, N3TGB, donated her hand-crafted quilt to the 10-10 scholarship fund. Bud Albright, KB9NZX, touts its qualities to passersby.



Dave Wilkinson, G4KHF, shows off his T-shirt and his 10-10 chapter.



Ken Harmon, K1IEQ, presents a check from the Battle Road Chapter to scholarship manager Larry Berger, WA2SUH, #00407.

Convention Coordinator Ken Harmon, K1IEQ (left), and ARRL New England Division Director Tom Frenaye, K1KI, take in a 10-10 chapter table presentation.

control station Ruth Bartholomew, N0KDB, called up every ham who had registered. Some had arrived in their own conveyances—RVs, bigger RVs, a Model A Ford communications coupe, and other, more mundane, vehicles. But many others came by bus or plane and were therefore present in the room when N0KDB began the call-up. Those who were operating from their vehicles in the parking lot replied when called. A person who was called, but was in the room, would take the mike from net control and transmit from W6OI! A line of people waited their turn to "QSL the net."

Awards, Scholarships, Forums and More

At a social gathering later that evening, 10-10 President Chuck Imsande, W6YLJ, presented the President's Plaque—for exemplary service—to Jean Henderson, the widow of past 10-10 president Tom Henderson, K4CIH, who died March 4. Harmon, speaking on behalf of the Battle Road Chapter, presented a check for $1000 to be added to the 10-10 International Scholarship Fund. The Fund awards five $1000 scholarships annually to children of 10-10 members.

For 2001, the recipients are Leslie K. Karp, KC6WZQ, Torrance, California; Joshua J. Long, N8CFS, Imlay City, Michigan; Jason Goldsberry, N5NU, Nacogdoches, Texas; Martin C. Worster, KD5LJT, Harrison, Arkansas, and John L. Walker, N4DMR, Cullman, Alabama.

Saturday's forums included Dennis Marandos, K1LGQ—QRP; Mike Davidson, N5MT—DXing; Bill Marple, AA7ZW—10-10 Net Control, and Hank Richroath, K5HWI—County Hunting. Imsande also spoke on "How to Present 10-10."

ARRL Volunteer Examiner Ed Emco, W1KT, conducted an exam session for 18 applicants. A Board of Directors' question-and-answer session was followed by an evening banquet.

Paperchasing

Paperchasing, the collection of Amateur Radio awards, is a fun part of the 10-10 experience. Paperchasers are not a large group, but they are very active and can usually be found around 28.345 and 28.825 MHz when conditions permit. 10-10 sponsors many categories of operating achievement awards for its members. Among them are 10-10 WAS, DX Countries Award, certificates for working 10-10 members, 10-10 WAC, 10-10 Mobile, and many others. In addition there are four annual contests. A CW QSO Party is held in the spring and fall and a SSB Phone Party in the spring and summer. There is also an all mode one-day "sprint" contest held each 10-10 Day—October 10, of course. The fall 2001 QSO Party will be October 27-28.

During 10-10 contest periods, 10-10 members are requested to observe a "quiet zone" between the frequencies of 28.490 and 28.510 MHz for the benefit of noncontesters. QST

By L. B. Cebik, W4RNL

An LPDA for 2 Meters Plus

Here's a high-performance 2-meter antenna with a nice bonus—it also covers 130-170 MHz, for your monitoring pleasure!

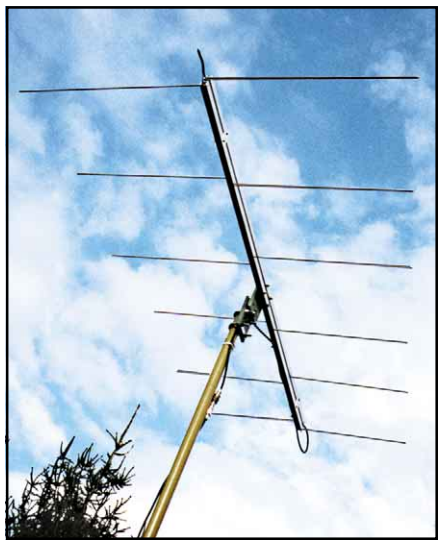
Building a log-periodic dipole array (LPDA) to cover all of 2 meters with good gain and a low 50-Ω SWR from 144 to 148 MHz requires about 6 elements and a 54-inch boom. The project would not make much sense (apart from satisfying raw curiosity), however, since that same number of elements on the same length boom can be arranged as a wideband Yagi with at least a dB more gain and an even lower SWR across the band.[1]

LPDAs find their niche wherever we need a wide operational passband with a relatively constant feed-point impedance. In the HF region, we typically build LPDAs for a 2:1 frequency range—for example, 14 to 28 MHz. Antennas with wider (10 to 30 MHz) and narrower (18 to 30 MHz) ranges are common. At VHF people have built wide-ranging LPDAs but most suffer from inadequate performance, except perhaps for general-utility purposes.

You can construct a fairly narrowband LPDA centered on 2 meters and built to high performance standards. It will also offer something beyond the range of Yagi performance—the ability to monitor frequencies from 130 to 170 MHz with a 2:1 or better 50-Ω SWR. However, the lowest SWR values and the best performance (in terms of gain and front-to-back ratio) occur within the transmitting region, namely the 144-148 MHz amateur band.

Such an antenna also serves other needs for sundry emergency and service functions, including coverage of CAP and other frequencies close to the amateur band. The region below 2 meters is largely devoted to aeronautical mobile services, while the region above

[1]Notes appear on page 46.



The LPDA with elements oriented horizontally.

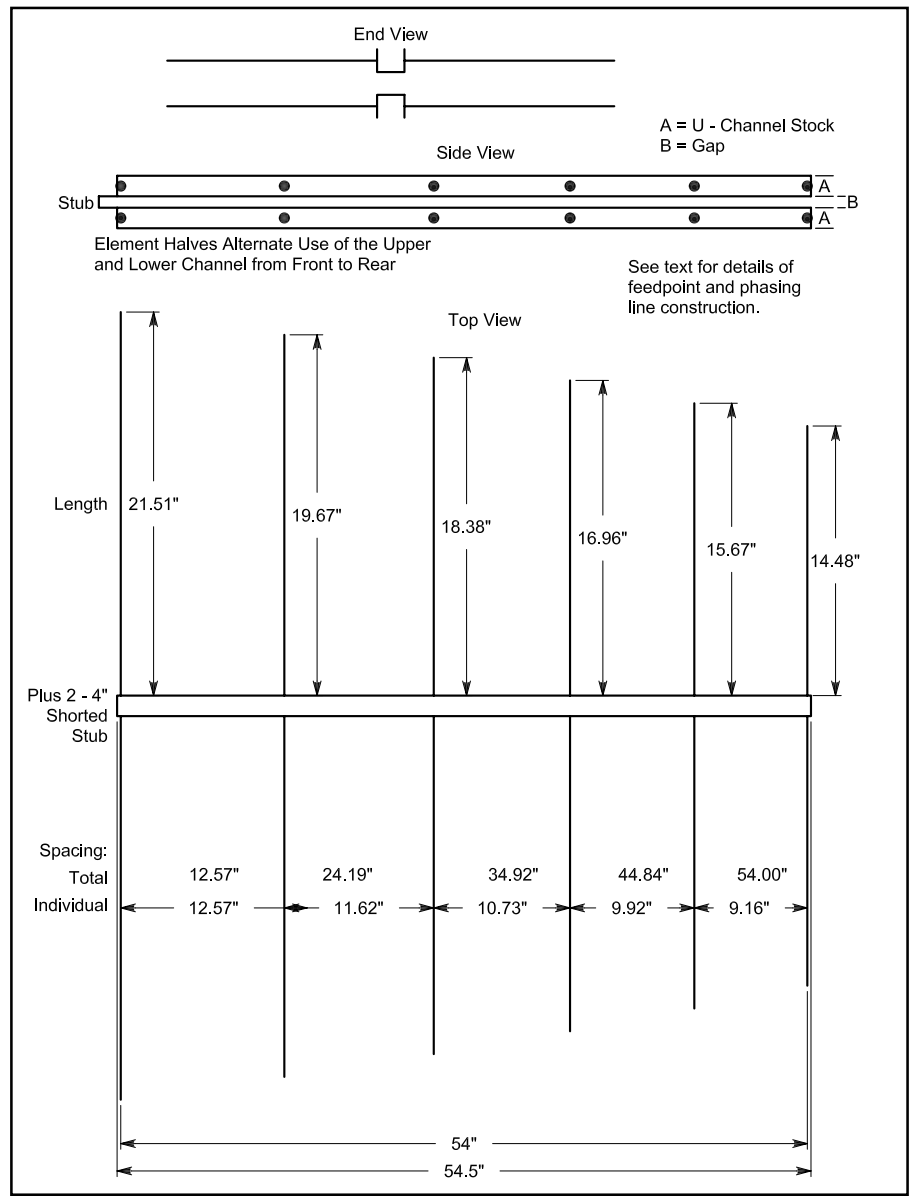


Figure 1—Outline sketch and dimensions of the 2-meter-plus LPDA.

2 meters is split between land and maritime mobile services. Let's see what an LPDA array to cover this wide frequency range looks like.

The Basic Design

Amateur-band LPDA design typically suffers from the attempt to use as few elements as possible on the shortest possible boom. LPDA design revolves around two mathematical variables: τ (*tau*), which defines the relationship between successive element spacings, and σ (*sigma*), the relative spacing constant. For every LPDA that uses less than the highest value of τ and the corresponding optimal value of σ, there will be only a few combinations that yield relatively high performance. For the present project, the design was restricted to 6 elements on a 54-inch boom, with a τ of 0.9238 and a σ of 0.1461. These values are short of the highest possible performance, but increasing τ would have required more elements and increasing σ would have lengthened the boom.[2]

For an LPDA, decreasing the characteristic impedance of the phasing line connecting the elements tends to increase array gain and to decrease the feed-point impedance. A 75-Ω phasing line yields acceptable 50-Ω performance from the array, with an average free-space gain across 2 meters of about 9.2 dBi. Since the front-to-back ratio of an LPDA tends to vary with the gain, it is uniformly high; that is, better than 30 dB across the band, with no strong rearward side lobes to decrease the overall front-to-rear ratio.

Figure 1 shows the general layout and basic dimensions of the LPDA that achieves this level of 2-meter performance. We shall examine a number of the construction details later in this article.

Of equal importance with the performance in the 2-meter band is how the array works across the entire operating passband. Figure 2 is a graph of the modeled free-space gain and front-to-back ratio of the LPDA from 130 to 170 MHz. The gain peak in the 2-meter band is readily apparent, with less but still useful gain above and below the desired design range. The front-to-back ratio only decreases below 20 dB above 160 MHz. The peak in the front-to-back curve is a normal LPDA phenomenon, since it peaks—often very sharply—at a frequency a bit lower than the peak frequency for gain.

For monitoring frequencies well outside the amateur band, these performance characteristics are quite serviceable. This LPDA was modeled with a 4-inch shorted transmission-line stub at the rear element. A stub between 2 and 4 inches long is necessary to avoid a pattern reversal at about 160 MHz, and it improves the overall performance of the array within the 2-meter band too. A stub length shorter than 4 inches will increase the 2-meter front-to-back ratio by about 2 dB, while reducing the operating range to a lower limit of about 132 MHz.

Figure 3 provides a look at the excursions of feed-point resistance and reactance. The curves are quite normal for an LPDA. These arrays tend to show maximum and minimum values of resistance and reactance—as referenced to a median value for each—in a relatively *out-of-phase* pattern. The result is a broadbanded SWR curve when plotted against the median feed-point resistance value, in this case, about 60 Ω.

The 50-Ω and 75-Ω SWR curves appear in Figure 4. Within the 2-meter band, 75-Ω cable would be a slightly better choice of feed line—if you are looking for the lowest possible SWR. However, for the widest operating passband at an SWR of less than 2:1, 50-Ω cable is the better choice, since the resistive component of the feed-point impedance shows values well under 50 Ω at the high end of the operating passband.

Mounting the LPDA

You can orient an LPDA either vertically or horizontally. However, at conventional mounting heights, which are often (but not always) below 5 λ above ground, antenna far-field gain will vary according to orientation. Figure 5 shows the modeled far-field performance of the array at a height of 25 feet (300 inches or

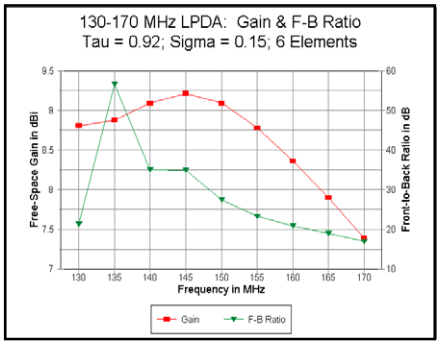


Figure 2—Modeled free-space gain and 180° front-to-back of the 2-meter-plus LPDA from 130 to 170 MHz.

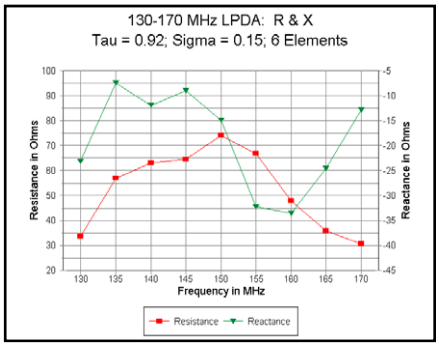


Figure 3—Modeled feed-point resistance and reactance of the 2-meter-plus LPDA from 130 to 170 MHz.

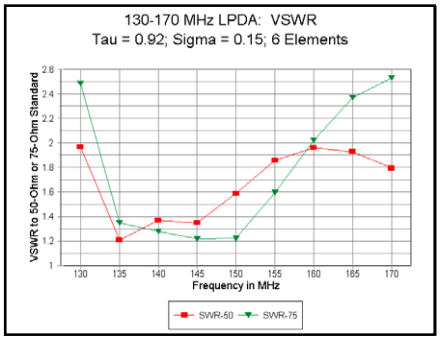


Figure 4—Modeled 50-Ω and 75-Ω VSWR of the 2-meter-plus LPDA from 130 to 170 MHz.

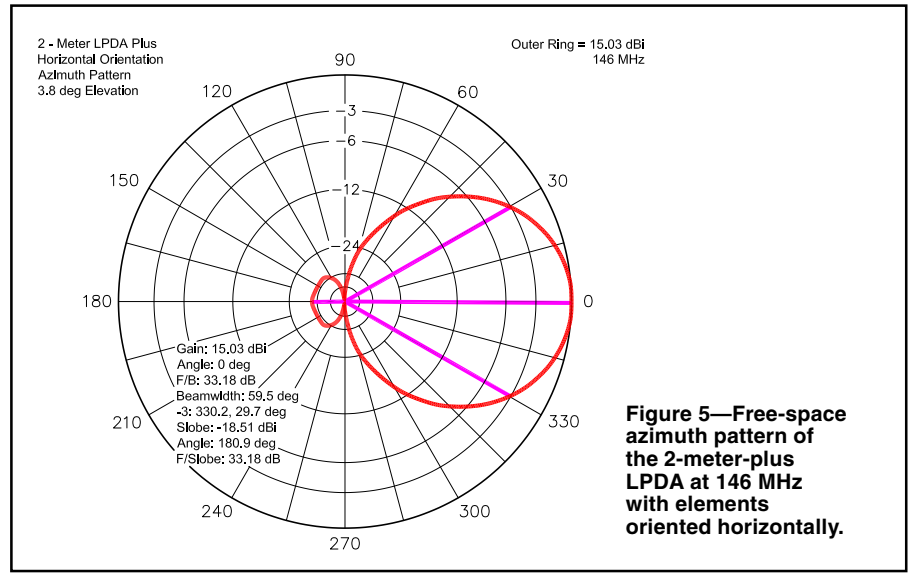


Figure 5—Free-space azimuth pattern of the 2-meter-plus LPDA at 146 MHz with elements oriented horizontally.

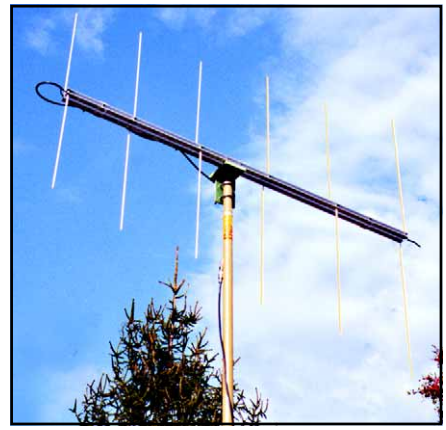
about 3.75 λ in the 2-meter band), with the antenna oriented horizontally. The operating frequency is 146 MHz. The 9.2 dBi free-space gain, when taking into account ground reflections, becomes just over 15 dBi at the elevation angle of maximum radiation (3.8°). Figure 5 also clearly shows the well-controlled rear pattern of an LPDA that uses high values for both τ and σ.

If we remodel the antenna to place the boom at the same height, but with the elements oriented vertically, we obtain the pattern in Figure 6. The –3 dB beamwidth has increased by about 25° for both the forward and rear patterns. The elevation angle of maximum radiation is 3.5°. The price of having a significantly wider beamwidth is forward gain, which is about 1.7 dB lower than the value shown in Figure 5 for the horizontal mounting configuration. An array must be well above 5 λ above ground before the gain figures for the two orientations begin to converge.

Questions arise from time to time about whether the far field patterns are good indicators of the antenna patterns in ground-wave point-to-point service. Figure 7 compares the relative patterns for the two orientations, using a receiving point 1 mile from the antenna at 25 feet above ground. It's clear that the antenna retains its pattern shape in point-to-point service. However, these patterns presume a clear field between the two antennas. Intervening objects and terrain variations can modify the actual performance of an antenna between any two stations.

Construction

Table 1 provides the basic dimensions of the LPDA array, in both inches and millimeters. The half-length values are important for construction, since each element is split at the center and connects to the phasing line.



The LPDA with elements oriented vertically. Use this orientation only with a nonconductive mast.

The boom and phasing line for this design are one and the same. I chose $^3/_4 \times ^3/_4 \times ^1/_8$-inch thick aluminum channel stock for the twin-boom. This stock can be obtained from some hardware outlets and can often be special ordered if not immediately available.[3] The choice of thick-wall stock (in contrast to the same material with a $^1/_{16}$-inch wall thickness) arose from the element size and mounting detail I selected for the antenna.

U-channel has been used in a number of commercial antennas for VHF and UHF booms. Very often, commercial antennas will pressure-fit elements into the stock. For home shop construction, I use a different system. I picked $^3/_{16}$-inch diameter elements because they remain strong when the ends are threaded for 10-24 nuts. If I had tried to use $^1/_8$-inch diameter elements, they would be fragile when threaded. The selection of 10-24 threads required thick enough U-channel stock so that the threaded holes have enough threads to grab the element.

Figure 8 shows a cut-away end view of the scheme. I drilled $^5/_{32}$-inch holes in the two sides of the channel stock for each half element and then threaded them for 10-24 bolts. About $^3/_4$- to $^7/_8$-inch of the end of each half element is also threaded. As I screwed the half element through the first side of the channel, I threaded two stainless steel 10-24 nuts onto it. I screwed the half-element end into the far channel wall until it just met the outer surface. Then I tightened the two nuts against the inner walls to lock the element.

Note that using this system requires that you add $^3/_8$ inch to each half-element length in Figure 1 and Table 1. The U-channel centerline is the reference point for all half-element lengths.

For my prototype, I used three nuts on the front half-elements, with a solder lug sandwiched between nuts on the element sides. I later soldered the coax cable to the feed-line lugs. The extra nuts on the rear element halves also do double duty when I added the shorted stub to the assembly.

The separation between U-channel faces is not at all arbitrary. The flat stock faces form a parallel transmission line. The use of flat-faced stock for the boom requires some adjustment when calculating the characteristic impedance of the phase-line. For conductors with a circular cross-section,

$$Z_0 = 120 \cosh^{-1} \frac{D}{d} \approx 276 \log_{10} \frac{2D}{d} \quad \text{(Eq 1)}$$

where D is the center-to-center spacing of the conductors and d is the outside diameter of each conductor, and D and d

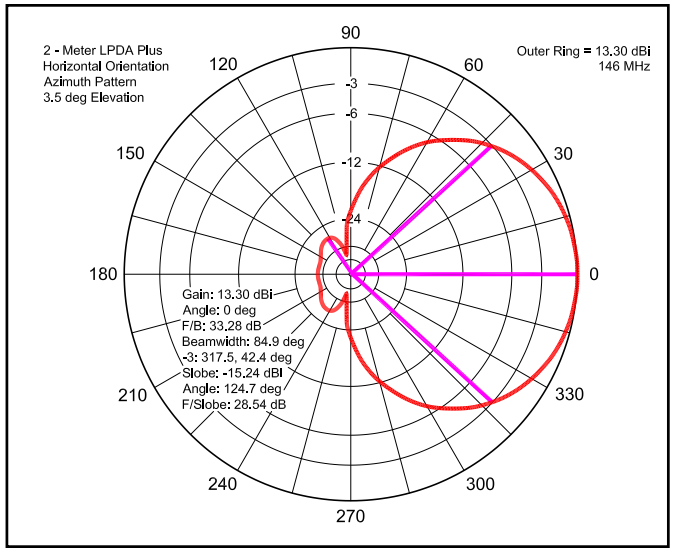


Figure 6—Free-space azimuth pattern of the 2-meter-plus LPDA at 146 MHz with elements oriented vertically.

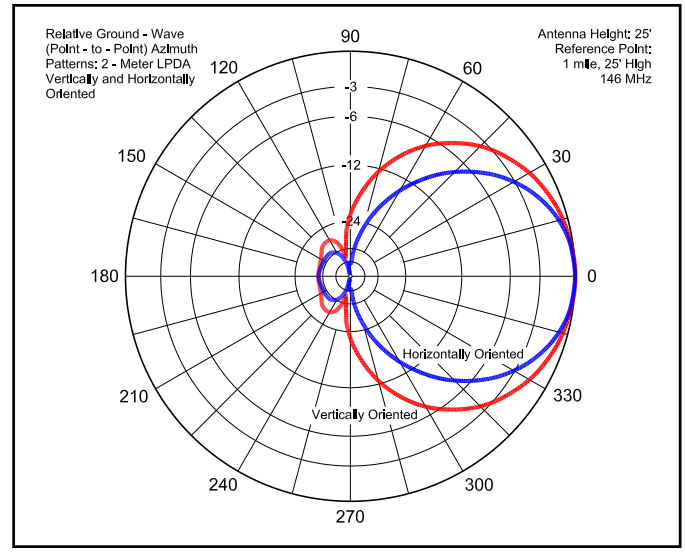


Figure 7—Relative ground-wave azimuth patterns with the elements oriented horizontally and vertically.

Table 1
2-Meter Plus LPDA Dimensions, in inches and mm

	inches				mm			
Ele #	Length inches	Half Length	Space from Ele n–1	Space from Rear Ele	Length mm	Half Length	Space from Ele n–1	Space from Rear Ele
1	43.02	21.51	—	—	546.3	273.2	—	—
2	39.74	19.87	12.57	12.57	504.7	252.4	319.4	319.4
3	36.72	18.36	11.62	24.19	466.3	233.2	295.1	614.5
4	33.92	16.96	10.73	34.92	430.8	215.4	272.6	887.1
5	31.34	15.67	9.92	44.84	398.0	199.0	251.9	1138.9
6	28.95	14.48	9.16	54.00	367.7	183.9	232.7	1371.6

are in the same units of measurement. Since we are dealing with closely spaced conductors, relative to their diameters, the following adjustment to the equation for calculating the characteristic impedance (Z_0) yields more accurate results. For a square or flat-face conductor,

$$d \approx 1.18\ w \qquad \text{(Eq 2)}$$

where d is the approximate equivalent diameter of the square tubing or flat-faced stock and w is the width of the stock across the facing side.

For a given spacing, a square or flat-face stock permits you to achieve a lower characteristic impedance than with a round conductor. The approximation is useful but not precise, especially for stock that is not perfectly square. However, it is only necessary that the phasing-line impedance be close to 75 Ω to achieve the desired results with the present array. For 3/4-inch U-channel, a spacing of about 0.32 inches (8.1 mm) is close enough for all practical purposes. The spacing can be adjusted during testing, with a closer spacing yielding—up to a point—a lower phasing-line impedance and feed-point impedance, with a potentially better 50-Ω SWR curve. However, too close a spacing (less than 0.25 inch or 6.3 mm) may be self-defeating, by altering array performance at one or the other ends of the operating passband.

Since the characteristic-impedance calculation presumes an air dielectric between conductors, I employed insulating spacers attached to the sides of the U-channel stock. Between the most forward element and the next one—and likewise between the rearmost element and the next one—I attached scrap Plexiglas strips on both sides of the twin boom. This is shown in the photo showing a side view of the array. At the boom center, I used a mounting plate with through bolts to support and separate the U-channel pieces.

The mounting-plate system was designed to permit the antenna to be oriented horizontally or vertically for various tests. A simpler system is certainly possible using a single mounting plate. The basic requirements are that the mounting system establishes the boom separation and that it holds fasteners (normally U-bolts) for attachment to the mast.

Figure 9 shows the double-plate system that I used for the prototype. Plate 1 holds the antenna's double boom at the approximate center point between elements 3 and 4. Stainless steel #10 nuts and bolts secure the boom to the plate. Plate 2 secures the assembly to the mast and is drilled for 1.25-inch wide stainless steel U-bolts. The most interesting feature of the mounting is the 2.5-inch hinge—rated for outdoor use—connecting the two plates.

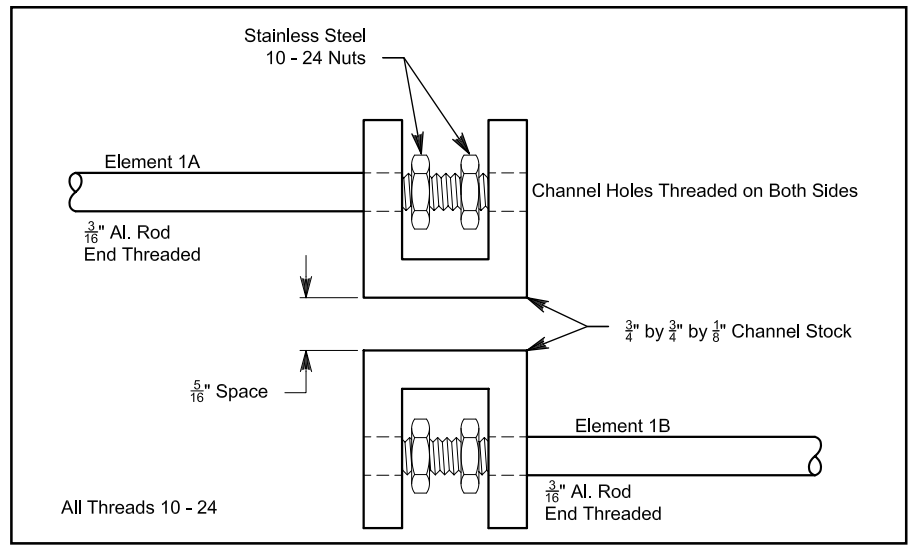
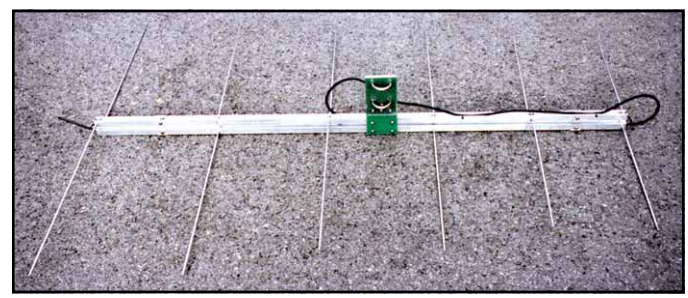


Figure 8—Cutaway end view of the twin-boom U-channel element mounting system.

View of the front of the LPDA showing the elements, the feedline mounting system and the front Plexiglas boom insulators.



Side view of the array, showing the main mounting plate.

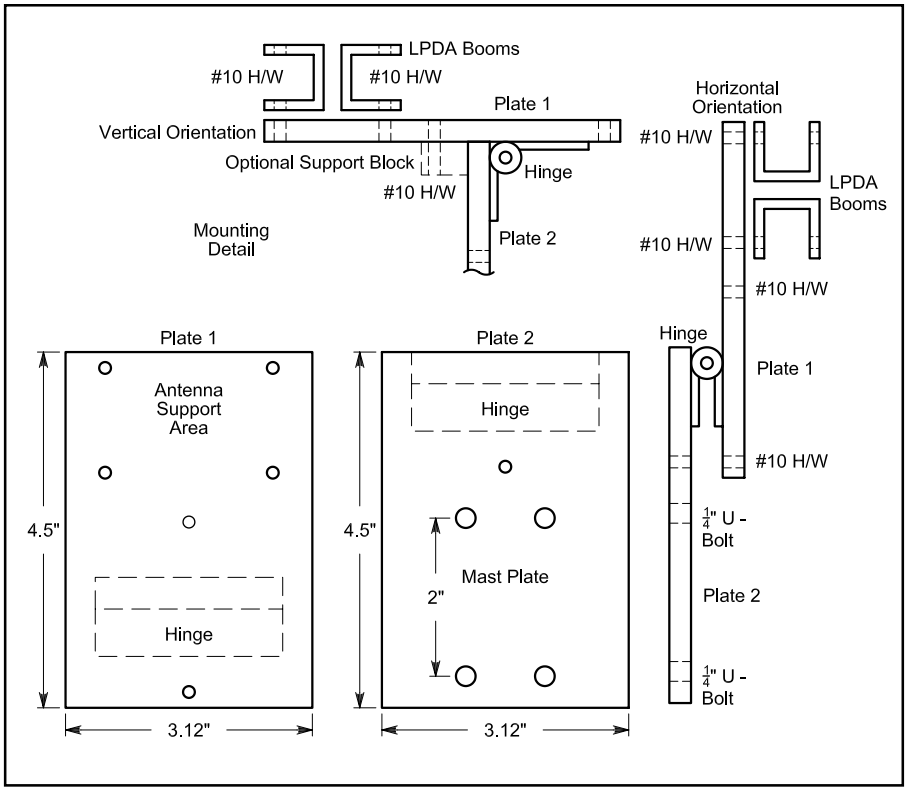


Figure 9—Details of the hinged boom-to-mast plate. Use a nonconductive mast if elements are oriented vertically.

The plate stock I used was 3/8-inch scrap fiberglass, which is structural overkill to some degree. Figure 9 shows the dimensions of the pieces that I used. When the antenna is vertically oriented, the top of antenna Plate 1 rests on the mast Plate 2 edge. For permanent use, I would add a further support epoxied and screwed to the mast plate. A stainless steel bolt would then lock down the antenna plate. When the antenna is horizontally oriented, the antenna plate is vertical and locked to the mast plate with a similar bolt.

The coaxial feed line for my prototype is RG-8X. A series of small holes (1/8 inch diameter) in the lower U-channel permits the cable to ride inside cable tie loops within the channel until it reaches the mast area. At the forward or feed end of the array, the cable center conductor and braid connect to the previously mentioned solder lugs attached to each side of the front element. These connections need to be weatherproofed by a suitable *cap* structure or by applying standard weatherproofing techniques. For the prototype, the cable end was coated with a plastic dipping compound available at home centers. Since it returns under the lower U-channel, you should size the coax loop to avoid internal deformation as the weather changes from cold to hot and back and to avoid stress on the connection points.

The final step in the process is to add the shorted stub to the rear of the array. I used a length of 75-Ω cable (RG-59U) with foam insulation, with a velocity factor of about 0.78. Hence, my 4-inch stub is about 3.1 inches long physically to account for the approximate 0.78 velocity factor of the line. Like the feed line, the ends of the cable were dipped in a plastic compound to provide a weather-seal.

In the final version, you might simply extend the twin booms 4 inches to the rear of the last element and connect the boom ends. This system might require moving the mounting plate to the rear slightly to keep the weight reasonably balanced. The array is likely a bit too heavy for effective rear-end mounting.

The stub completes construction. Lighter construction is undoubtedly possible, since the weight of the stock used in the prototype more nearly approximates commercial service sizing. However, the antenna has stood up to rough use in testing.

Performance

The photographs show the finished product, which I tested at 6, 10 and 15 feet above ground. The view of the antenna showing the elements oriented vertically is for photographic purposes only. The use of a metal mast would actually detune the array. When I changed the upper 5 feet of mast to a length of PVC, everything returned to normal—that is, to the values obtained with the elements horizontally oriented.

Initial SWR curves were taken with 20 feet of RG-8X between the array and an MFJ 259B analyzer, frequency calibrated to a 2-meter receiver. Within the 2-meter band, measured SWR was 1.5:1 or better. The predicted 2:1 SWR curve for the model (Figure 4), which did not employ a feed line, ranged from 130 to 170 MHz. The measured SWR provided less than a 2:1 SWR from 124 to 172 MHz. Part of this frequency range expansion is due to cable losses. However, the greater low-end extension of the curve suggested that the stub might be a bit long relative to the 4-inch equivalence desired. A ruler confirmed the suspicion, since the stub lead lengths had not been fully accounted for during construction.

Although I have no antenna range on which to directly confirm gain and front-to-back values, the array gain equaled that of other antennas in my shop of similar capabilities. With the antenna vertically oriented, I was able to silence all but one local repeater for over 180° of array rotation, indicating that the front-to-back ratio was as modeled. With a borrowed scanner, I received numerous signals at full quieting throughout the design passband.

The LPDA described here is not a competitor to wide-band Yagis designed expressly for 2 meters. Instead, it is a complementary antenna, designed for good 2-meter performance, but with additional capabilities over the 130-170 MHz range. If the wider-band service of an antenna is among your needs, then this 2-meter-plus LPDA may find a niche in your gallery of antennas.

Notes

[1]See the article "In Pursuit of Better VHF Quad Beams: A Work in Progress" in the 2001 *Proceedings of the Southeast VHF Society* for details of a wide-band Yagi meeting the specifications noted in the text. An alternative but close set of dimensions is provided in an article at my Web site (**www.cebik.com**) in the item called "High-Gain, Wide-Band Yagis for 10, 6 and 2 Meters." This item first appeared in *AntenneX*, Aug 1999 (**www.antennex.com**).

[2]See Chapter 10 of *The ARRL Antenna Book*, 19th Edition, for a full explanation of LPDA design and the fundamental design factors, τ and σ.

[3]My thanks to Raul Pla, W4AWI, of Antenna World, who generously donated the U-channel stock for this project.

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

By Thomas P. Johnson, KQ6DV

Back to School

"Mr Johnson, we can't do that!" soon gives way to enjoyment and enthusiasm in a classroom enriched with liberal doses of Amateur Radio.

The author's students, with some practical experience having enriched their algebra class, pose beneath the dipole antenna they helped design and build.

I recently began substitute-teaching as the first step toward a career transition from business to education. When I was offered a four-day assignment teaching algebra at San Lorenzo Valley High School in Felton, California, I recognized this as an auspicious occasion to introduce the students to Amateur Radio.

This being a "scheduled absence," I was able to connect with the teacher, Rob Martin, beforehand to go over the lesson plans. I told him that although English was my primary subject, I did have a bit of a math bent as a result of my involvement with ham radio. I asked him what he thought about my doing a demonstration of Amateur Radio as a practical example of the relevance of mathematics in the real world. Rob liked the idea and gave me the go-ahead to try it.

The stage was set, so I went about thinking how I could incorporate some of the mathematical principles used in radio into the curriculum. I decided that Ohm's Law and the formulas for determining wavelength and the length of a resonant antenna for a specific frequency dovetailed nicely into the subject matter they were studying. I would have each class for two days, so I planned to devote one day to theory and one to practical application.

I began each class with this question: "How many of you really like math?" As I suspected, few raised their hands. Then I asked how many hated math, and finally how many were ambivalent. Then we computed the percentages for the answers in each category. Even though algebra was an elective course, the percentage of students who said they "really liked math" was only between 10 and 15 percent. Then came the kicker: I asked them what percentage of the class would most likely end up in careers doing what they really liked and making a lot of money?

I told them that I used to be in the "hated math" category myself, but as a result of my getting into Amateur Radio I had learned to like math. I recounted what had motivated me to get my amateur license and how I quickly learned that a working knowledge of mathematics was an essential component of the hobby. Then I told them that I had gotten permission from their teacher to set up an Amateur Radio station in their classroom and allow them the opportunity to experience making contacts themselves on the air. The only caveat was that they would need to learn some mathematics and operating procedures in order to set up and operate the station successfully. This wasn't a tough sell: operating a radio station was much more appealing to them than plodding through their math lessons! But when I started writing formulas on the board, they began to have second thoughts.

"Mr. Johnson, we can't do that!" they exclaimed.

"Oh yes you can," I assured them. "This is easy—you're way beyond this already—all this is is A = BC, except that here it's P = IE and I = ER: now the letters represent actual measurements expressed mathematically."

I proceeded to explain what the letters stood for, and defined watts, amps, volts and ohms. Using an example drawn from *The ARRL Handbook* I showed them how they could calculate the power dissipated in a resistor in a simple circuit for which they only knew values for power and resistance. By substituting E/R for I in the first formula, we were able to determine the wattage ($P = E \times E/R$, or $P = E^2/R$).

I went on to explain hertz, the speed of light, wavelength and resonance. I taught them about SWR and why our antenna wouldn't work if our calculations were incorrect. I told them I would be bringing expensive radio equipment in for our demonstration and I certainly didn't want to break it due to a miscalculation! Determining the length of our antenna was where the rubber would meet the road. As we would be operating on the 10-meter band we calculated the resonant length of an antenna at 28 MHz to be 17.55 feet. Now that we were done with the heavy theory, we would get to the payoff—actually getting on the air.

These were two-hour classes, and the lesson plan for the second half of class

was to finish watching the *Apollo 13* video they had been assigned as a treat. Serendipitously, the end of the movie involved the NASA engineers frantically calculating how to ration enough amp-hours out of the damaged spacecraft's electrical system to get the astronauts back to Earth. I pointed out to the students that they were using some of the very same formulas we had just learned!

Some of the students suggested we should have watched *Frequency,* as this movie involved Amateur Radio. I agreed and rented it to show the next day's classes. Serendipitously again, *Frequency* begins with a display of the Aurora Borealis, and it just so happened that there had recently been a major coronal eruption, producing a dazzling display of the Northern Lights. The classroom had a computer connected to the Internet, and I showed them the pictures of the *Aurora Gallery* on the **spaceweather.com** Web site. They were duly impressed.

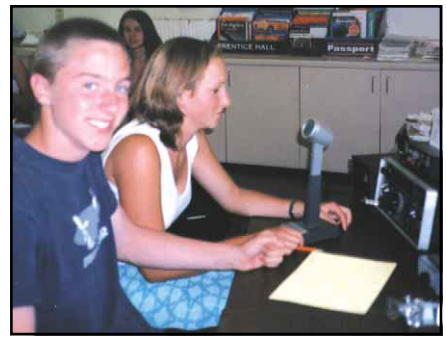
We were now prepared to put theory into practice, but there was one minor detail I had yet to cover: obtaining permission from the principal, Connie Benton. I had only one opportunity for an appointment with her, and it was on the morning of the day of our first scheduled demonstration. This was really coming down to the wire! I went ahead and loaded up my truck with the necessary equipment, hoping (and praying!) that her approval would come.

The first question she had when we met was "What does this have to do with algebra?" Fortunately I had anticipated this. "Just about everything," I enthused. "I'd love for you to come take a look at the two blackboards I've filled up with formulas. I've taught these kids Ohm's law and how to calculate the resonant length of an antenna for a specific frequency. The radio station will demonstrate to them a practical application of the math they have been learning."

"OK, that sounds reasonable," she said, "but I'll have to run this by the Administration Board in our meeting this morning. Come back at lunch time and I'll let you know what we've decided."

You can imagine my feelings as I shuffled off to teach my morning classes, unsure of the outcome. Fortunately I did not have to wait until lunch for the answer. A student delivered a message to me from the principal during first period. To my delight I read "The radio station is a go!"

When my afternoon algebra class arrived I went over some of the basic protocol for talking on the air. I also handed out copies of the International Phonetic Alphabet and asked them to learn how to spell their names phonetically. We would be using a homebrewed rotatable dipole for our antenna, which I had laid out on the floor of the classroom.



A shy smile and an SSB contact in progress—two of the author's students get their first taste of Amateur Radio excitement.

I took a few volunteers outside with me and in short order the antenna was hanging from a tree limb and connected to the radio by coax we ran through a window. Now, finally, the fun would begin.

"OK, first we've got to measure this and set it at the right length," I told them. "Remember we determined it should be 17.55 feet long. Let's see what we've got here." I solicited a volunteer to hold one end of the tape measure and we went to work. "Uh oh, it's not even 17 feet long! Did I mess up or what?" Their faces fell. "Nope, actually not! We didn't include the skin effect or the velocity factor in our calculations. A tubular antenna has a shorter electrical length than a wire antenna. And to further complicate things there are a lot of other factors affecting the resonant length of an antenna, such as how high it is above the ground, the chemical composition of the ground, and whatever objects, such as trees, there might be surrounding it—all of which have an effect in determining an antenna's resonant frequency. There are calculations to take this into account, but that's Algebra II and I don't want to bog you down! Besides, the bottom line is it's virtually impossible to calculate the *exact* length of our antenna in the real world. That's why whenever we hams make an antenna we always begin with a longer element than our calculations predict and then cut it down to the right size using test equipment to determine its actual optimum length. I just so happen to have such a piece of equipment here: this is an antenna analyzer. I know this antenna works because I've used it before. I'm going to set it at the length where it worked last time I used it and we'll see what the analyzer thinks about that."

I then adjusted the end sleeves of the antenna to the settings I used at our last Field Day, and asked a student to hold the antenna up off the ground while I put the analyzer on it. I asked my volunteer to be careful not to touch the antenna as he held it aloft by the harness I had rigged up to hang it from a tree outside our window.

"Oh, bummer!" I said as I checked the analyzer. "This says the SWR is lousy. What now?" Faces fell again, and I was beginning to sense a bit of impatience with this whole process. "Don't worry—I know this antenna will work. The problem is we're testing it here in this room just a few feet off the floor, and it's also being affected by us standing all around it. When it's up in the tree the SWR should be much better, and besides, if worse comes to worse I've got an antenna tuner over there that will take care of it. Using a tuner's kind of like cheating, but if it comes to it we'll do what we've got to do. So, let's get this baby up in the tree and get on the air! Who wants to help me string it up? The rest of you can watch *Frequency* while we're setting up."

I took a few volunteers outside with me and in short order the antenna was hanging from a tree limb and connected to the radio by coax we ran through a window. Now, finally, the fun would begin. I fired up the rig and reminded the students once again of the essential protocol: It was illegal to use foul language on the air and making wisecracks would not endear them to those we contacted. Then I picked a frequency and called CQ.

Immediately my prearranged contact, Dan Anderson, AA6GD, came back. (In case the band was dead and to ensure we made a sympathetic contact I had asked Dan to monitor the frequency.) Dan did a splendid job of talking with the students. He asked them all to spell their names phonetically when they introduced themselves. Dan and I also demonstrated CW, and I sent him a "secret word" the students chose which he reported back to us in voice to prove we were actually communicating. After warming up with Dan we went off into the "ether," looking for contacts. The band was fairly good and we made a number of successful contacts across the United States.

I was surprised to find that all the classes expressed an interest in CW, which I "low balled." I simply set up my paddles and left it up to them to ask what it was. It turned out they all wanted to see a Morse code demo, and some of the students even learned to send their names. Our farthest contact was a CW QSO I had with Greg, WB5LXJ, who

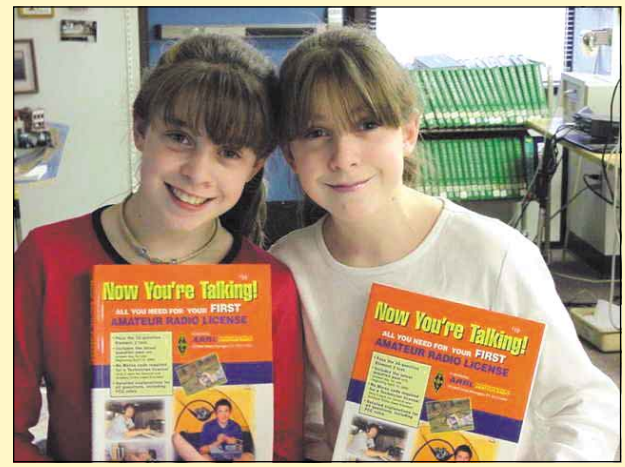
If You're a Teacher, We've Got a Big Project for You!

By now many ARRL members have heard about school activity that's a part of The Big Project, ARRL's ambitious education project. The most recent story, on *ARRLWeb* (**www.arrl.org/news/stories/2001/06/15/1/**) reported that DeGolyer Elementary School students and faculty in Dallas accepted equipment valued at $2600 for the school ham radio club station—paid for by the ARRL Education Project Fund. Teacher Sanlyn Kent, KD5LXO, says that, so far, 14 youths have earned licenses. Kent earned her Technician license only last fall and has been learning along with her students. The Web story also recounted how students at the Franklin Elementary School in Kirkland, Washington, received a shipment of ARRL's *Now You're Talking!* books, thanks to an ARRL Progress Grant, also part of The Big Project. Eighteen youngsters who earned their licenses are members of the Lake Washington Ham Club mentored by teacher Dave Condon, KI7YP.

How can you get involved in The Big Project? Although the program has just begun to ramp up and curriculum isn't yet available, you can find a host of support items on *ARRLWeb* (**www.arrl.org/FandES/ead/teacher/**). There, you will not only find helpful items, but you'll read more classroom success stories that give ideas for ham radio activity you may want to try in your area schools.

Youth represent our future—both for Amateur Radio and the country. Let's make that future as bright as the brightest LED you'll ever see!
—*Rosalie White, K1STO*

The Lake Washington Ham Club received copies of *Now You're Talking!* as an ARRL Progress Grant through The Big Project. The books, along with the excellent teaching skills of teacher Dave Condon, KI7YP, helped produce an enthusiastic group of new hams, among them KD7NJE, KD7NJP, KD7NJK, KD7NJA, KD7NJG, KD7NJO, KD7NIZ, KD7NIY, KD7NJC and KD7NJR.



The Brokaw twins, Tiffany, KD7NJO, and Tammy, KD7NJP, licensed in May, enjoy themselves at Franklin Elementary School, Kirkland, Washington.

was mobile in Dallas, Texas. I made sure they understood that he was actually sending and receiving code while driving around in his car! I also explained that the reason hams still use Morse code is not just because it's "retro," but because it is still one of the most reliable and efficient means of communicating on the radio, especially when using low power or operating under marginal propagation conditions.

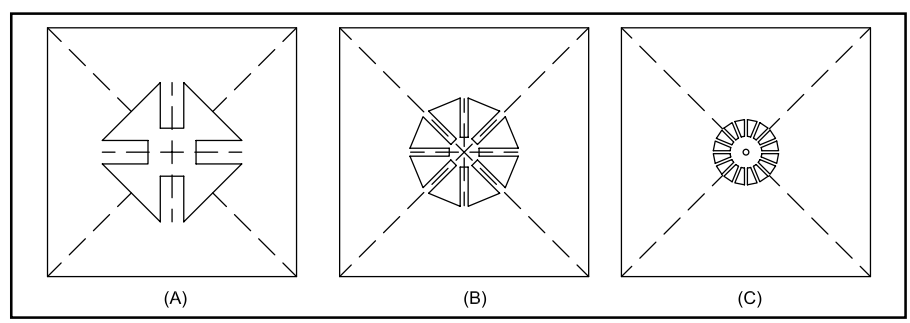
As I expected, Mr Murphy dutifully showed up to throw a monkeywrench into every operating session. I explained to the students that this was par for the course, and in each case we overcame the obstacles encountered. In one class our antenna broke in half and had to be lashed together with parachute cord. We switched to the 10-meter whip on the roof of my truck while we made the necessary repairs. Using the whip, we contacted Barney, WA9VEW, in Dixon, Illinois, and he was sporting enough to talk with a few of the students even though our copy was marginal. We also encountered the usual difficulties associated with stringing up an antenna in the trees, complicated by an unseasonable freezing downpour during one of our sessions. Propagation favored the afternoon classes, but all of our sessions yielded enough contacts to be deemed a success.

The students gained a greater appreciation for the utility of mathematics and an enthusiasm for Amateur Radio as a result of their hands-on experience. Just in case any of them wished to pursue a license for themselves, I gave them a homework assignment: visit a Radio Shack store and ask for the book *Now You're Talking!*

You can reach Thomas P. Johnson, KQ6DV, at 2599 Warwick Ln, Santa Cruz, CA 95065, tel 831-464-3120, **kq6dv@arrl.net**. QST

FEEDBACK

◊ In "Update on the Pfeiffer Quad System," Sep 2001 *QST*, the gamma capacitor referred to in Figure 8 should be 200 pF. In addition, the relative sizes of the three parts of Figure 5 are more accurately represented here.



By Nick Powell, NH6ON

A Ham's South Pole Adventure

Enjoying Amateur Radio at one of the most remote and hostile locations on the planet.

Figure 1—The Ceremonial South Pole with the old station complex (dome) and new elevated station under construction in the background.

Recently I returned from a trip to South Pole where, when time permitted, I had the unique privilege of operating as KC4AAA at Amundsen-Scott Station (90° degrees south). This was the first trip to the pole in my new position as South Pole Information Technology (IT) Project Engineer at Raytheon Polar Services Company (RPSC). RPSC is the National Science Foundation's (NSF) United States Antarctic Program (USAP) prime contractor and provides a spectrum of support services including information technology engineering, operations and maintenance at South Pole, of which I am most closely involved. NSF's USAP is the US Government activity that oversees and facilitates scientific research on the continent at three permanently manned bases at McMurdo, Palmer and South Pole, numerous field camps around the continent and two research vessels (R/V *Lawrence M. Gould* and R/V *Nathaniel B. Palmer*). A wide variety of marine and physical scientific research is conducted using these resources in and around the continent. At South Pole research focuses on atmospheric, astronomical, geomagnetic, ionospheric, glaciological and radio sciences.

Geography and Climate

South Pole is at 9300 feet atop the polar icecap, which moves in a "grid" northwest direction at a rate of about 33 feet a year. Since all directions from South Pole are to the north, the "grid" method of determining direction was developed. Movement along the 0°, 90° E, 180° and 90° W longitude lines are considered movement to the North, East, South and West, respectively.

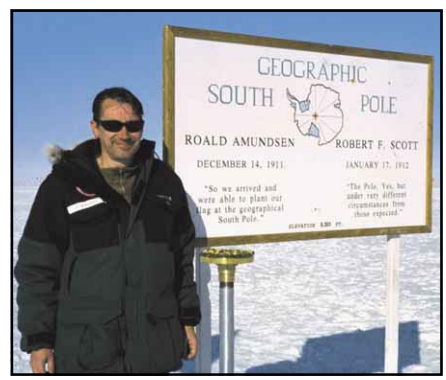


Figure 2—The author at the Geographical South Pole. The quotes read: "So we arrived and were able to plant our flag at the geographical South Pole."—Roald Amundsen and "The Pole. Yes, but under very different circumstances from those expected"—Robert F. Scott

There are two poles at South Pole, the ceremonial pole (Figure 1) and the geographical pole (Figure 2). The ceremonial pole remains fixed with respect to the station and is the location where most visitors have their "hero" shots taken. Since the ice sheet and everything on it is moving, the geographical (or true) pole appears to be moving relative to the station. Every year on January 1 the geographical pole is resurveyed and a new marker is installed. This year the two poles are separated by about 100 feet. Figures 3 and 4 provide a view of the station from the new satellite communications ground station looking toward the station from "grid" South.

Weather data has been recorded continuously for more than 40 years and it confirms that South Pole is cold and dry. Summer temperatures typically range between –15 to –25° F while winter tempera-

Figures 3 and 4—Panoramic views of Amundsen-Scott Station at South Pole from the SPMGT antenna platform. The building in front is the RF building. SPMGT is about 4000 feet from the main station, which makes for challenging service calls in winter.

tures of –60 to –90° F are common and temperatures below –100° F occur regularly. The record high and low temperatures are +7 and –117° F. Interestingly, South Pole, like much of the interior, is not exceptionally windy. The highest recorded wind speed was 50 knots. Due to the Earth's rotation, the pressure altitude is often much higher than that normally experienced for 9300 feet in mid latitudes. Pressure altitudes over 11,000 feet can occur and altitude sickness is a concern, so personnel arriving on station take it easy for the first couple of days to become acclimated. The extreme dryness of South Pole creates ideal conditions for static build-up and discharge, particularly during winter months, which can cause equipment damage if the wrong components are in the discharge path.

To the Pole!

My trip started with a commercial flight to Christchurch, New Zealand via Los Angeles. Before leaving for Antarctica, all personnel receive an issue of Extreme Cold Weather gear at the International Antarctic Center's Clothing Distribution Center at Christchurch Airport. Once our clothing was issued and put on, we boarded a landing-ski-equipped New York Air National Guard LC-130 military aircraft for the 8-hour flight to McMurdo on Ross Island. McMurdo has a summer population of about 1200 and drops back to around 250 during the winter. South Pole's summer and winter populations are 220 and 50, respectively.

I arrived on December 30 and the next flight for South Pole wasn't scheduled until January 2. This meant spending New Year's at McMurdo. The folks there sure know how to party! There was no weather delay, so my LC-130 flight took off on time for the 3-hour flight to South Pole. Since it was a fuel tanker mission, there were only five passengers and very little cargo, which made for a roomy flight. After arrival we gathered in the galley for briefings and room assignments. I was fortunate and received a room that had an enclosed walkway to the restroom making those late night "walks" much more bearable. Others, living in "summer camp" Jamesways, suited up if they had a late-night urge to use the facilities.

McMurdo has a summer population of about 1200 and drops back to around 250 during the winter

Work at the Pole and Communications

This was no holiday, so after settling in it was time to get down to work. Installation of the new South Pole MARISAT/GOES Ground Terminal (SPMGT) had begun in October and was nearing completion. Now it was time to begin system testing and checkout. Figure 5 shows the completed 9-meter antenna on its raised platform designed to minimize burial from drifting snow.

SPMGT provides increased communications capability to South Pole. It is the Pole's satellite uplink/downlink facility for MARISAT F2, an old geosynchronous communications satellite, and GOES-3. We use the communications transponder of the old weather satellite. MARISAT is parked over 34° W with an inclination of 12°. This makes it visible at South Pole for about 5.5 hours a day as it rises above the horizon to its maximum elevation angle of 4.5°. GOES-3 is located over 105° W with an inclination angle of about 12.5° making it visible for approximately 6 hours a day as it rises to about 5° elevation above the South Pole horizon. MARISAT and GOES operate in the L- and S-band frequencies (1.540 to 2.027 GHz) at data rates of 1.544 Mbps and 512 kbps, respectively.

Installing a 9-meter satellite antenna presented some interesting challenges. The Pole's cold temperatures meant that the antenna had to employ heating systems to keep motors and drive assemblies from freezing. Teflon cables were used to minimize cold induced damage. Equipment is housed in two buildings. A shelter on the antenna platform contains Radio Frequency (RF) components such as the up/downconverters, solid-state power amplifiers and RF switches. The new RF building is a separate facility about 150 feet away and contains modems, the antenna control unit, a

monitoring and control computer, test equipment, local area network interface equipment as well as satellite beacon and GPS receivers. Eventually most station RF equipment will be moved to this building and it will serve as the hub for all off-continent communications.

Communications off station are accomplished through a combination of satellites and high frequency radio. Geosynchronous satellites in high-inclination orbits provide several hours of satellite time a day. Four satellites: LES-9, NASA's TDRSS F-1, MARISAT and GOES-3 provide about 16 hours a day of combined coverage. All satellites are used for e-mail exchange, FTP data transmissions and Internet access. During MARISAT, TDRSS and GOES passes, Voice-Over-IP technology is used for telephony. There is also an IRIDIUM phone that provides 24-hour voice service.

HF radio is used for phone patches and RTTY transmissions during periods of no satellite coverage. HF communications typically take place between South Pole and McMurdo, Palmer, field camps and aircraft. It is surprisingly reliable (as long as there are no geomagnetic storms or solar flares). Frequencies seldom change during the day since the polar regions experience little diurnal variation in ionospheric conditions except around the equinox. VHF communications are used for land-mobile radio and aircraft operations. Figures 6 and 7 show the South Pole communications center and radio transmitter racks with HF antenna patch panel matrix.

Figure 6—South Pole Communications Center with Neil Conant, N8BPR, at the console. All station HF and VHF communications originate here.

Figure 5—The completed 9-meter reflector, antenna shelter housing RF components and platform comprised over 100,000 lbs of steel before snow backfilling to add additional stabilization. The platform is designed so that a radome can be added at a later date if necessary.

SPMGT is actually part of a much larger upgrade to South Pole. The South Pole Station Modernization (SPSM) effort will replace the existing dome, near the end of its useful life, with an elevated station. Figure 8 is an artist's conception of the new station when it is completed around 2005. In addition to the new station, SPSM also includes installation of SPMGT, the RF building, new power plant (online this past austral summer), vehicle garage, cargo storage, new fuel storage facility, and inside and outside telecommunications fiber and copper cable plant upgrades.

Ham Radio Ops

Incredible as it may sound, this was my first time as an amateur HF radio operator (my other HF experience was as an Air Force radio operator). It was truly a baptism by fire and a fascinating experience. The opportunity to work DX pileups was great! The station has an ICOM IC-735 transceiver, Ten-Tec

Figure 7—South Pole antenna patch matrix and transmitters.

1 kW linear amplifier and a multielement beam array that permanently points toward the eastern US. The equipment limited operations to HF voice and CW, but I worked only voice.

Since South Pole was on New Zealand Daylight Time, we were a day ahead and 6, 5, 4 and 3 hours behind EST, CST, MST and PST. We would work 12 to 18-hour days and sometimes longer, often losing track of time since the sun there was up all day. Also, our time on station was limited and we needed to make sure SPMGT was working before departure. When work allowed, I usually tried to operate at hours that corresponded to evening hours in the US. Needless to say, there weren't a lot of chances to operate and contacts were for the most part fairly limited to give as many operators as possible the chance to communicate with South Pole. Typically, 14.243 MHz was the operating frequency.

Whether the result of propagation or antenna orientation, contacts were made with stations primarily in the eastern US with a scattering of stations in the west. It was a pleasure to give operators the chance for an Antarctic contact. Some said this was their first contact with the continent, let alone the South Pole. Particularly satisfying was working QRP stations. There was one contact with a station in New Jersey transmitting 7 W into a wire hanging out his apartment balcony window—an amazing contact!

Thanks go to our QSL manager Larry Skilton, K1IED, for helping out with the task of handling QSL cards. Mail is slow to the Pole and time for recreational activities is limited. Processing cards would probably not have been possible. For all those with whom I managed a QSO and those I didn't, thank you for your patience. The courtesy and patience extended by everyone reflects all that is good about Amateur Radio and was a credit to our community.

Lessons Learned for Next Time

I did not expect to have much time for Amateur Radio operations so gave little forethought to a number of things. It appears I will have a longer deployment this year (from early November to perhaps as late as mid-February). Based on my experiences, here are some lessons learned and changes planned for the coming season:

- Operate at different hours of the day
- Bring logging software—all contacts are currently logged manually
- Take copies of the station log before leaving
- Attempt to increase Western US contact numbers
- Have personal QSL cards made
- Continue the practice of "QRP night"
- Try to participate in contests
- Operate PSK31 and MFSK16

I'd also like to add young operator and school club days. Along those lines, last year I transmitted daily activity reports from South Pole to a few schools from elementary to high school. These reports were favorably received and I plan to do it again this year. Interested institutions may send their school e-mail addresses to **Nick.Powell@polar.org** and I'll add them to the address list.

Long term, I'd like to see improvements made not only to the ham shack at South Pole, but to those at McMurdo and Palmer as well. These include: addition of HF digital modes (RTTY, PSK31, MFSK16, PACTOR, etc), more antenna options, better satellite capabilities, ensure that up-to-date ARRL publications are on station, increase the cadre of trained operators and look at anything else needed to further Antarctic ham radio.

Antarctic exploration/research and ham radio share a long and proud tradition of cooperation. It is my hope the future will see this relationship not only continue, but improve with new technology and interested amateurs. Now, if there was some way I could get sent down there just to operate the ham radio station …

Nick Powell received his General class license in 1988 while stationed with the Air Force in Hawaii. He just recently upgraded to Amateur Extra. He has been active mainly on VHF, but his trip to Antarctica really fired up his interest in HF. Nick worked for four years as an HF radio operator in the Air National Guard. He went on active duty in the Air Force as weather officer where he worked a number of years in space weather at NORAD, Air Force Space Command, and the Air Force Weather Agency's space weather forecast facility. In that capacity he predicted and analyzed the effects of solar disturbances and geomagnetic storms on DoD HF radio propagation, satellite communication, radar and electronic systems. After retirement in 1996, he went to work at Hughes Electronics Space Systems division, which was purchased by Raytheon. Nick transferred to the Polar Services division in April 2000.

You can reach Nick Powell, NH6ON, at 4780 Rustler Ct, Colorado Springs, CO 80918-5214; **Nick.Powell@polar.org**.

All photos by the author. QST

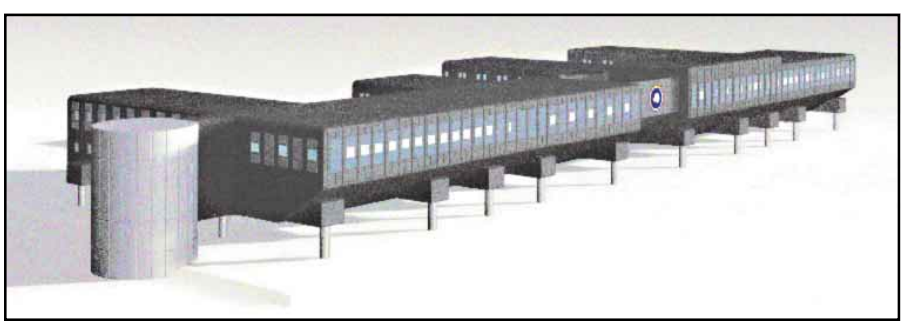


Figure 8—Artist's conception of the new elevated station. *(Courtesy of National Science Foundation, Ferraro & Choi Architects, and Raytheon Polar Services Company.)*

By Steve Ford, WB8IMY

Fame, Glory and $65 a Page

Don't envy the author—become one!

Someone once said that each man is the hero of his own life story. Each man (or woman) isn't a writer, however, which is probably a good thing. Libraries would be overflowing and editors would be stacked up like cordwood in mental hospitals. Even so, I bet you have at least one tale to tell, or more than a couple of tales to tell, and no doubt a few of them are related to Amateur Radio. (Why else would you be reading this magazine?)

At *QST* we're in the business of publishing stories that we call *articles*. To be perfectly blunt, the formula works something like this: The more good articles we publish, the better the magazine, which means more members for the ARRL and more advertising revenue. The final result is income for the League, which funds nifty services for you (those services don't run on ARRL President Jim Haynie's pocket change, you know). The income also finances watchful eyes at international radio conferences, representation at the International Amateur Radio Union and a number of persuasive people who bend the ears of Senators and Representatives on Capitol Hill each week.

So why are you shirking your duty to our magnificent avocation? (Cue "Battle Hymn of the Republic.") Every moment you spend away from the keyboard is another story that doesn't cross our desks. The absence of an article from you means that one of our Washington representatives may not have cab fare to make that critical Congressional committee meeting. Lost revenue means that our IARU teams will travel in rusty container ships, with temperamental engines, arriving two months late for the opening meetings. Bureau QSLs will be sent by hot air balloons. Award certificates will be printed on tea leaves. Cats will be living with dogs…well, you get the idea.

I Don't Write So Good

Hey, who does these days? Thanks to the current state of public education in America, coherent sentence construction is high on the Endangered Species list. That's why God created editors. It's our job to take mangled prose and turn it into readable text that everyone will understand and appreciate. We can't turn an illiterate rant into *The Great Gatsby*, but we can make you look awfully good. Don't worry about spelling and grammar. Just send the verbiage and we'll take care of the rest.

What Does *QST* Want?

Sigmund Freud asked a similar question about a century ago and the answer he came up with was vague, to say the least. Let's be as specific as possible.

QST will consider anything that arrives at the door—as long as it doesn't contain toxic chemicals or an ominous device with a numeric LED display that is counting down to zero.

We love to see projects, from the mundane to the complex. The candidate list includes antennas, power supplies, amplifiers, receivers, transmitters, keyers, digital devices—in other words, just about anything your imagination can create.

We also love good general-interest stories. Tell us how your club invited new amateurs to operate a contest at the club station. Tell us how you jumped in a canoe and operated low power (QRP) while drifting down the Mississippi. Tell us about your amateur television net. If you have a story that might be of interest to 165,000 of your fellow hams, we want to see it.

What Doesn't *QST* Want?

The list of what we will not consider for the magazine is small.

- *Poetry.* You may be the next Keats, but the overwhelming majority of Amateur Radio poetry is something this side of hideous. You know the rule: If we consider one poem, we have to consider them all. That's a prospect too painful to contemplate.
- *Autobiographies.* Unless your life story is extraordinary (like the time you operated from the top of Mount Everest using rotten lemons to power your radio), most readers will greet your tale with wide yawns. We will, too.
- *Eulogies* to your most admired amateur, living or dead. If this individual is so spectacular in your eyes, tell him or her directly. (Use a Ouija board, if necessary.) The rest of us might share your enthusiasm had we known the saintly soul, but we didn't.
- *Offensive remarks.* Screen your article for statements that someone of another race, culture, gender, religion or nationality would find insulting. If you're unsure, err on the side of caution and delete the sentence.
- *Personal attacks.* Don't attempt to drag *QST* into a libel lawsuit just because you have a disagreement with someone. If you want to launch a volley of insults at your fellow ham, do it on an Amateur Radio newsgroup, e-mail list or in one of the many forums found on ham Web sites. That's why Al Gore invented the Internet in the first place.

By George L. Heron, N2APB

PSK31 Audio Beacon

Build this programmable single-chip generator of PSK31-encoded audio data streams and use it as a signal generator, a beacon input to your SSB rig—or as the start of a single-chip PSK31 controller!

Here's an easy, fun and intriguingly useful project that has evolved from an ongoing design effort to reduce the complexity of a PSK31 controller.

A conventional PC typically provides the relatively intensive computing power required for PSK31 modulation and demodulation. With this beacon project, however, the PSK31 modulation computations have been designed to fit into a small PIC-like microcontroller that can serve as the basis for the "transmit half" of a standalone PSK31 controller.

A fast and inexpensive microcontroller is programmed to generate an audio data stream using the PSK31 algorithms. The data-driven audio waveform is fed to an amplifier IC that drives a speaker and *voila*, the familiar and melodious PSK31 warble is heard! When presented as input to a PSK31 receiving system such as *DigiPan*, these modulated audio tones are decoded and the programmed beacon string is displayed.

A keyboard or data terminal may also serve as the input of real-time textual data to the PSK31 audio beacon. A standard RS-232 serial interface is provided in the hardware and software to allow a more dynamic "signal generator" use of the project. The project can be electrically connected to the input of an SSB transceiver to create an RF PSK31 beacon for brief tests.

This project is also ideally suited for groups wishing to have some "audio beacon" fun during meetings. A number of club members would operate their audio beacons while someone attempts successful copy of the beacon strings while sitting at a microphone-equipped laptop running *DigiPan* software.

Construction is simple and straightforward, and you'll have immediate feedback on how your beacon works when you plug in a 9-V battery and speaker.

Beacon Features

- Single-chip implementation of PSK31 encoding and audio waveform generation.
- An on-board audio amplifier sufficient to drive a speaker for group activities.
- A low-level output suitable for interfacing to an SSB transceiver.
- A Scenix SX28 RISC microcontroller operating at 50 MHz with a 20-ns instruction cycle time. This provides computing power necessary for accurate implementation of the PSK31 modulation algorithm. The SX chip is similar to Microchip's popular PIC microcontroller, containing the same software instruction set but operating more than 40 times faster.
- The SX28 microcontroller is programmed with a unique beacon string. It can also accept real-time text input from an RS-232 serial interface.
- Configuration jumpers provide for selection of three base carrier frequencies (500 Hz, 1 kHz or 2 kHz), and choice of 16 sub-variations around the selected base frequency. This allows the user to operate the beacon on any of 48 distinct audio frequencies.
- Continuous loop or single-pass operation.
- Open source code for custom modification of the beacon string and/or software operation.
- Construction may be done Manhattan-style (a form of ugly-style construction) for freedom of desired implementation. A printed circuit board is also available for this project.

Typical Beacon String

The current version of the beacon software is programmed to transmit two types of data in sequence:

(1) Idle Stream—Upon transmit initiation, the beacon sends a series of 64 zeros to allow the PSK31 receiving system and decoder to synchronize for the data reception that follows. In some PSK31 applications this idle stream time allows the decoding software to measure signal "IMD," an indication of energy present in adjacent sidebands and somewhat of a figure of merit for the received signal.

(2) Data String—Immediately following the idle stream of zeros, the beacon begins sending the data string that will ultimately be displayed on the receiving side of the communications channel. This is the custom-programmed sequence

Packaging Your Article

You can send your article to us via postal mail, or electronically by e-mail.

If you use postal mail, print the text on white paper and include the word processor file on a diskette. Don't fret about the word-processing format. We work in Microsoft *Word*, but we can read almost anything. Include photographs (the more the better!) with descriptions written on Post-It Notes or other pieces of paper taped to the back of each print. *Do not write on the backs of the photos*. Include suggested captions at the end of your article text. If your article is a project of some sort, include a schematic diagram and/or construction illustration along with a list of all parts and corresponding part numbers at RadioShack, DigiKey or wherever. Pencil renderings are acceptable, but we draw the line at crayons.

Mail your article to: *QST* Editor, ARRL, 225 Main St, Newington, CT 06111-1494

If you choose to e-mail your article, send the files to: **qst@arrl.org**. We accept digital images, but the resolution must be high enough to reproduce well in the magazine. As a rule of thumb, set your camera to store the *least* number of photos (this is often known as the "high quality" or "high resolution" setting).

A word of caution: Send your article to only one magazine at a time. Never blast your article shotgun style to several publications at once. While this may seem like a timesaving approach, it causes tremendous headaches and possible legal complications. It is a form of blasphemy known in the publishing world as the *simultaneous submission* and earns an instant rejection as soon as a magazine editor discovers the truth.

The Process

One should never witness the making of laws, sausages or editorial decisions. Nevertheless, here is what happens to your article when it shows up on our doorstep (or e-mail server):

(1) Your article is logged into our tracking system and a short acknowledgment is sent back to you.

(2) Copies of the article are distributed to members of the *QST* Editorial Committee, a group of Headquarters staff who wear black robes and conduct their solemn business in dank, candlelit rooms.

(3) The Committee meets and discusses the fates of the current candidates (by this time about two weeks have elapsed). Each article is considered not only for *QST*, but also for *QEX*, the *National Contest Journal* or *ARRLWeb*. Articles are judged on content, and whether the topic fits our editorial needs at the time. Don't be surprised if the Committee asks you to send your project to Headquarters for ARRL Laboratory analysis. Such requests are routine and indicate that your pride and joy may be a favored candidate.

(4) If we accept your article, we send a written notification along with a release form. When you sign and return the release form, you are transferring the article copyrights to us. In effect, the ARRL becomes the owner of your article and all the photography it contains. You are *not*, however, signing away the rights to your project design or software. We are simply buying your story, nothing more.

(5) Your freshly accepted article is scheduled (not unlike an airliner awaiting takeoff) in our editorial calendar. Chances are good that it will appear within a couple of months, but our requirements occasionally mandate delays of up to six months.

As the fateful issue approaches, your article will be assigned to a handling editor. This is the wordsmith who will gently (well, sometimes not so gently) shape your article to match our style guidelines and to squeeze it into the number of pages available. If the handling editor has questions, he or she will contact you. Otherwise, no news is good news.

(6) About two weeks before the issue goes to press, we'll send you a copy of the final version of your epic story. This is your last chance to look over the article and make any corrections or revisions.

Show Me the Money!

Oh yes, the money. You'll be pleased to know that *QST* pays for articles at a rate of $65 per published page. If your article consumes 2 pages in the magazine, for example, you'll net a cool $130 to put toward your next radio. The check will be in the mail within about three weeks after the issue goes to the printer.

What if We Say "No"?

Even professional writers have to deal with rejection. It's a natural fact of the writing life. Successful authors spend years wading through an ocean of rejections before they finally hit the jackpot.

No one enjoys seeing a rejection letter in the mailbox. It's difficult to place a positive spin on the word "no." The best response is to grumble in the privacy of your shack, then quickly send your brainchild to another magazine. After all, a different publisher may just as easily say "yes."

The worst response to a rejection is to vent your bruised feelings in a letter or e-mail directed to the offending editor. Not only is the editor not likely to change his or her mind, your petulant message will leave a highly negative impression—one that the editor will remember when your name appears again. This behavior is known as "burning bridges." It's never a good policy to follow in the writing game or anywhere else.

Your 15 Minutes is Waiting

Andy Warhol said that in the future everyone would be famous for 15 minutes. Your quarter hour in the spotlight may be in *QST*, but you'll never know if you don't send an article. As I mentioned in the beginning, don't drive yourself to a nervous breakdown worrying about grammar, punctuation and narrative flow. Just do a creative brain dump to your keyboard and send the results to us. Nervous breakdowns are best left to trained professionals—like editors.

A copy of the *ARRL Author's Guide* is available at **www.arrl.org/aguide/** or by postal mail.

Steve Ford, WB8IMY, is the Editor of QST. *You can contact him at* **sford@arrl.org**.

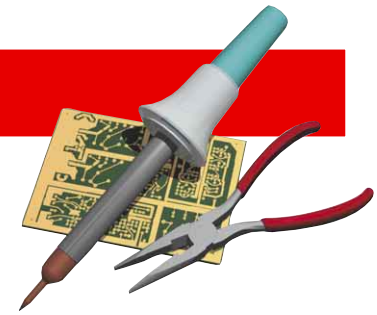
The Source Code Dilemma

Many projects we see flying over the editorial transom these days include microprocessors that operate using software that the authors have created. Authors spend hours writing and debugging their codes. The programs are their brainchildren in the most literal sense you can imagine.

We understand that authors might be reluctant to distribute the fruits of their labors to anyone who wants them. When a piece of software enters the public domain, it circles the globe in a heartbeat. What was once the precious possession of its creator is now "owned" by the world.

But remember that *QST* is an Amateur Radio publication. Part of the spirit of Amateur Radio is centered on the open sharing of knowledge. You wouldn't buy a transceiver with the case welded shut, would you? By the same token, would you build a project that depends on software you could not examine or modify?

For this reason, the availability of open source code is a strong factor in our decision to accept or reject an article. We prefer that authors of all software-dependent projects make their software available to the amateur community free of charge or legal encumbrance. Just send us a copy of the source code and we'll post it on *ARRLWeb* for distribution.



The Doctor is IN

Q Every day I see old computers discarded such as old 486s that have operational power supplies. Many of these supplies can provide 200 to 250 watts at +12 volts, more than enough current capacity to supply much amateur gear such as 2-meter mobiles. The problem is that 12 V is a bit low. I have been unable to find diagrams for these common switching supplies and thus have been unable to figure out how to raise the voltage to 13.8 V.

A In a computer, the biggest consumer of power is the microprocessor and the voltage on that is 5 V. Here's an example of the outputs from a 200 W power supply in a 486DX2/50 we have here:

5 V, 20 A (100 W); 12 V, 8 A (96 W)
–5 V, 0.3 A (1.5 W); –12 V, 0.3 A (4 W)

While the supply could be modified to alter these outputs, the voltages and currents are determined by the transformer and the output circuitry, so it would all have to be replaced. As you can see, getting 200 W out of the 12-V output isn't quite so easy.

Computer supplies are switching supplies rather than linear. The near square-wave switching waveform creates a significant amount of RF. While it is possible to build an RF-quiet switching supply (witness the recent ham radio market switchers), it isn't necessary on a computer so the PC supplies are unfiltered and therefore unsuitable for use with radios in their "stock" form. To get an idea of the kind of filtering needed to produce "RF clean" output from a switching supply, you might want to take a look at the switching supply in Dec 1999/Jan 2000 *QST* (and *The ARRL Handbook* from 1999-present).

As you mentioned, schematics are not readily available for these supplies. Unlike a complex system such as a complete computer, it isn't cost-effective to have a technician (at a corporate rate of $15/hour or more) spend a couple of hours troubleshooting and fixing supplies that only cost (wholesale) $10-20 to replace. So, the foreign companies that build the supplies don't have a reason to include schematics. Pretty much the only recourse here would be to attempt to "reverse-engineer" the schematic from the components and circuit board in the supply. Even then, it may not be completely possible due to the use of specialty ICs that no data can be found for.

Now, with these points having been made, it still should be possible to use parts from several of these supplies along with some added filtering in order to produce something useful for the ham shack. However, if anyone has attempted it, they have not informed us of their work.

Q I recently purchased an A3S tri-band beam. The instruction manual suggests a coil of 8 turns, 6 inches in diameter, be constructed of RG-8 feed line next to the feed point of said antenna. This is referred to as an RF choke. Why would one want an RF choke inserted into one's feed line?

A What they are referring to is fully named a choke balun. What it does is choke off RF that would otherwise flow down the outside of the shield of the coax. Now, as you know, the shield of the coax provides the return path for the RF flowing through the center conductor. Well, RF is a "surface phenomenon," so it flows along the surface or wire and braid and you can have different RF currents flowing on the outside and inside of a hollow conductor like braid.

Ideally, the braid that makes up the coax shield shouldn't have any RF current flowing on the outside. If it did, it would radiate and therefore wouldn't be a shield anymore. The "choke" formed by coiling coax suppresses current flow on the outside of the shield, but does not have any effect on the RF on the inside. Why is that? Because in order to act like a choke, adjacent conductor windings have to be magnetically coupled. While adjacent turns of the outside of the shield form a coil, the shield keeps the inside of the coax from coupling between adjacent turns.

Q I have a set of Drake Twins, 4C models, that I purchased new in 1977. They have not been used or plugged in since 1986 and I am concerned about electrolytic capacitors drying out and causing all kinds of problems when I try to use them. The local ham radio store says they can bring up the voltage "slowly" and let the capacitors "rebuild themselves." The cost will be a flat $200, not counting parts and labor if necessary. Do you have any suggestions on putting these back in service at a reasonable cost?

A Sure: Do the start-up yourself. Just borrow a variable transformer (Variac and Powerstat are two popular brands) from someone—maybe a member of your local club has one or you can borrow one. The most common ones are about the size of a small lunch box and have a knob at the top with which to vary the voltage.

Remove all the tubes from the rig.
Turn the knob on the autotransformer to zero.
Plug the autotransformer into the wall.
Plug your Drake into the autotransformer.
Turn on the radio.
Very slowly turn the knob on the autotransformer up until you get to 25 V ac.
As you turn, look and listen for smoke or sizzling.
Wait a few minutes.
Increase the voltage to 50 V.
Keep this up until you have full voltage on the radio.
Moderately slowly turn the autotransformer down to minimum.
Turn off the radio, unplug it and replace the tubes.
Perform the procedure again.

If you had no bad "special effects," you just saved yourself a bundle of money.

If you had any components act up, you know what needs to be replaced.

Q I am new to HF and purchased the ARRL Amateur Radio Map of the World so I can have an idea of where to point my beam antenna for different places I want to contact. I would like to know exactly how to use it and the 0-360 degree part. I live in Homestead, Florida, about 25 miles south of Miami.

A The world map you have is centered on the geographical center of the US—Kansas. The numbers around the perimeter of the map can be used to point a beam. Your rotator control should have a compass-heading indicator of some sort. Just point the antenna at the number that appears on the map. For example, placing one finger at the center of the map and another on France, you will see that you are heading in a direction of 45 degrees. Rotate your antenna in this direction using the device on your controller.

Since you are not in Kansas, it is not perfectly accurate, but it will work well enough.

If you want the best accuracy, you need a beam-heading map centered on your location. You can print such a map at the following Web site: **www.wm7d.net/azproj.shtml**.

Q I have a question about the new/old antenna you are using at HQ—I believe you called it a "cage" antenna. Okay—now you have piqued my interest. What the heck is a cage antenna? Is it suitable for multi-band operation?

A The bandwidth of an antenna is affected by the diameter of the conductor. Hams who use a conventional single-wire dipole or inverted V for 80 meters usually find that it works in the CW band or the phone band, but not in both without a tuner.

The cage antenna is a classic design from the early days of radio that uses multiple conductors instead of a single one.

What the cage antenna does is "fool" the RF into thinking that it is seeing a very "thick" conductor. Therefore, you can operate over a very broad range of frequencies on the band for which the antenna is designed without the need of an antenna tuner—the "fatter" the cage, and the more conductors used, the broader-banded the antenna.

Since W1AW transmits bulletins in at the low (CW) portion of the 80-meter band and also at the upper (SSB) end, this is an ideal 80-meter antenna.

The cage antenna is not intended as a multiband antenna. On bands other than that for which the antenna is constructed, a tuner would have to be used and the performance would be comparable to that of any other random wire antenna.

Q I recently received an "Atomic Clock with Wireless Temperature," a WWVB receiver clock purchased at Wal-Mart. The wireless temperature sensing unit sends its signal at 433 MHz. While I haven't yet heard it, my son, N1TUI, has picked it up on his ham equipment. The manual states that it has a maximum transmitting range of 82 feet. The box is marked: "Distributed by SWC, Bentonville AR 72716. Made in China"

While this unit is pretty low powered it seems as though the Chinese have taken to the ham bands for yet another product. I paid attention to this as I am just starting in on satellite work.

I don't know if "flea" power gets an exemption to FCC Registration but there is no mention of it in the manual.

A ARRL has received a number of reports about devices that operate near 433-434 MHz. This is a common frequency internationally for unlicensed devices. In the US, such devices can be authorized under Part 15 of the FCC rules. Most are authorized as "periodic emitters" under Section 15.231. This rule permits field strengths that are generally useful for up to about 300 feet, but limits the transmissions to short bursts, with longer quiet periods in between.

To be legal in the US, the device needs to be Certificated under FCC rules. If so, the manufacturer is required to put an FCC ID number somewhere on the unit, or in the operator's manual. If the device has been certificated, it can be marketed in the United States.

In addition to the manufacturer's meeting the radiated emissions limits and certification requirements, the operators of unlicensed devices are required to operate them in such a way that they do not cause harmful interference to other radio services. Much the way Amateur Radio is secondary to commercial users on 30 meters and to government operation on 70 centimeters, Part 15 devices are secondary to Amateur Radio, subject to the requirement that they not cause harmful interference.

Although your son may very well be able to hear the signal in the 70 cm band, merely hearing a Part 15 device in "our" bands is not harmful interference. In this case, the rules define harmful interference as the repeated interruption of a radiocommunications service. It is much like our use of 30 meters. The commercial operators sometimes hear amateur stations in "their" bands, but unless our operation causes them interference, it is okay for us to be there. We certainly wouldn't think it fair if they said that we had to get out of their bands because they sometimes hear us on channels they are not using.

Under the rules, Part 15 devices can, if certificated, legally use nearly any frequency. The real issue then becomes one of harmful interference. For more information about Part 15 and Amateur Radio, see: **www.arrl.org/tis/info/part15.html.**

Q WB6RLP/0 writes: As I recall, in the vacuum tube transceiver days, maximum power was determined during tune-up in the CW mode. I believed that the maximum peak envelope power at full modulation in SSB would be the same as the maximum power obtained during tune-up in the CW mode.

I purchased a 100 W transceiver and a 300 W tuner. It has worked fine for several months. Two weeks ago I purchased a linear amplifier. I assumed I could drive the amplifier to 300 W output in the CW mode for tune-up into the tuner and then switch to SSB. This seemed to work for about a week and then I noticed that if I kept the power at 300 W in CW the SWR would start to rise slowly, then more rapidly, and the meters would peg. This included the plate and grid current meters on the amplifier. I didn't hear arcing in the tuner. I eliminated the bad load as the problem. I called the tuner manufacturer and their technician said on CW you can input only 150 W and that 300 W was the PEP for SSB. He said he thought it was an arcing problem, but didn't know where it was originating.

As I understand the definition of peak envelope power, it is the average power of one RF cycle at the peak of the modulation envelope. If I am fully modulating, why isn't this average power for one cycle the same as the average power of a maximum power CW signal?

A The gradual change in SWR sounds more like an overheating than an arcing problem. Usually if a tuner arcs over, you can hear it and the SWR goes sky high while the arc is occurring. It is possible that continuous power of 300 W CW is causing one of the coils or capacitors in the tuner to overheat, and thus change value.

You are correct: PEP is the average power of a single cycle of RF at the modulation peak. Thus, a 300-W CW signal has a 300-W PEP. But any heating effects in the tuner will be dependent on the average power, with a time period based on the time it takes the overheating component to either change value or reach thermal equilibrium. So, with typical dit/dah ratios, a CW signal has an average-to-peak ratio of about 40%. An SSB signal can range from 10% to 30%.

For more info, see **www.arrl.org/tis/info/pdf/9505088.pdf**. This *QST* article, "Power: Watts It All About" is from the May 1995 "Lab Notes" column.

Do you have a question or a problem? Ask The Doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. Add your comments: "The Doctor is On-line" at www.arrl.org/members-only/qst/doctor/. QST

By Kirk A. Kleinschmidt, NT0Z

New Life for Old Laptops

With computer prices falling faster than ever, yesterday's laptop computers are plentiful, affordable—and sometimes even free! Let's look at where to find them and how to make them work for you.

I'll never forget my first episode of laptop envy. I'd *always* wanted a laptop computer, of course, but in the late 1980s, when I was a junior editor at ARRL HQ, several of the senior editors—who obviously had more disposable income than I did—began bringing their new 386 laptops to work. By today's standards the machines were pretty clunky, but at the time they were nothing short of fabulous. Microsoft *Windows* was a future dream in Bill Gates' eye, and DOS ruled the day.

But these limitations didn't stop the lucky owners from taking their shiny new laptops on DXpeditions, contest junkets and Field Day outings. Who cared if the computers weighed 10 pounds each and had only four megabytes of memory? They had seductive LCD screens (monochrome), they looked sexy and they were *portable*. They also made contest logging, RTTY, packet, satellite tracking and a bunch of other engaging ham pursuits possible just about anywhere. (I must admit that, before I had a laptop of my own, I used to take secret pleasure in hearing about other laptop owners' DXpedition misfortunes. What's that? Your laptop burned up in the hot sun, dumping your 10,000-QSO contest log from Tahiti? Too bad for you! Hey—if I can't have one, you can't enjoy yours! After suffering through a few mishaps of my own, I tempered my jealous hostility.)

I/O ports connect your laptop to your ham radio stuff. From l-r are ports for keyboard, mouse, parallel, serial and VGA connectors. Although workarounds exist, models with two serial ports are prized by hams.

Above: PC Card slots allow for tremendous expansion opportunities. The PC Cards shown here are modems (emerging and at the right) and a 10 Mbps LAN card (left). Most PCs have two PC Card slots.

That era of emerging portable computing power had its price, however, and in the late '80s and early '90s, laptops cost a kilobuck or four and were virtually one-of-a-kind devices. The minimal degree of standardization we enjoy today would come much later.

As computers evolved, however, performance increased and price, size and weight tumbled ever downward. As we'll detail elsewhere in this article, if you know where to shop, you can buy a *nice* new laptop PC for $1000 and a *fabulous* laptop for $2000. Still, that's a fair amount of cash, and if you can't write it off at tax time it may constitute an "unreasonable expenditure" (especially in the eyes of your spouse!).

So, what's an enterprising ham to do? Pick up an older laptop or two and tweak them into submission! Although some do-everything logging packages and graphical propagation suites require major league PC horsepower, there's a *lot* of useful Amateur Radio software that will run just fine—day in and day out—on yesterday's laptops.

As with any PC, laptop or desktop, more power, more RAM, bigger hard drives and higher-resolution screens are always better, but many excellent logging and terminal packages run fine on monochrome 386 laptops—and machines in this class can usually be acquired for next to nothing (or are free for the taking)!

So, if you're in the mood to acquire and configure some interesting computer hardware that won't break the bank, let's start things off with an overview of laptop technologies employed between the late '80s and the mid '90s—the sweet spot for inexpensive "ham laptops."

Laptop Technology

The laptops we're mostly interested in are those with Intel 386, 486 and lower-end Pentium-class CPUs manufactured approximately between 1988 and 1997. A few models will sport Cyrix or AMD CPUs, but the vast majority use Intel microprocessors. Diehard aficionados of Apple, Commodore, Tandy and

Many IBM laptops have a fold-up keyboard that allows easy access to the modular drive bay (l), the hard drive (r) and the battery (goes in the center). Unfortunately, many of these keyboards have broken latching hardware, making them a pain to refurbish.

Laptop RAM, old and new. Shown here is credit card RAM from the mid-'90s and a more recent SODIMM module on the right.

other "unusual" brands may find less useful information here. Many of us have a soft spot for these machines, but most Amateur Radio software is designed to run in DOS or *Windows* (*Linux* is making a better showing nowadays), so the numbers greatly favor the mainstream.

Here are some tidbits that should help you choose the right PC for your applications.

Microprocessor Classes

• **286 or less:** Laptops in this class aren't powerful enough to be very useful. They'll run their share of older DOS-based terminal programs, but with 4-10 MHz CPUs, their overall performance is too limiting. Typical price: If it's not free, forget it! If it is free, consider passing on the deal unless it's a collectible, funky or otherwise unusual machine that you'd like to acquire for the fun of it. Disposal costs exceed the value of 286-class machines, laptop or desktop.

• **386 or equivalent:** Considering the low cost of faster laptops, 386 machines define the bottom edge of functionality. With enough RAM (1-4 Mbytes), a decent, "contrasty," monochrome screen and an 8-20 MHz processor, 386 laptops can run a variety of DOS-based ham programs, especially terminal programs for packet TNCs and multimode communications processors. Terminal programs, which primarily sling serial data back and forth, don't require much CPU power. Almost every 386 laptop has a low- to medium-resolution monochrome screen. After a hard life and natural aging, many of the screens look pretty shabby. Price: Free to $50. Don't overpay. Machines in this class aren't exactly desirable!

• **486 or equivalent:** This is the budget ham's sweet spot when it comes to inexpensive laptops. With CPU speeds ranging from 20 to 100 MHz and the 486's improved system architecture, these machines can run DOS and *Windows 95/98* pretty well. They won't win any races, but once they're booted, they'll get the job done. Low-end machines have minimal RAM and mono screens, but luxury models have beautiful, hi-res color screens, working sound systems, large-enough hard drives, multiple expansion ports/slots and *greatly improved* functionality. Memory can usually be expanded to at least 32 Mbytes which, as you'll remember, is a *lot more* than *Windows 95* requires for fast operation. Prices: Free to $150 (not bad for a machine that might have cost $4500 when purchased new!).

• **Pentium or equivalent:** Pentium-class laptops mark the beginning of the "modern era" in laptop design. With all of the features found in high-end 486 machines and more, these computers were the first to have built-in CD-ROM drives, modular construction and even-higher-resolution screens. Although Intel's Mobile Pentium Processor eventually hit speeds of about 300 MHz, scroungers are likely to find units with 75-166 MHz CPUs. With adequate RAM, Pentium-class laptops look good and have a snappy feel, even in *Windows 98*—and they really scoot when running DOS! Obviously, well-cared-for machines in this class are a scrounger's nirvana—get one if you can! Price: Free to $300.

Memory

Although memory modules for modern laptops are somewhat standardized, in the early days it was a wild, wild West. Slower, older machines sometimes have a fixed amount of RAM and may not be upgradeable. Most 486 PCs can accept RAM beyond the "base" amount, although some use arcane and obsolete modules that you'll probably have to find online at eBay or in a USENET newsgroup.

My favorite 486-class RAM modules look like credit cards. Back when RAM was $40 a megabyte these things were worth their weight in gold and topped out at about 8 Mbytes per card (max of one per machine). Now, used credit card modules are usually priced at $1 per megabyte or less and max out at 32 or 64 Mbytes—which will really boost the performance of a 486 machine struggling to run *Windows*.

Pentium-class laptops were the first to use RAM modules that resemble those found in desktop PCs. Dubbed SODIMMs, these handy modules fit into sockets on the motherboard and can max out at 128 Mbytes per stick (more for modern units). Most Pentium-class laptops have two memory slots.

Whatever your laptop, the more RAM the merrier.

Drives

Most laptops have a floppy drive at a minimum, although some newer models use external floppies to save space and weight. I prefer built-in units because by the time a scrounger acquires the PC, the external floppy is usually somewhere else! Finding a replacement (online) will cost $25-$75—which may be more than the purchase price of the main unit!

Hard drives are almost always built-in and come in a variety of sizes and speeds. Older 386 machines are sometimes limited to drives of 40-100 Mbytes, while 486 PCs typically sport 300-800 Mbyte drives (but can be upgraded to drives of 2 Gbytes or more). Pentium-class machines often have drives from 800 Mbytes to 2 Gbytes.

Laptop hard drives are slow when compared to even garden-variety desktop drives. And although they're intended for mobile use, they often die horrible deaths. Scroungers may have to replace hard drives on laptops of any vintage.

Replacing internal parts on machines—those without modular bays or easy access external hatches—can be a pain. Most laptops aren't designed to be easily disassembled (that's often the reason they're free!). And even when it's easy to get at an internal hard drive, manufacturers used a variety of strange connectors on otherwise standard IDE hard drives. These hurdles are far from insurmountable, but they do require

patience and a bit of sleuthing.

CD-ROM drives aren't always a necessity, but because the vast majority of modern software is distributed via CD, they can sure be handy. Most 486 machines—if they have CD drives at all—have slow, fixed units. Late-model 486s and many Pentium machines have CD drives that fit into bays or ports and can be removed. That's a good thing, because laptop CD drives are amazingly failure-prone! CD-ROM speeds on machines in this class range from 4X to 24X.

Don't worry if your machine doesn't have a built-in CD drive. Several external types are available. More on that later.

Screens

The big considerations here are color vs monochrome and passive-matrix vs active-matrix displays. This is a complex topic, so I'm going to have to generalize. In general, passive-matrix LCDs look "chunky" and washed out (low contrast), while active-matrix (TFT) screens look rich and sharp, whether color or monochrome. In the past few years manufacturers have tried valiantly to improve the quality of passive-matrix displays. These technologies, referred to as HPA and HCA, did improve things a bit, but I have always *greatly* preferred TFT LCDs. My rule of thumb is to use TFTs for color displays and anything that needs to run *Windows*, saving passive-matrix designs for DOS or other text-based operating systems. Of course, your mileage may vary.

Batteries

Unfortunately, the batteries that usually accompany low-budget laptops are usually junk. Older machines use NiCds, while newer models use nickel-metal-hydride and lithium-ion power packs.

Laptop batteries are also expensive—annoyingly so. That free laptop gets expensive when you have to buy a $150 battery! Prices do vary, so you might get lucky by searching through the offerings of dozens of online vendors. A $150 battery at one outlet might cost $90 at another (which might be a good purchase for a semi-modern model).

The funny thing is, even laptops that have new batteries are usually powered by ac adapters! I usually forget about them altogether and remove the dead or dying battery pack to save a lot of weight. I can't operate away from ac power, but most of the time I don't have to. And when I do, I usually use "other" batteries (more on that later). You can sometimes get lucky by finding someone online who's selling "new" "old" batteries, or by carefully disassembling a NiCd pack and replacing the individual cells. If you try this, be sure to retain and reuse the fusable link or the built-in thermal sensor. NiCds run amok can get hot enough to start a fire!

Video

Unlike desktop PCs, laptops have fixed video hardware that usually performs well below the benchmarks set by desktop PC video cards. There's not much that can be done about that, either. Thankfully, most ham programs don't require too much in the way of video performance or 3D acceleration. Better models support external monitors, sometimes at higher resolutions than the internal LCD.

Sound

Sound system, useful for many ham applications, are usually limited to 486- and Pentium-class machines. Higher-end machines (in their day) designed to run *Windows*, often have mike inputs and speaker- or line-level audio outputs. Sometimes these work with "soundcard-based" DSP programs (RTTY, PSK31, SSTV) and sometimes they don't. Some laptops have insufficient output levels, obscure audio hardware or digital noise levels that mask desired signals. I've had good luck with Toshiba and IBM laptops in this regard, but each unit is a new adventure.

The IBM 701C "Butterfly" (486 with decent sound hardware) has what is arguably the niftiest keyboard ever to appear on a laptop. When the lid is closed the keyboard folds in on itself like a collapsing Tetris puzzle and does not extend beyond the edge of the laptop (as it does when it's in use).

Ports

Expansion ports—serial, parallel, PS/2 and sometimes USB—are often critical for such Amateur Radio applications as contest loggers, memory keyers, terminal programs, rig-control apps and antenna aimers. Most laptops have a decent array of ports—usually at least one serial port, one parallel port and a PS/2 mouse/keyboard port. Units with two serial ports and a VGA connector are prized by hams. New models have USB ports, which opens up a whole world of connectivity, but few, if any, scrounged models will be so equipped.

PC Card Slots

Usually found on 486-and-up models, PC card slots (usually two per machine) are a convenient way to add modems, LAN cards, external hard drives, CD-ROM drives, etc. Laptops that have them are more useful than those that don't. Formerly called PCMCIA slots, these expansion ports run in *Windows* (and sometimes DOS) and feature hot-swapping (devices can be inserted and removed without rebooting).

Pointing Devices

I hesitate to call them mice, because laptop manufacturers have used a wide variety of mouse-alternative "pointing devices." Units may include trackballs (built-in and snap-on externals), touch-pads (new models only), eraser heads (IBM likes these)—even mechanically linked mini mice (used on a few tiny HP "palmtops"). I only use these when necessary, as I prefer to simply connect a conventional mouse whenever possible. Personal preference plays a big part here.

Docking Stations

Once high-dollar luxuries, docking stations (or the less ambitious port replicators) can be found for most 486-and-newer laptops. These "base stations" are designed to support conventional monitors, keyboards and mice. When you're computing at home, you connect the laptop to the docking station and use the more familiar peripherals. When you're on the run you remove the laptop and take it with you.

Especially handy for machines that don't have a lot of built-in goodies, docking stations can usually accept conventional CD drives, LAN cards, hard drives, expansion cards—even video cards. They also automatically charge the laptop's

If your laptop screen breaks you can replace the screen itself (r) or find a parts machine with dead guts and a working screen (easier to replace and probably less expensive).

batteries or power it if no battery is present.

Once nearly a kilobuck, most docking stations can be acquired for $30 or less, and often at no cost.

Problem Solving

Now that we've touched on some of the technology and device considerations, let's take a look at a few specific problems and how to solve them. This section is far from complete, but you'll at least get an introduction—and you'll learn that somewhere, somewhen, someone knows exactly what you need to know or has the precise part or documentation required. The Internet makes finding arcane information and obsolete parts *much easier*. Without it you'll be rather limited. I'll mention sources here by name, and by specific reference later on. Good luck.

My Old Laptop has a Dead Battery: As mentioned earlier, old laptops almost always have dead batteries. The easiest solution is to remove the battery and forget about it, running your machine from the ac supply. I take my battery-free laptop from home, to work and even to the restaurant down the block. I have the hostess seat me at the booths that have ac outlets underneath the tabletops! I don't even miss it.

If you need a battery, search the listings on eBay using your laptop's specific model and the term "battery." Be sure to search the active and completed items. Used batteries sometimes have a fair amount of "life" remaining, but often quickly die and have reduced run times. Visit the manufacturer's Web site to see whether a battery from a similar machine will work.

If you need to buy a new battery, shop around online, because prices vary widely. Some aftermarket battery makers can supply cheaper NiCd batteries in place of expensive lithium or nickel models. These will probably work just fine—with reduced run time when compared to the originals.

With some machines you can use a 12-V car, motorcycle or gel-cell battery (straight or via a "car adapter" designed to provide the correct voltage to your specific machine). This will help during Field Day-type outings, or when you can't obtain the PC's ac adapter. Some laptops handle this power swapping with aplomb, some won't run and some die horrible deaths. Be careful to observe correct power polarities and search the 'net for suggestions before flipping the switch. My older Toshibas run just fine on 12 V dc, while my IBM's are quite fussy as a rule. Although some PCs use proprietary power connectors, Radio Shack will probably have a dc connector that's the right size.

My Laptop Doesn't Have a CD-ROM Drive: This is certainly a common complaint—and one that has several solutions. The least expensive way to handle this is to pick up a docking station (usually free or only a few bucks) and put a standard CD-ROM drive in it. That way, when the laptop's docked you can load software and operating systems without having the extra

Look, mom—no keyboard! This Fujitsu "Pen Computer" (stylus) is typical of the many unusual "laptops" you'll find out there.

weight of the internal drive when mobile.

If you don't want to wrangle with a bulky docking station, external CD-ROM drives come in parallel port, PC card and USB varieties (new machines). Although PC card drives are usually faster, handling the device drivers is more complicated, especially when loading operating systems. I prefer parallel port models. Simply connect them to the serial port, boot the laptop and install the "no-brainer" drivers from a single floppy. Parallel port CD drives *are* slow, but they make up for it in economy and tremendous compatibility. I've had good luck with the MicroSolutions Backpack model, which has worked flawlessly with dozens of old laptops since 1997. Parallel port drives cost about $100 or so. It's not inexpensive for a single machine, but if you work with laptops regularly, it's a steal.

Where Can I Find Docs and Drivers? Most old laptops don't come with user manuals or required system drivers. The drivers can often be ignored, but a bit of specific information is always welcome. Larger manufacturers often have comprehensive tech support Web sites, so try these first. Because these companies really want to sell you a *new* laptop, their "old-machine" resources can be difficult to find, even on their own Web sites (Compaq, Dell, Toshiba, others!), so be persistent.

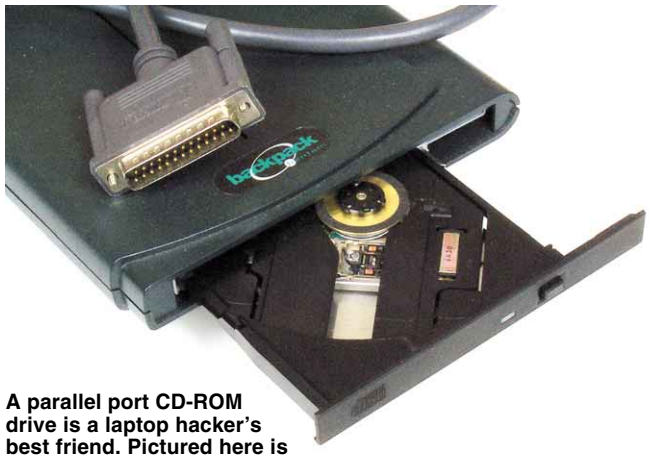
Other companies, especially those who are only rebranding machines made by others, may be long gone from the laptop business. The best solution in this case is to do a comprehensive Web search. Surprisingly, many hobbyists have Web sites devoted to "glorifying" their favorite old PCs (desktop and laptop). These folks can be an excellent source of specific information. Send them some e-mail if the info isn't on their Web sites.

You can try the same thing on eBay: Find someone selling your specific laptop and drop them a line. They may have drivers, info and tips just for the asking. At any one time there are several thousand laptops for sale, so chances are good that you'll find someone selling your very machine—even if it takes a few weeks. The eBay community generally shares a ham-like camaraderie. I've never been hassled when approaching sellers for information. You can also post a query on the USENET laptop newsgroups. Sometimes you can get lucky!

I Have an XYZ-Brand Laptop. Who Really Manufactured It? Although brand names abound, there are really only a handful of companies that actually manufacture laptop computers, and most of them are headquartered in Taiwan. Dell laptops? Made in Taiwan. Gateway laptops? Made in Taiwan. Almost every laptop? Made in Taiwan.

This can be helpful if you can scavenge parts from an exact clone of your PC that happens to be a different brand and model. Usually, though, you'll have a difficult time identifying these "same model" laptops because most manufacturers and resellers want to keep this info to themselves. What that means is, to have the best chance of finding spare parts and information, look for brand-name laptops (or at least know that finding parts for obscure machines might be difficult or impossible).

I Broke My Screen—What Now? If you've cultivated a



A parallel port CD-ROM drive is a laptop hacker's best friend. Pictured here is the Micro-Solutions Backpack model. It's slow, but it's a workhorse.

This HP Omnibook 300 is more of a palmtop than a laptop. The tiny precursor to today's *Windows CE* machines has its software and operating system in ROM cards. It's a cult classic—something to be collected just for the fun of it.

source for freebie laptops, consider stripping the chassis and throwing the thing in the trash (or selling it on eBay as a parts machine). Replacement screens are sometimes available from the manufacturer or from aftermarket screen replacement specialty companies, but the price you'll pay could put someone through college! That laptop might have cost you $50, but a replacement screen from the aforementioned sources might run $300 to $600—hardly a bargain.

It's usually easier to find another identical laptop that's being sold for parts on eBay or other online sources. (That way you can replace the entire upper half of the unit instead of totally disassembling it to swap the screen.) Sometimes you can even find replacement screens there at bargain prices. Just getting some laptops opened up for screen replacement can be almost impossible, however, and even if you do, that replacement screen may not work. Manufacturers made many mid-model changes as vendors came and went. Make sure you buy the screens cheap and you'll be covered either way. Newer machines are better candidates for replacement screens, but it's almost easier to replace older models (or connect an external monitor, if you can get away with it).

Help! My Desktop PC is Interfering With My Ham Radio! After trying an endless supply of desktop PCs and monitors in my shack, I just couldn't eliminate the RFI. When I tried a laptop, however—blissful radio silence! A different laptop from another manufacturer produced the same results! That got me started with collecting, refurbishing and selling used laptops. Not all laptops are "radio silent," but it's worth a try.

Where to Find Inexpensive Laptops

They say that the best things in life are free—and that goes for laptops, too. So where can you find free laptops? Companies—large, medium and even small. Most large- and medium-size companies have piles of desktop and laptop computers stacked up in the back corner of the IT department. The trick is getting a few stacked up in your shack!

Persistence and a few telephone calls will usually produce results, especially if you make your efforts on behalf of your radio club. Call the IT department manager or vice president and simply say that your ham club is looking for some older laptop computers. Some companies will jump at the chance to get rid of the things, and some have in-house auctions, recycling plans or employee giveaway programs to take care of old technology.

You can also place a classified ad in your local shopper: "Local Amateur Radio Club needs your old laptop computers. Will pick up, clean up and haul away. Call Joe at …" Want more free towers or satellite dishes than you can handle? Substitute "antenna towers" or "satellite dishes" for "laptop computers." Two years ago that ad in my rural Minnesota shopper produced four 10-foot satellite dishes and a pile of hardware and satellite receivers. The year before, a reader gave me the 48-foot Rohn tower I use today (and I turned down two others). It never hurts to ask!

Corporate auctions can also produce piles (literally) of laptop and desktop PCs. When buying in bulk I usually pay $1 to $4 for 486-class desktop PCs and $10 to $30 for laptops. You won't win every sealed bid, but once you find the right bidding range you'll be able to buy as many laptops as you want. What I don't need I sell at the local computer store or on eBay.

Speaking of eBay, it's a great place to find inexpensive older laptops and related parts. Yahoo Auctions is another. Make sure you don't overpay, because not every auction deal is a sweet one.

Ham radio flea markets can also be an excellent place to pick up older computer gear of any flavor. The same goes for the USENET ham radio swapfest at **rec.radio.swap**.

If you want to make a more conventional purchase, check out uBid's online auction (**www.ubid.com**) or Electrified Discounters (**www.electrified.com**). As a "dot com survivor," uBid is a great place to find excellent deals on new, used and refurbished computer stuff (and just about anything else). And the sellers are established companies—it's not a free-for-all like eBay or Yahoo Auctions. Like Connecticut's Electrified Discounters, you can find Pentium- and Pentium II-class laptops in the $250 to $450 range.

If you're in the market for a new laptop at stunningly low prices, check out the hot deals forum at **www.anandtech.com**. The members there scour the Internet looking for the best deals, and when they find them they post the specs in the forum. How about a 600-MHz desktop PC, factory fresh, for $199? Or a Dell laptop that usually sells for $1300 for $699? Or a new Gateway dual-CPU file server with built-in Ultra-SCSI hard drives for $399? That's about $2000 less than the usual price! Deals such as these—and hundreds more—are posted daily. Among all of the "good deal" sites on the Internet, Anandtech stands out.

Also, be sure to check out the factory outlet stores at Dell and Gateway. They frequently run unadvertised specials on new and refurbished PCs (although these will be discovered, discussed and digested in the Anandtech forums…).

Tidbits

- When buying used laptop PCs, stay away from the danger-

Online Resources

Batteries

www.batteryzone.com—If you need to purchase a new laptop battery (ouch!), this vendor has offered some excellent deals in the past. I recently purchased a battery for a Toshiba 4800CT laptop for $79. Most sellers priced the battery at $139.

www.batteriesplus.com—When you've run out of low-price options, Batteries Plus (online and via more than a hundred retail stores nationwide) probably has what you need—at a price. If you can't find "The NiCd Guy" at a local hamfest, BP also carries a comprehensive line of NiCd replacement cells.

Drivers

www.windrivers.com—Comprehensive collection of computer device drivers.

www.driverguide.com—Ditto. The site requires a user name and password. User: "Drivers," PW: "All."

External CD-ROM Drives

www.micro-solutions.com—Micro-Solutions makes high-quality external drives of every type. Check out the product line here and find the best price on Pricewatch.

Good Deal Sites

www.anandtech.com—You can find hundreds of Good Deal sites on the web, but when it comes to computer stuff, the Hot Deals Forum at Anandtech is the best I've found to date. I check this site daily. Be careful. The deals are *so* good you'll end up spending money if you frequent the forum!

Ham Shareware

www.dxzone.com/catalog/Software/Collections—Have laptop, need software? This site has links to dozens of ham radio shareware programs you can download.

www.ac6v.com/software.htm—Ditto.

Laptop Manufacturers

www.laptopworldwide.com/laptops.html—If you have an obscure brand of laptop PC, you'll probably find the "real" manufacturer listed here.

Online Auctions

www.ebay.com—Often imitated, never duplicated. The best online auction site for scroungers. Sooner or later, everything finds its way to an eBay auction listing.

www.ubid.com—A great site to buy computers and related goodies at great prices. Unlike eBay, vendors are all large, established companies (not individuals).

Price Engines

www.pricewatch.com—Find the lowest prices on just about anything PC related.

www.pricegrabber.com—Takes a back seat to Pricewatch, but sometimes lists items not found elsewhere.

Replacement LCDs and Misc Parts

www.73.com/a/index1.shtml—At the Surplus Traders Main Page you'll find links to thousands of obsolete laptop parts (and every other electronic part), including thousands of replacement LCDs. Use the search engine to find what you need or browse the links—it's fun!

www.eio.com/lcdmanuf.htm—Links to dozens of LCD manufacturers.

Search Engines

www.google.com—Don't waste your time with other search engines because Google is the best, bar none. If Google ever requires subscriptions, I'll be standing in line.

www.deja.com—Now a part of the Google online information dynasty, Deja is a huge searchable archive of USENET postings going back several years. Somewhere in there, someone else was looking for whatever you were looking for. A quick search often yields answers to the most esoteric questions.

USENET Newsgroups

rec.radio.swap—An online hamfest. Radios and inexpensive laptops show up here.

comp.sys.laptops—A great place to post specific laptop technology queries. Someone in this forum knows what you need to know…

uk.comp.sys.laptops—The UK version.

www.easynews.com—Easy-to-use Web-based access to USENET newsgroups.

www.newsguy.com—Ditto.

ous "middle ground" between disposable and brand new. When that old laptop finally craps out (and it will, sooner or later), you can acquire another one for a few bucks—no big deal. And when your new laptop breaks (and it will) it's covered under the warranty. But when your $600 used Pentium II laptop dies a week after its 90-day warranty expires—you're out $600 or you have to start the eBay search for a parts machine. Ouch!

So, I suggest you stick with disposable laptops or buy a new laptop with the longest-term warranty you can afford. You see, laptops are really quite fragile and, unlike almost every desktop computer, when they break, the corner PC store can't fix them. The factory can—but for an unholy price!

For once, my brother listened to me and spent $300 extra for a three-year, "no-matter-what" warranty on his new Dell laptop. That brought the price to $2300, which he wasn't thrilled about (not to mention that six months after the purchase he could replace it for about $1400). Two weeks later, the large, beautiful LCD went black. If that hadn't been covered under the warranty, it would have cost about $800 to replace. A couple of months later the DVD drive died ($200). And then the batteries were recalled ($100 each). Soon thereafter the keyboard became flaky… You get the idea—laptops break and they cost a lot to fix. The corollary is, if an old laptop has survived for five years, it's not likely to die of random causes anytime soon…

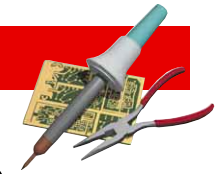
- Laptop PCs love RAM. In most cases, adding RAM is a better upgrade for the buck than getting another machine with a slightly faster CPU. Want to turbocharge your newer laptop PC? Replace that 32- or 64-Mbyte stick of RAM with 128 or 256 Mbytes. Now that RAM is about 25 cents per Mbyte—down from $40 a meg in the late '80s—every PC should have gobs of RAM, even laptops.
- When buying a laptop from a commercial vendor, always try to make the purchase with a credit card, get the warranty in writing and save your receipt! It's unfortunate that these steps are necessary, but it's better to be safe than sorry.
- When starting your Web search for information or low prices, start with **www.google.com**. It's by far the best Internet search engine available (not just my lowly opinion). For searching USENET newsgroups surf to **www.deja.com**. Formerly **www.dejanews.com**, this Google-owned site can search through millions of archived newsgroup messages in the blink of an eye. Basically, I've discovered that if you can't find it at Google or Deja, it's probably not on the Internet. Google also translates sites hosted in several foreign languages. You'd be surprised by how much handy technical information can be found on German-language sites (for example)!

Final Thoughts

I know I've only scratched the surface here, but I hope I've given you enough motivation and information to pick up an old machine or two, or save a few hundred bucks on a shiny new model. Nowadays, laptop PCs are definitely within everyone's reach, and they're so handy for so many ham radio pursuits. I've also discovered that the older machines really grow on you. Some are really funky and even a bit bizarre. If you're not careful you'll start collecting the interesting models as I have. Be sure to check out the URLs in the Resources sidebar—and happy hunting! Oh, and if you run across me on PSK31, ask me about the little Toshiba 486 that's "powering" my end of the QSO…

All photos by the author.

16928 Grove St, Little Falls, MN 56345
kirk@cloudnet.com



SignaLink SL-1 Sound Card/Transceiver Interface

Thanks to the boom in sound-card-based Amateur Radio software, there is a burgeoning market for devices to interface computer sound cards to transceivers. These devices are designed to handle audio signal interfacing as well as transmit/receive switching. Functionally speaking, the interfaces have a lot in common, but there are some features that set them apart.

The SignaLink SL-1 is a contender in the miniature interface field. The SL-1 is slightly smaller than a pack of cigarettes but attractively designed to make the most of its meager surface area. The front panel includes a POWER ON/OFF pushbutton switch, a pushbutton DELAY switch (to toggle between longer and shorter transmit/receive switching times) and two bright LEDs to indicate power (green) and PTT activation (red). These LEDs are especially handy; you know at a glance when the SL-1 is powered on and when it is keying the PTT line to transmit.

Installing the Interface

The SL-1 is designed to work with just about any computer and radio combination. Two 1/8-inch stereo jacks on the rear panel are for the audio cables to your sound card. One cable attaches to your sound card MIC or LINE input; the other connects to the SPEAKER or LINE output.

The next task is getting audio to and from your *radio*, and dc power to the interface itself. The SL-1 allows you to make most of these connections through your rig's microphone jack. You can order the SL-1 with a pre-prepared cable for 4- or 8-pin round mike connectors, or for RJ-45 telephone-style connectors. For this review we ordered the RJ-45 cable for compatibility with my IC-706 transceiver. The SL-1 sports an internal IC socket that functions as a jumper block. By inserting short wire jumpers (supplied) and carefully following the instructions, you can configure the SL-1 according to the type of radio you are using. The manual provides detailed examples, showing jumper block diagrams for almost every common transceiver model. You simply locate your rig's model number, study the adjacent diagram and insert the jumpers accordingly. It takes all of about 15 minutes, including the time required to open the SL-1's enclosure.

Depending on the type of transceiver you own, you may be able to tap the receive audio at the mike jack. Just install the correct jumper and you're good to go. This is elegant in that it eliminates yet another cable, but there is a drawback. The receive audio that is available at most microphone jacks is *not* fixed. In other words, you'll need to crank up your radio's receive audio gain to provide an adequate signal to your sound card. The audio level at the microphone jack is usually less than what is supplied to the radio's speaker (or external speaker jack). I often found that I had to turn the audio up to the point where my external speaker was blaring at objectionable levels just to get a usable signal for my sound card software. This makes it difficult to operate when the rest of the family is asleep! Fortunately, the SL-1 includes an alternate input jack for audio from your radio. You can tap the audio at the transceiver's accessory jack where the level is fixed and unaffected by the audio gain setting. Yes, you have to use yet another cable, but it is a small sacrifice for domestic peace.

While you can power the SignaLink SL-1 from an external dc power source, you may also be able to use "rig power." Many modern transceivers, including my own, supply between 8 and 13.8 V at one of the microphone jack pins. This is just enough juice to power the SL-1. Install the correct jumper and you'll eliminate the need to run wires to an external supply.

Where is the Serial Port?

One of the first things you'll notice when you unpack the SL-1 is the absence of a DB-9 or DB-25 serial port. In most interfaces this port connects to a serial cable that, in turn, connects to your computer's COM port. The sound card software uses the COM port to send transmit/receive switching pulses to your radio (through the interface, of course). So where is the serial port in the SL-1?

The SL-1 lacks a serial port because it relies on *audio switching* to key your radio. That is to say, it uses a VOX-style circuit to detect transmit audio from your sound card. When it senses audio from your computer, the circuit grounds the PTT line to your transceiver and switches it into the transmit mode.

The advantage of this approach is that it frees your computer's COM port for other applications. (I use mine with an FSK switching interface to run FSK RTTY with my sound card.) The disadvantage is that the SL-1 will key when it senses *any* audio from your computer—whether it is a bona fide transmit signal or a random beep. The solution is simply to switch the SL-1 off when you are not using it. The green PWR LED is a good reminder, but you need to be careful.

Conclusion

If you're looking for a compact, affordable interface, the SignalLink SL-1 is a worthwhile model to consider. I found it to be dependable, easy to install and virtually invulnerable to RF. The manual is quite thorough—perhaps a little too thorough. It communicates a strong sense of caution (telling you, for example, to use a VOM to double-check the results of your jumper wiring). I found myself skipping over several paragraphs just to get to the basic what-goes-where information. On the other hand, for hams with minimal technical training and computer familiarity, the SL-1's manual is right on target.

Manufacturer: TigerTronics, 400 Daily Ln, Grants Pass, OR 97527; tel 800-822-9722; **www.tigertronics.com**. $49.95. QST

Steve Ford, WB8IMY ♦ Editor

By H. Ward Silver, N0AX

Test Your Knowledge!

Make Me a Matchmaker

No matter how complex or simple the station, the question of impedance matching always comes up. Here's a quiz featuring—what else?—a set of matching exercises.

1. Match the stub with the resulting impedance.

a. 1/4-wavelength shorted	f. capacitive reactance
b. 1/2-wavelength open	g. short
c. 1/4-wavelength open	h. open
d. 1/8-wavelength shorted	i. open
e. 1/8-wavelength open	j. inductive reactance

2. Pair up the type of feedline-to-antenna matching with the description.

a. T	f. unbalanced, connects one side of the line directly to antenna
b. Gamma	g. connects feedline to "taps" on antenna with correct impedance
c. Hairpin	h. center is electrically neutral
d. Delta	i. balanced, acts like a folded dipole to transform impedance
e. Omega	j. series and shunt capacitors

3. Identify the most common component arrangement that fits each type of L-C matching network.

a. L	e. two inductors
b. Pi	f. three capacitors
c. T	g. one inductor, two capacitors
d. Link	h. one inductor, one capacitor

4. Match the balun type with its description.

a. coaxial choke	e. coiled cable
b. detuning sleeve	f. 1/4-wavelength, air-insulated transmission line
c. voltage	g one winding across the input
d. W2DU	h. ferrite beads over cable

5. Which device performs which function?

a. reflectometer	f. samples a portion of transmission line power
b. wattmeter	g. measures SWR
c. antenna tuner	h. measures forward and reflected power
d. directional coupler	i. impedance transformer
e. noise bridge	j. measures impedance

6. Get a line on the correct impedances.

a. RG-213	f. 300 or 75 Ω
b. RG-11	g. 50 Ω
c. TV twinlead	h. 450 Ω
d. Ladder line	i. 93 Ω
e. RG-62	j. 75 Ω

7. Match the transmission line with the characteristic velocity of propagation factor (VF).

a. Coaxial, foamed insulation	e. 66%
b. Twinlead	f. 70%
c. Coaxial, solid polyethylene insulation	g. 80%
d. Coaxial, Teflon insulation	h. 95%

8. Select the termination for a 40-meter, quarter-wavelength stub that will result in an open circuit at its opposite end on each band.

a. 40 meters	e. open
b. 20 meters	f. open
c. 15 meters	g. short
d. 10 meters	h. short

9. Match the measurement to its corresponding unit.

a. return loss	f. dB
b. reflection coefficient	g. degrees
c. characteristic impedance	h. radians/unit length
d. phase constant	i. unitless
e. electrical length	j. ohms

10. Can you pair up the symptom with the problem?

a. SWR changes with line length	e. High SWR
b. Tuning network arcs	f. Common-mode line current
c. Non-unity SWR with no power applied	g. Strong nearby broadcast station
d. Low SWR with line open at far end	h. High line loss

Bonus—What is measured in nepers/unit length?

Total Your Score!

Give yourself one point for each correct answer.

7-10	An excellent match
4-6	Better check your SWR
1-3	Your impedance is out of range

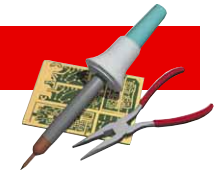
22916 107th Ave SW
Vashon, WA 98070

Answers

1. a-h, b-i, c-g, d-j, e-f
2. a-i, b-f, c-h, d-g, e-j—Amateur antenna-makers should know all of these matching techniques
3. a-h, b-g, c-f, d-e—Know the limitations of each type of balun
4. a-e, b-f, c-g, d-h
5. a-g, b-h, c-i, d-f, e-j
6. a-g, b-j, c-f, d-h, e-i
7. a-g, b-h, c-e, d-f—Actual VF varies with manufacturer and exact cable type
8. a-short, b-open, c-short, d-open—This is a useful technique for reducing interstation interference.
9. a-f, b-i, c-j, d-h, e-g
10. a-f, b-e, c-g, d-h

Bonus—Line loss. One neper is 8.688 dB and is derived from the hyperbolic trigonometry used in calculating transmission line behavior.

HINTS & KINKS



YAESU FT-920 AUTOMATIC-TUNER TRICKS

◊ About two years ago, I traded for a Yaesu FT-920 that was in excellent condition, except for its automatic antenna tuner. I went to each band and started the matching process by holding the TUNER button in, and the tuner arrived at a good match on all the bands my antenna covered (40 through 6 meters). The next day, the match was gone on some bands.

Trying to tune those bands ended in a match failure, even with a dummy load!

I first suspected a relay or some mechanical failure, so I opened the transceiver and tried to determine the problem. There seemed to be no mechanical problems; everything was secure but to be sure, I went through the Antenna Tuner Adjustment procedure in the Service Manual. Everything seemed to work for a couple of days, and then the problem started again. I dug into it again and tapped on all the relays as it was tuning, hoping to find one that was sticking or making erratic contact—none found!

I decided to watch the tuner as I went through all the bands and noticed that one of the stepper motors had turned its variable capacitor beyond the fully unmeshed position. Normally the home position for these guys is fully meshed; there is a mechanical stop at this position. Looking from the front of the radio, the stepper motors turn the capacitors clockwise, to the fully unmeshed position at most. There is no stop at this unmeshed position and no feedback to the controller indicates whether this position—or any for that matter—has been reached. This time one capacitor was beyond the unmeshed position, and I thought that one of the stepper motors had a problem, so I replaced it. I should have watched it more closely, because that wasn't the case. The problem returned, and with it continued slipping of my sanity. I had about decided that this was a "return to Yaesu" problem and connected a manual tuner. However, the thought that a tuner was there but not working was driving me crazy.

I opened the radio up again, started the tuner on each band and noticed this time that *both* of the stepper motors had gone beyond the unmeshed position! Normally when you first turn the transceiver on, these capacitors go to the home position (fully meshed) and then go to the saved position for the current particular frequency. After one or both of the capacitors have gone beyond the unmeshed position, however, the home-position reference seems to be lost. When you move to another band, the controller takes the stepper-motor positions and relay sequences from memory and acts accordingly. However, the motor-position information is referenced from the home position, which has now changed. Since there is no positional feedback, the capacitor settings are completely wrong. If you try to tune again, the controller thinks the capacitors are somewhere within that 180° arc from meshed to unmeshed, but instead one or both of them is beyond 180°. Therefore, the capacitance increases, rather than decreases with clockwise rotation. That's why no match could be achieved, even with a dummy load. If you turn the radio off and back on, the motors will turn (counterclockwise) for the length of time they are programmed to turn, but will not go fully home if they're beyond 180°. If you do this several times, they eventually get to the home position. Then, the positional information for most bands is correct again. When you go to one of those bands, everything works again.

I eventually discovered that doing a warm reset (pressing GEN and ENT on the keypad while turning the radio on) would clear the problem for a while, but it kept returning—usually every few days. I knew I shouldn't need to reset the radio that often.

Then one afternoon it was doing this wonderful thing again. Everything was fine on all bands until I went to 6 meters. The match was fine there, but when I went back to 10 meters, I heard a dip in the signal level and then it came back up a little. I knew the capacitors were in the wrong place. I opened it and that was indeed the case. I kept it on 10 meters, turned the radio off and on enough times to get to the home position and started the tuner. It did its thing and achieved a match. I went to 6 meters; the capacitors moved to the new location. Then I went back to 10 meters, and both capacitors went beyond 180°. I went through the off-on-tune thing several times, and each time I went to 6 and back to 10 the capacitors went past 180°. The only way to clear it was to do a warm reset and retune on each band.

It then dawned on me what the problem could be. The tuner uses a serial EEPROM to store values. This EEPROM and the microcontroller are powered from 5-V dc from a regulator on the Tuner Control Board. This 5-V line also goes to the Main Tuner Board for the relays, coils, capacitors and so on. Having had some experience with EEPROM devices, I surmised that noise/RF could be getting into them via this 5-V line and causing erroneous values to be written into memory. There are a couple of 1 µF electrolytic and 0.01 µF disc capacitors along this line, but with as much RF as could be running around in there, I thought it needed more. I took the board out, fired up the soldering iron and added a couple of parts. With these additions, I've had *no* problems with the tuner at all over the last two years. In fact, it seems to tune faster and smoother than before. I added two capacitors: a 330-µF 16 V electrolytic. This could probably be much smaller and work as well, but this is what I had on hand: a 0.047-µF ceramic disc. I wanted a 0.1-µF disc, but this is what I had on hand. Here's the modification procedure:

1. Very carefully unplug all cables from the Tuner Control board. Don't jerk them or you might pull a wire out or break it. Gently rock them from side to side until they come loose.

2. There's a white (at least on mine) flat cable that comes up from underneath the transceiver and slides into a connector on the Tuner Control Board. Don't force this one free. Pull up the small clips on each side to release pressure on the cable so it will come out correctly.

3. Remove the four screws that hold the board in place.

4. There is a screened position on the board marked "C5547." There is no part in that position on my board, nor is there a part on the schematic with this designation. This is where I placed the 330-µF capacitor. Please note that the negative connection is marked with a dot on the board—at least on mine—please verify that on yours!

5. The 0.047-µF capacitor should be soldered as close to pin 8 of JP5004 as possible and ground. I traced the 5-V line and found a spot on the board where I was able to get to a ground connection that already had solder on it.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

I also redressed the leads going to this board somewhat. Especially those going to the stepper motors. They seem three times longer than necessary. I bundled them with a wire tie.

That's it! Put the board back in place and replace all the connectors. Be sure to get the right connector to the right socket for each stepper motor.

Several people on the Internet reflectors reported problems similar to mine, even with multiband antennas such as a five-band vertical. At least five of them (the ones who contacted me) tried this modification and it solved the problem. In the real world, there are many variables. Perhaps Yaesu designed the tuner in a lab environment, then problems resulted outside that environment.

Other notes for FT-920 owners

The automatic tuner in the '920 "gives up" quickly if the SWR is high. In addition, if the SWR is more than 1.5:1, the settings will not be saved. A trick I've used is to turn the RF power to minimum and start the tune cycle. When it starts to tune, raise the power a little at a time so a rough match is attained, then turn it up completely near the end of the cycle. I have been able to get a good match on 40 through 6 meters on a half-length G5RV. The only thing I had to do was to increase the length of the feedline a little.

I've also seen that at certain frequencies the tuner will refuse to tune at all and give a "High SWR" indication. I found a way to get around this problem. Like before, turn the RF power all the way down, then start the tuning cycle. Now instead of gradually increasing the power, quickly rock the power control up and down until the tuner starts the sequence. Then like the other instance, increase the power a little at a time until it's at full power. This will take a few tries. You are really tricking the tuner because there's a slight dip that it sees.—*Anthony Bowyer, NT4X, 113 Cliffwood Rd, Bristol, TN 37620;* **adb1x1 @yahoo.com**

◊ Have you read the notes at the end of every Hints and Kinks column? Some Hints are useful, but not necessarily safe in all situations. The important part of Anthony's advice is that stray RF can cause automatic tuners to malfunction. If you experience this problem, first do everything you can to remove the RF: Is the antenna too close to the operating position? Are you using a shield choke at the back of the radio? Is the station properly grounded?

For example, when operated at any SWR greater than 1:1 there are periodic voltage maxima and minima that develop along a feedline. RFI problems sometimes result when a maximum occurs near the affected equipment. Such problems may be reduced or cured when the feedline length is changed by $\pm\lambda/8$ on the problem band, so as to move the voltage maximum away from the equipment. Of course, changing the feedline length may create a problem on another band, so it may take several iterative adjustments to reach a cure.

Once you have exhausted other possible remedies, consider whether you feel comfortable modifying your equipment and with the possible consequences.

In the "Other Notes," Anthony is fooling the tuner into functioning with SWRs beyond its design specifications (greater than 3:1). Although the tuner might be persuaded to match the impedance, there is a concern that the higher RF voltages associated with the higher SWR might exceed tuner-component specifications. (The component specifications presume that the tuner will *not* try to resolve higher impedances.) Perhaps the increased voltages contribute to the need for additional bypassing in the tuner? So, as with all the Hints and Kinks, this technique is definitely "at your own risk."—*Bob Schetgen, KU7G, Hints and Kinks Editor*

ONLINE GRID-SQUARE RESOURCES AND UTM COORDINATES

◊ When I visited the TopoZone site, I found that the coordinates associated with the cursor were given in UTM coordinates, not degrees. UTM stands for "Universal Transverse Mercator," a coordinate system used by the military and others for local navigation. The UTM system divides the world into 60 zones (each 6° of longitude wide, extending from 80°S to 84°N latitude) and superimposes a rectangular grid over each zone. A position is specified by its zone number and Cartesian coordinates (in meters) from a point on the equator 500,000 meters west of the zone center. The first coordinate is an "Easting" and the second a "Northing" (in the Northern Hemisphere, I saw no mention of a "Southing" for the Southern Hemisphere). With the cursor on the ARRL HQ building, UTM 18 688945E 4620367N shows in the status window of the map page. (For an explanation of the UTM system, visit the Map Tools Web page at **www.prusik.com/maptools/UsingUTM/** or the USGS Fact Sheet 157-99 at **mac.usgs.gov/mac/isb/pubs/factsheets/fs15799.html**.) Clicking on the QUAD INFO link at the upper right of the map takes you to a page of information about the USGS map that you are viewing. There, you can read the HQ position as latitude 41.7146º, longitude –72.7288º, where the negative sign indicates west longitude.

Many Web map sources include latitude and longitude information. I often use MapBlast (**www.mapblast.com/myblast/index.mb**). There, you simply enter an address, click the CREATE MAP button and read "Lat: 41.716905, Long: –72.727083" above the map's upper-right corner. MapBlast doesn't give topographic information.—*Bob Schetgen, KU7G, Hints and Kinks Editor*

YOUR GPS UNIT MAY DISPLAY GRID SQUARES

◊ Many VHF/UHF contesters and other hams make use of the Maidenhead system of grid squares. The grid squares are one degree of latitude tall by two degrees of longitude wide. They were agreed upon at a conference held in Maidenhead, England. Many of the populated areas of the world exist in the middle latitudes where the lines of longitude have converged to about half of the separation they have at the equator. This makes the grid squares look approximately square in the middle latitudes.

Over a year ago, I moved to Friendship, Maryland, so I am designing a new QSL card reflecting the new station location. In order to find my grid square for the new card, I took my latitude and longitude readings from a Garmin GPS-12 handheld GPS unit. Then I went out on the Web and found one of the many grid-square lookup pages. The lookup page wanted the latitude and longitude coordinates in degrees, minutes and seconds. The GPS was displaying degrees, minutes and decimal fractions of minutes. Well, it is easy enough to do the math and convert to seconds, but I chose to look in the GPS setup menu and have it display seconds. As I scrolled through the many display formats, I was surprised to find a choice labeled "Maidenhead." What a great deal! Just standing there in my backyard with a GPS and presto! I find that I am in Grid Square FM18QR.

Actually FM18 is the 1°×2° square. The fifth and sixth characters "QR" refine the location to 2.5′ of latitude by 5′ of longitude. For more information go to **www.arrl.org/locate/gridinfo.html**.—*Ric Creager, KK4GV, 24 Scrivner Dr, Friendship, MD 20758-9778;* **creager@erols.com**

◊ A rapid, accurate, interactive and free method to quantify latitude and longitude for locating Maidenhead grid squares, in addition to ordering paper USGS topographic maps or employing a GPS receiver, is to utilize the online USGS

topographic maps at TopoZone (**www.topozone.com**). The user enters a place name and state, selects the desired map, and then confirms their location and respective degrees, minutes and seconds of latitude and longitude by moving the mouse cursor over the TopoZone map. The latitude and longitude data are then entered into the ARRL grid square locator (**www.arrl.org/locate/grid.html**) for four or six character grid determinations (see **ftp://ftp.arrl.org/pub/contests/ln9404.pdf**). Accompanying aerial photographs and topographic relief images, which notably enhance visualization of the map locations of interest, are available at TerraServer (**terraserver.homeadvisor.msn.com**).

The online topographic maps, aerial photographs and relief images are similarly helpful for scouting out the logistics of contest, mobile, portable or base-station locations and respective grid squares.

Important tips for TopoZone and TerraServer: The maps usually have elevations, contour lines and contour intervals in meters. The scale bar below each map enables distance conversions to feet and miles. In addition, notice the vintage of the maps, photographs and images, which can be determined while online. When investigating areas with significant urban growth, remember that new features may have been constructed.—*Jay C. Close, K0GEO, 174 W Sterling Pond Cir, The Woodlands, TX 77382;* **k0geo@arrl.net**

MORE ON SCHEMATIC DRAWING SOFTWARE

◊ I've been following, with much interest, the Hints and Kinks articles regarding programs folks are using for designing PC boards.[1]

[1]Schematic Drawing Software," *QST*, Dec 2000, p 66; "More Schematic Drawing Software," *QST*, Feb 2001, pp 78-79.

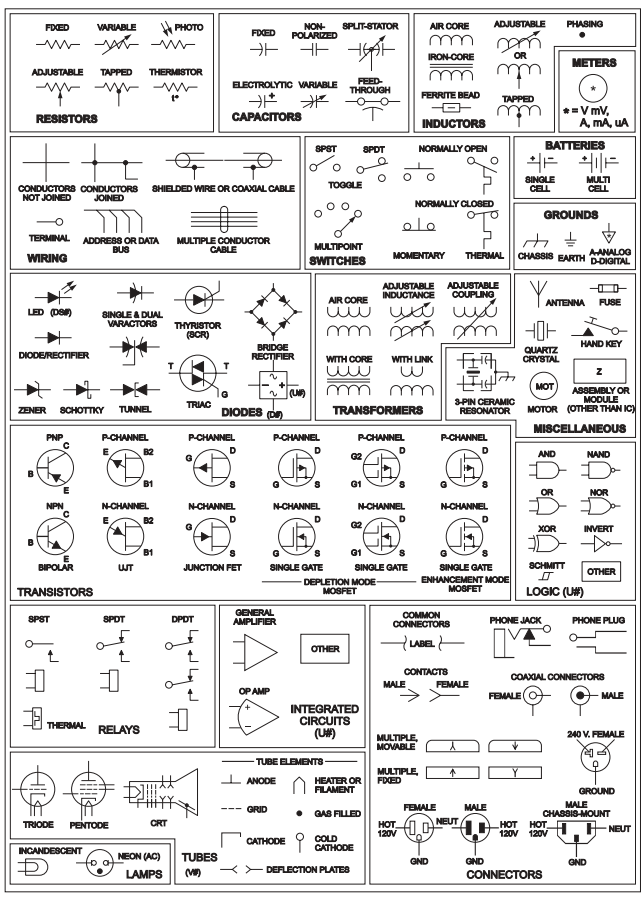


Figure 1—The symbols in the *CorelDraw* symbol library [Electr Draft Symb (ARRL).cdr] of N0SS.

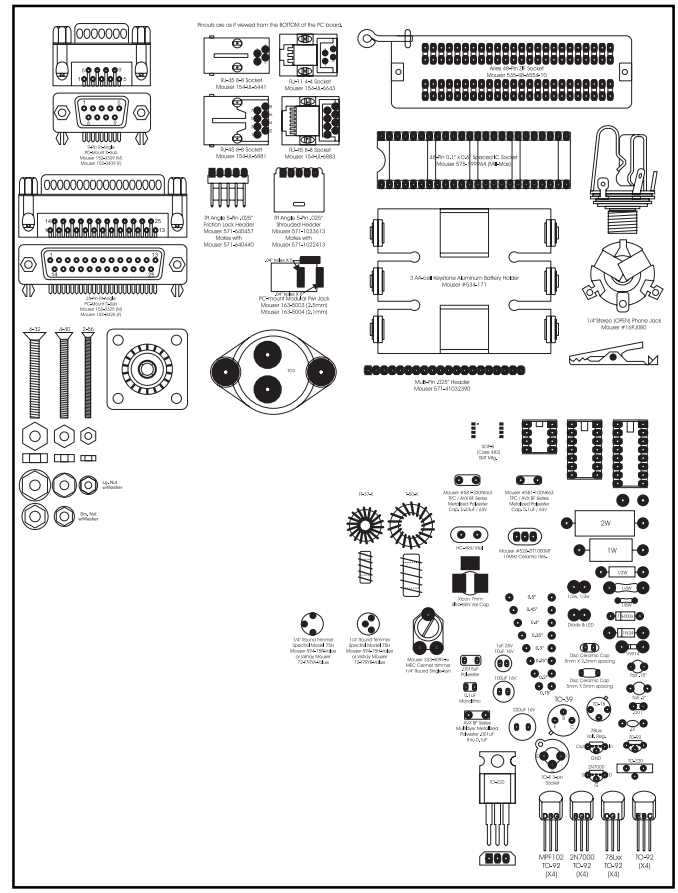


Figure 2—The symbols in the *CorelDraw* PC-board pad-configuration library (Electr Pcb pads.cdr) of N0SS.

I've been using *CorelDraw* for the past seven or eight years (version 9 for the last year or so). I like the way it allows me to place components anywhere *I* want to place them, rather than putting them where *IT* wants them to be.

Over the years, I've developed a library of numerous schematic symbols (Figure 1) along with component outlines and PC-board pad layouts (Figure 2) for the outlines. Most recently, I redrew the ARRL schematic symbols library printed in a semi-recent *QST*. I now use them in place of the symbol file I once used.

All drawings are individual items unto themselves. They can be selected, duplicated and then moved onto the design sheet for use wherever I wish to use them.

I am attaching the two files I use most often in the hopes that they may benefit others who might have access to *CorelDraw* and wish to do their own PC-board designs.[2] I look forward to exchanging views with other *CorelDraw* users on this subject.—*Tom Hammond, N0SS, 5417 Scruggs Station Rd, Lohman, MO 65053-9537;* **n0ss@arrl.net**

[2]You can download this package from *ARRLWeb*: **www.arrl.org/qstfiles/**. Look for SCHEMATIC.ZIP.

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 **h&k@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

Turkish Amateur Radio Leader Bahri Kacan, TA2BK, SK

The International Amateur Radio community is mourning the loss of well-known amateur and founding president of the Turkish Radio Amateur Association Bahri Kacan, TA2BK. Kacan, of Istanbul, died unexpectedly July 23. He was believed to have suffered a heart attack.

ARRL Executive Vice President David Sumner, K1ZZ, called Kacan "a friend and great Amateur Radio enthusiast" who was responsible for getting Amateur Radio recognized in Turkey. "Bahri worked patiently for many years to regularize Amateur Radio in Turkey," Sumner said. "The present status of Amateur Radio in Turkey—where there's formal recognition of its emergency communications role—stems from his efforts." Sumner added that Kacan "had to overcome obstacles most of us cannot even imagine" to gain government recognition for Amateur Radio.

A native of Yugoslavia, Kacan got his start in Amateur Radio in 1956 at the YU1BKL club station in Belgrade. When he moved to Turkey, he became one of the founders of TRAC in 1962. Although Kacan had used the TA2BK call sign for many years, the Turkish government did not formally recognize ham radio until 1984. Prior to that, it tolerated the low-profile operation of the handful of die-hard enthusiasts.

Sumner said Kacan was instrumental in persuading Turkish government officials that Amateur Radio was a resource for the country and not the security threat some feared. He thus was able to be formally granted the TA2BK call sign he'd adopted on his own years earlier. Kacan, who worked for the German firm Bosch, was an avid DXer and held DXCC Honor Roll status under his TA2BK call sign as well as his German call sign, DJ0UJ. In 1970 and 1971, he was a part of the ZA2RPS DXpedition which made Albania available to the DX community for the first time. He also was a guest operator at 4U1ITU. During World Radiocommunication Conference 2000 in Istanbul, TA2BK helped organize the TA1ITU special event station that operated during the conference. His TA2BK call sign also was well known on 160 meters, where he was a frequent visitor.

Current TRAC President Aziz Sasa, TA1E, cited Kacan's "wisdom, patience and personality" and said he played a major, ongoing role in developing Amateur Radio in Turkey. "It's now our obligation to continue his phenomenal work in order to make him unforgettable," Sasa, said. Survivors include Kacan's wife, Nermin, as well as a son and daughter. A funeral service was held July 24. Condolence messages may be sent to TRAC via e-mail (hq@trac.org.tr).

Bahri Kacan, TA2BK, who was founding president of the Turkish Radio Amateur Association.

BRIEFS

● Canadian Basic operators with 5 WPM credit now have access to full HF Amateur Radio frequencies. Effective May 19, Industry Canada has amended the Technical Requirements set out in the Radiocommunication Information Circular 2, "Standards for the Operation of Radio Stations in the Amateur Radio Service." The IC grants full operating privileges at a maximum of 250 W dc input in all Amateur Radio frequency bands below 30 MHz to operators holding the Basic plus 5 WPM Morse code qualification. Copies of the revised RIC-2 are available from the Industry Canada Web site, **strategis.gc.ca/SSG/sf01226e.html**.—*RAC*

● In a letter to the IARU from Mr Sahruddin, VU2SDN, President of the Amateur Radio Society of India, it was announced that India's Licensing Authorities have agreed to reduce the code speed for the Morse test for the Grade 1 Examination. The Morse testing speed was dropped from 12 WPM to 8 WPM. The Advanced Grade license's Morse testing speed remains at 12 WPM, and the Grade 2 license exam remains at 5 WPM. Also in India, under an extension of a temporary agreement, the country's Amateur's may continue to use the following frequencies through 31 January, 2002: 3.790-3.800 MHz; 10.100-10.150 MHz; and 50.350-50.550 MHz.

● The SETI (Search for Extraterrestrial Intelligence) League has named Peter Wright, DJ0BI, as the winner of its 2001 Giordano Bruno Award, the organization's highest honor. Wright was cited for his efforts to promote the search for extraterrestrial intelligence and Amateur Radio astronomy in Europe. He is the seventh recipient of the award. A native of Scotland, Wright is a former member of the US-based Society for Amateur Radio Astronomy. He founded a similar organization in Germany—the European Radio Astronomy Club. The SETI League promotes a privatized search for extraterrestrial intelligence. Many of its members are hams, and the executive director is Paul Shuch, N6TX. For more information, visit the SETI League Web site, **www.setileague.org**.

● Amateur Radio's role in emergency communication received high praise in an opinion adopted by the recent Second Tampere Conference on Disaster Communication. Several speakers at the conference, held in late May in Tampere, Finland, also lauded the work of amateurs in the wake of disasters. An *Opinion of the Conference* expressed appreciation for "the role played by volunteers, in particular those of the Amateur Radio Service," and encouraged administrations to facilitate their work in emergency telecommunications.

In the role of International Amateur Radio Union expert consultant, ARRL Technical Relations Manager Paul Rinaldo, W4RI, spoke at the conference on Amateur Radio and disaster communications. Approximately 125 attended the conference, including what Rinaldo called, "a notable percentage of radio amateurs" representing agencies or companies from several nations. Rinaldo cited Hans Zimmermann, HB9AQS, of OCHA as "the prime mover" for the conference. Seppo Sisättö, OH1VR, of the International Institute of Communications chaired the organizing committee.

The conference *Opinion* also invited administrations to consider "the recognized need of disaster relief organizations to use their existing radiocommunication equipment under disaster relief situations" as well as "the need to conclude frequency arrangements" for such equipment in emergencies. The conference—sponsored by the United Nations Office for the Coordination of Humanitarian Affairs and the IIC—was organized to raise visibility of the 1998 Tampere Convention (**www.arrl.org/news/stories/1998/12/02/1/**) and to urge its ratification. The US is not yet among the nine countries that have ratified the Convention. Tampere II also provided a forum for administrations and nongovernmental organizations to exchange information about disaster communications. QST

Ten-Tec Model 526 6N2 Multimode VHF Transceiver

Reviewed by Brennan Price, N4QX
Field and Regulatory Correspondent

Like most hams who earned their licenses within the past few years, I began my ham operating adventures on the 2-meter band. My first two rigs were single-band FM-only handheld and mobile transceivers. I had learned about the magic of VHF weak-signal operation while studying for my first license. I somewhat naively believed that new all-mode gear would be abundant and inexpensive. As it turned out, my first two FM rigs combined were far less expensive than any new all-mode VHF transceiver I could find. I did have fun on the weak-signal modes, but only through the facilities of Georgia Tech's club station, W4AQL.

As I upgraded, HF caught my fancy, and from that point forward any of my savings earmarked for station improvements were appropriated away from my VHF roots. Still, the availability of a VHF all-mode rig for the budget-conscious beginner would have been appealing.

When I witnessed the unveiling of Ten-Tec's Model 526—or "6N2"—at the Dayton Hamvention, I immediately recalled those halcyon days of my Amateur Radio youth. I thought to myself, "Self, had this been available in 1997, this may very well have been your first rig." The 6N2 delivers not just one, but *two* of the most popular weak-signal VHF bands, 6 and 2 meters (thus the nickname of the rig). It supports CW, SSB and FM operation. And priced at just under $700, it's not terribly cost prohibitive to the thrifty ham, who might spend nearly as much on a high end FM-only VHF/UHF mobile transceiver. Weak-signal enthusiasts will confirm that having access to these modes on these particular bands can be very worthwhile. Don't take our word for it though—check out Emil Pocock's "The World Above 50 MHz" column that appears each month in *QST*.

How would this rig hold up under fire? I anxiously volunteered to find out.

Operating Conditions

A full understanding of my experiences with the 6N2 requires an appreciation of my QTH. Affectionately known as the "N4QX Microstation of Power," my station is not in an environment where any rig easily shines. I live on the second floor of a three-story apartment building, facing a parking lot, with no readily available support structures for antennas other than simple dipoles. Most serious VHF operators use beams, but beams are out of the question for me. If I could put the 6N2 to enjoyable use under these conditions, surely it could be put to even better service from a more ham hospitable location—fixed or portable.

Upon opening the box, I was struck by the similarity in size and weight to Ten-Tec's Scout—my current HF transceiver. It even resembles the Scout to some extent, with the green LED display and prominent tuning knob. I had just finished operating Field Day as a solo operator, where the Scout was my weapon of choice. Both rigs are appealing for portable applications due to their small size and light weight, and I made a mental note to seriously consider supplementing my setup with a couple of more bands next June.

Getting on a Repeater—the Ford Test

I am a firm believer in the Steve Ford, WB8IMY, test of VHF FM rigs. This test involves taking the rig out of the box, tossing the instruction manual off toward the other side of the room, and seeing how quickly one can raise a local repeater relying on instinct alone. After hanging a trusty Zack Lau, W1VT, 2-meter ground-plane antenna on a hook outside my windowsill (see "Build a Portable Groundplane Antenna," *QST,* Jul 1991), I set my sights on raising the nearby W1AW repeater.

Connecting the power supply and the antenna was simple enough; the 6N2 sports a two-pin power connector and separate SO-239 connectors for 6- and 2-meter antennas. A four-pin microphone connects to the front panel. (Ten-Tec's basic handheld microphone—the Model 701—is included.) The AF knob, clearly labeled and conveniently located at the bottom right of the front panel, doubles as the power switch and turns the radio on or off with a satisfying audible click. The MODE and BAND buttons are located just above. The available modes—CW, USB, LSB and FM—are selected by pressing the MODE button. Translucent icons situated along the top of the display window light to indicate the active mode. Additional icons on either side of these show the state of several other operating parameters. These include VFOA, VFOB, MEM, SPLIT, TONE and RIT. The tuning knob is impossible to miss; dialing in 145.45 MHz was not a problem.

This is where I hit a snag. It was not immediately apparent to me how to enter the repeater offset. This is clearly ex-

Bottom Line

The Ten-Tec Model 526 delivers multimode fun on the two most popular VHF bands—6 and 2 meters. Use it to chat with the locals on the FM repeaters, or expand your radio horizons with an exploration of the wonders of the weak-signal modes.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

plained in the manual—and below—but the procedures for the Ford test dictate perseverance before I resorted to retrieving the manual from somewhere behind the couch. I noticed the A/B and SPLIT buttons to the right of the tuning knob. Ah, dual VFOs! I had my solution. I tuned 144.85 MHz into the second VFO and returned the first VFO to the display (only one frequency is shown at a time). A press of the SPLIT button lit the corresponding icon atop the display.

I turned up the MIC gain and PWR controls on the lower left front panel and keyed the microphone—the display flipped to 144.85. After announcing "N4QX monitoring," I unkeyed and savored the sweet synthesized sounds of success: "This *is* the W1AW repeater [beep]." The 6N2 had passed the Ford test, going from in the box to on the air in just under six minutes. All without the benefit of the manual—and without ever knowing the proper procedure for setting up a repeater split!

It turns out that the correct way to set a standard repeater split is through the use of the RIT button. In the narrowband modes—CW and SSB—receive incremental tuning operates just as it does on any HF rig. The 6N2's RIT can be adjusted anywhere within ±10 kHz of the transmit frequency. The offset amount appears on a sub display to the right of the main frequency display, and is controlled with an unlabeled knob to the left of the concentric AF/SQL knobs. This unlabeled knob does different things in different situations. The manual calls it "multi" (it would have been nice had it been similarly labeled on the rig).

While in the FM mode, pressing this same button will cause the frequency offset value to appear in the supplemental display. The multi knob then allows selection of specific offsets: –600 kHz, 0 kHz and +600 kHz on 2 meters, and –1 MHz, –500 kHz, 0 kHz, 500 kHz, and 1 MHz on 6 meters. Users in areas where nonstandard splits are employed (1 MHz and 1.035 MHz on 2 meters, or 240 kHz on 6 for example), fret not. These odd splits are accommodated by using the two VFOs and the split function—precisely the method I had stumbled upon during the Ford test.

CTCSS encoding is enabled by using the TONE subfunction of the B/W (bandwidth) button. Subfunctions are assigned to five of the radio's buttons and are accessed by first pressing the FUNCtion button, positioned to the lower right of the tuning knob. The transmitted tone's value is adjusted by—you guessed it—the multi knob. Forty-two tones are available.

The 6N2 can only send a CTCSS tone; it cannot decode an incoming tone (sometimes referred to as "tone squelch"). CTCSS decode tends to come in really handy in densely populated environments, and an increasing number of repeaters are superimposing these subaudible tones on their output frequencies.

The memory functions and programming are no more complicated than they are on any other radio. Once you've set the desired frequency—and any offset or tone information—in the VFO mode, a press of the MW (memory write) button brings up a memory channel number (from 00 through 99) in the supplemental display. The user turns the multi knob to the desired memory position and presses MW again to store. Pressing FUNC before MW erases a memory.

When in memory mode, the user can scan the programmed frequencies, and there's a "skip" feature for locking out perpetually busy channels—NOAA Weather Radio for example. There are also provisions for scanning all frequencies between user-programmable limits. Those who like to use scanning features will not be disappointed.

Beyond FM—The Weak-Signal Modes

The real fun of the 6N2 comes when one toggles the mode from FM to CW or SSB. With the press (or presses) of a button, an adequate FM rig becomes a very capable and enjoyable weak-signal rig. As soon as I got done playing with the 6N2 on the W1AW machine, I set my sights on raising some attention on the 2-meter SSB calling frequency: 144.200 MHz. Despite the obvious limitations of my small vertical antenna, N1OPO soon answered from 6 miles away and gave positive signal quality reports.

For those who have yet to experience it, single sideband operation is very much like FM—simply press the PTT switch and talk. When switching over from the FM mode, you'll initially want to turn the squelch all the way counterclockwise so you'll hear any weak signals down in the noise.

A phono jack on the rear apron serves as the connection point for a CW key. The same switching line is used for push-to-talk on SSB and FM; indeed, CW *can* be sent by pressing the PTT switch on the microphone. The CW offset and sidetone pitch is adjustable in 20-Hz increments from 400 to 1000 Hz, and these settings "track" each other. CW operation is full break in, and the 6N2 upholds Ten-Tec's reputation for silky smooth QSK.

The built-in DSP bandwidth filter, the noise blanker and 20-dB attenuator are nice features. Single sideband bandwidth is adjustable (once again, through the multi knob) from 1500 to 2800 Hz, and the CW bandwidth can be further adjusted down to 200 Hz. The DSP-based filter arrangement is very flexible and quite effective. The attenuator is nice for those rare receiver overload situations, but there is no indicator on the display when it is turned on; users have to listen for a marked increase or decrease in audio in order to determine the state of this setting. The 10-step adjustable noise blanker suppresses pulse-type noise, a routine occurrence at my QTH. These sporadic noise bursts were neatly eliminated with a press of the NB button, and I was impressed.

Bells and Whistles—Amplifier Control, Transverters, Digital Modes and "Perfect Paul"

The 6N2 provides up to 20 W of RF output power out of the box. Two separate phono connections for amplifier keying, one for each band, are located on the rear panel. There are also rear-panel audio input and output jacks for connecting external devices such as TNCs or computer sound cards. QRO and digital operators should have no problem whatsoever figuring out what gets connected where, and the phono-type jacks simplify the task of making up cabling.

There is also a transverter switch on the rear of the rig, which reroutes the 144-MHz output signal from the SO-239 output to a phono jack labeled XVTR OUT. This jack delivers a low-level (+5 dBm) 2-meter transmit signal for driving transverters. The receive signal from the transverter is connected to the 6N2's 2-meter SO-239 jack, and the transverter is TR switched by the same connection that would be used to key a 2-meter amplifier. Conveniently, activation of the transverter feature does not affect 6-meter operation. Unfortunately—unlike some recently released transceivers—there are no provisions for reprogramming the 6N2's display to directly indicate the "transverted to" frequency.

Many FM rigs include extended receive capability on the public safety, MARS, CAP and business bands from 136-174 MHz. The 6N2 is no exception. The farther the frequency is from 144-148 MHz, however, the more cranking that's required to get there. Turning the tuning knob is the only means of changing the frequency within a band while in VFO mode. Although the "fast" tuning setting for the FM mode allows tuning in 10-kHz steps, that's still a lot of turns to take us from 147 to, say, 162.55 MHz, a popular NOAA frequency. Fans of NOAA's "Perfect Paul" should dial their

Table 1
Ten-Tec 6N2, serial number 04C10421

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 50-54, 136-174 MHz; transmit, 50-54, 144-148 MHz.	Receive and transmit, as specified
Power requirement: Receive, 0.4 A; transmit, 6 A.	Receive, 1.4 A (maximum volume); transmit, 4.4 A. Tested at 13.8 V.
Modes of operation: SSB, CW, FM.	As specified.
Size (HWD): 2.8×8.5×8.8 inches; weight, 4.5 pounds.	
Receiver	**Receiver Dynamic Testing**
SSB/CW sensitivity, 2.4-kHz bandwidth, 10 dB S+N/N: 0.2 μV.	Noise floor (MDS), 500-Hz bandwidth: 50 MHz –135 dBm[1] 144 MHz –135 dBm[1]
FM sensitivity: Not specified.	For 12 dB SINAD: 52 MHz 0.72 μV 146 MHz 0.46 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500-Hz filter: *spacing* *20 kHz* *5 kHz* 50 MHz 125 dB* 68 dB 144 MHz 112 dB*[1] 67 dB
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 500-Hz filter: *spacing* *20 kHz* *5 kHz* 50 MHz 77 dB[1] 62 dB 144 MHz 88 dB[1] 66 dB
Third-order intercept: Not specified.	50 MHz[2] –16 dBm[1] –54 dBm 144 MHz[2] –1.6 dBm –53 dBm
FM adjacent channel rejection: Not specified.	20-kHz channel spacing: 52 MHz, 61 dB; 146 MHz, 66 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20-kHz channel spacing: 52 MHz, 63 dB*; 146 MHz, 67 dB*; 10-MHz channel spacing, 52 MHz, 100 dB; 146 MHz, 98 dB.
S-meter sensitivity: 50 μV at S9.	S9 signal at 50 MHz: 61 μV; 144 MHz, 67 μV.
Squelch sensitivity: Not specified.	At threshold: SSB, 50 MHz, 1.0 μV; FM, 52 MHz, 1.4 μV; 146 MHz, 1.2 μV.
Receiver audio output: Not specified.	2.0 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500-Hz bandwidth): 385-1000 Hz (615 Hz); CW-W: 154-2632 Hz (2478 Hz); USB-W: 143-2632 Hz (2489 Hz); LSB-W: 167-2667 Hz (2500 Hz).
Spurious and image rejection: Not specified.	First IF rejection, 50 MHz, 33 dB; 144 MHz, 75 dB; image rejection, 50 MHz, 75 dB; 144 MHz, 89 dB.
Transmitter	**Transmitter Dynamic Testing**
Power output: SSB, CW, FM, 20 W (high); 1 W (low).	Typically 19 W high, <1 W low.
Spurious-signal and harmonic suppression: Not specified.	61 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: Not specified.	60 dB.
Undesired sideband suppression: Not specified.	57 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figures 1 and 2.
CW keying characteristics: Not specified.	See Figure 3.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 30 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 10 ms; FM, 7 ms. Unit is suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 4 and 5.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

*Measurement was noise-limited at the value indicated.

[1]See text.

[2]Third-order intercept points were determined using S5 reference.

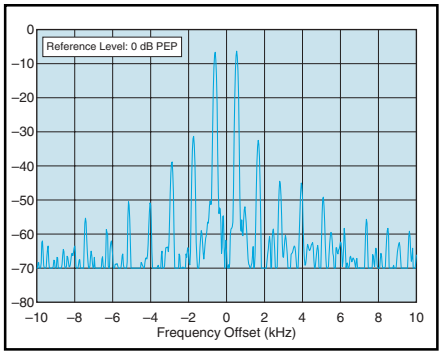


Figure 1—Spectral display of the 6N2 transmitter during two-tone inter-modulation distortion (IMD) testing on 6 meters. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is down approximately 40 dB. The transceiver was being operated at 20 W PEP output at 50.2 MHz.

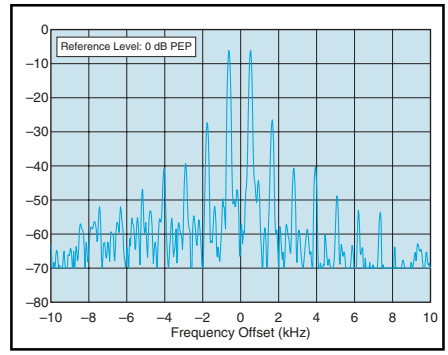


Figure 2—Spectral display of the 6N2 transmitter during two-tone inter-modulation distortion (IMD) testing on 2 meters. The worst-case third-order product is approximately 27 dB below PEP output, and the worst-case fifth-order product is down approximately 40 dB. The transceiver was being operated at 20 W PEP output at 144.2 MHz.

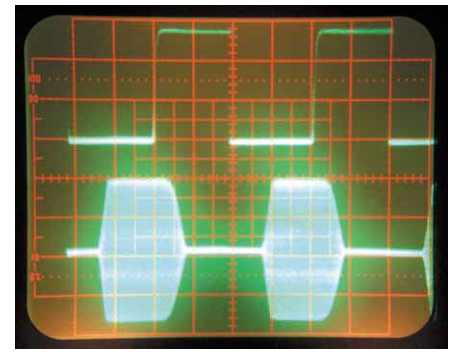


Figure 3—CW keying waveform for the 6N2 showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. The transceiver was being operated at 20 W output at 144.02 MHz.

local weather frequency in once, put it in memory, and be done with it; otherwise, they will spend a lot of time spinning the big knob.

The fast tuning rate in CW and SSB is an even more miserly 1 kHz. Temporarily switching to the FM mode when making significant frequency excursions in these modes helps, but a wider selection of available tuning speeds—actually "steps" in this case—would have been helpful. The memories are "tuneable," though.

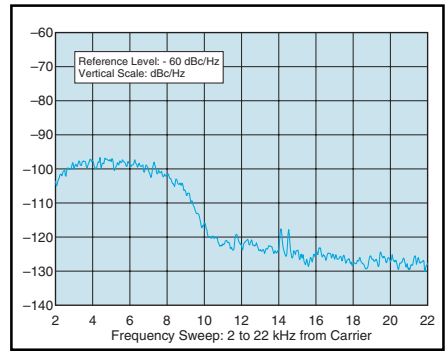


Figure 4—Spectral display of the 6N2 transmitter output during composite-noise testing at 50.02 MHz. Power output is 20 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

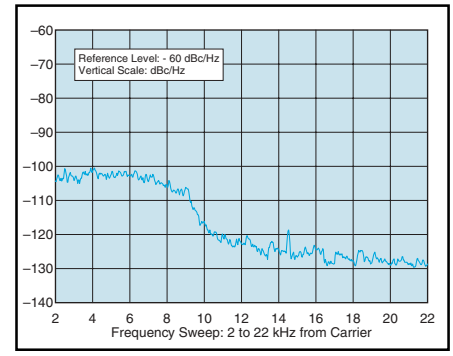


Figure 5—Spectral display of the 6N2 transmitter output during composite-noise testing at 144.02 MHz. Power output is 20 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

Overall Impressions

I had a good time using this rig, both on FM and the weak-signal modes. Its shortcomings as an FM rig—primarily its inability to decode CTCSS tones and lack of DTMF capabilities for phone patch or remote control—are far from fatal. Its weak-signal capabilities are impressive for a radio in this price class.

A close look at the Lab data in Table 1 reveals an overall level of performance that compares favorably—and in some instances surpasses—the SSB and CW 2- and 6-meter performance of the current crop of multiband HF/VHF/UHF subcompact transceivers.

When we shared our initial Lab data with the folks at Ten-Tec, the 6-meter third-order intercept point (–16 dBm) immediately caught their attention. This measurement came in considerably lower than their design objective. They requested that we return our radio for further investigation.

They traced the cause to a couple of surface mount inductors on the RF board. Axial-lead inductors were substituted. Our subsequent Lab tests showed significant improvement. The 20-kHz offset 6-meter two-tone third-order dynamic range increased by 11 dB (to 88 dB), and the 2-meter measurement rose 2 dB (to 90 dB). Blocking dynamic range on 2 increased by 2 dB as well, up from 112 to 114 dB. SSB/CW sensitivity on 6 and 2 also gained a couple of dB. The improvements in 6-meter sensitivity and two-tone third-order dynamic range boosted the 6-meter intercept point up to a reasonably respectable –4 dBm. The 6-meter blocking dynamic range, though noise-limited, came in at a very impressive 125 dB (both pre and post modification)!

Ten-Tec reports that the component changes have been implemented in all current production units, and are offering an update kit to purchasers of earlier units. Contact them directly for details.

The casual operator will find that this rig will do nearly everything one could ever want to do on 6 and 2 meters. The 6N2 is relatively inexpensive, however, and every manufacturer will admit that an all-mode 6- and 2-meter transceiver in this price class will likely need to make some tradeoffs in features and/or performance. So what does the user of the 6N2 give up for the lower price?

First of all, the control panel is somewhat less sophisticated than other radios. The LED display, while clear and easy to read (even in bright light) is far from state-of-the-art. The buttons on the front panel feel somewhat clunky when pressed. This is true on some other rigs, too, but the buttons on the 6N2 are made of plastic, as opposed to the somewhat yielding, almost soothing, rubber-coated buttons on many other modern rigs. The tuning knob, while much better than the

Scout's, is still not very substantive, even when compared to other low-end HF and VHF transceivers.

In spite of these criticisms, the 6N2 sounds very good—on both ends of the circuit. On FM and SSB, I received universally positive reports on my audio. The simple handheld microphone does the trick! Similarly, the small internal speaker provides clear and pleasant audio, without a trace of tinny-ness. The 6N2 certainly does not *sound* like an inexpensive radio. In this price class, one should expect some sacrifices. Ten-Tec didn't sacrifice sound—and that's what really matters on the air.

In Summary...

I believe that the 6N2 is a very good rig for the price. It could provide an entry-class licensee with a variety of modes on the two most popular bands for weak-signal work, allowing him to experience the thrill of chasing grid squares and DX. Old salt HF operators who are reluctant to trade in their perfectly good HF-only rig for one of the latest "dc-to-daylight" alternatives will find the 6N2 a means of gaining access to multimode VHF operation without putting a serious dent in the bank account. Contesters and mountain toppers will appreciate its respectable performance, variable bandwidth DSP filtering, convenient transverter connectivity and compact, lightweight construction.

Manufacturer: Ten-Tec, 1185 Dolly Parton Parkway, Sevierville, TN 37862; 865-453-7172, fax 865-428-4483; **sales@tentec.com**; **www.tentec.com**. Price: $695.

Ranger Communications RCI-2970DX 10/12-Meter Transceiver

Reviewed by Wayne Irwin, W1KI
Assistant to the ARRL VEC Manager

Now that the code-less Technician class license has become the main entry gate for the Amateur Radio service, folks looking to progress along the upgrade path typically next set their sights on tackling the 5-WPM requirement. Suitably armed with "Technician with HF" privileges, most are then anxious to immediately get their hands on some gear for the bands below 6 meters.

While some—likely those already getting cozy with the General class exam question pool—decide to take the plunge and purchase full-blown multiband HF, HF/VHF or HF/VHF/UHF gear, a significant number look to the more affordable single-band 10-meter multimode transceivers.

Ranger, RadioShack, and a small number of other manufactures have recognized this market segment and have recently turned out some new products. Ranger—with the RCI-2970DX—has decided to entice these customers further by offering a rig that provides a little "room to grow"—capabilities on the popular 12-meter band as well.

Beyond its appeal to relative newcomers, the RCI-2970DX's 10- and 12-meter frequency coverage makes it an attractive choice for mobile installations or for those with limited space for setting up antennas at home. Efficient mobile antennas for these bands don't need to be particularly large, and the dimensions of simple fixed-station antennas for 10 and 12 lend themselves well to home construction techniques.

In addition to the extra band, the '2970DX entices prospective buyers with a few other features that you won't find in some of the competing transceivers. These include high RF output power: an advertised 150 W on SSB; all-mode operation: AM, FM, USB, LSB and CW; memory and VFO scan capabilities; and built-in SWR metering.

The General Configuration

The RCI-2970DX's front panel is dominated by a large LCD display. Frequency digits, a vertical bargraph S/RF/SWR meter and over a dozen small feature icons appear as black segments on a light green field. Background illumination can be set to one of three different levels or shut off completely. The small main tuning knob is located on the left edge of faceplate, and has a detented tuning action. Just below this knob is a six-pin microphone connector. A hand mike is provided.

Four more knobs are located on the far right of the front panel. Three of these are concentric pairs that handle the volume and squelch; RF power and mike gain; and RIT (labeled CLR) and RF gain. The fourth is the mode switch, which includes positions for AM, USB, LSB, CW and PA (public address). These four controls are grouped close together. It can be difficult to change the settings of their outer rings without inadvertently disturbing the settings of their immediate neighbors.

Two rows of seven backlit translucent buttons are located just below the display window. Their assignments are printed directly on the surface of each key. Nearly all of these keys perform just one particular task. This makes operating the transceiver fairly easy and intuitive. No "function key" combinations are required to access secondary key operations, so you won't find yourself straining to read unlit secondary assignment labels (which are typically printed directly on the faceplate of most other transceivers).

The rear panel is the epitome of simplicity. There are three $^1/_8$-inch phone jacks—for a CW key, external speaker

Bottom Line

With a higher level of RF output power and real all-mode capabilities on both 10 *and* 12 meters, the RCI-2970DX packs in lots more fun than the typical 10-meter mobile.

Table 2
Ranger Communications RCI-2970DX, serial number T1M00426

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: receive and transmit, 24.89-24.99, 28-29.7 MHz.	Receive and transmit, as specified.
Modes of operation: CW, USB, LSB, FM, AM.	As specified.
Power requirements: 13.8 V dc; current consumption not specified.	Receive, 0.35 A; transmit, 18 A, tested at 13.8 V.
Size (HWD): 3.9×7.8×9.3 inches; weight, 7.4 lb.	
Receiver	**Receiver Dynamic Testing**
SSB/CW/AM Sensitivity, 10 dB (S+N)/N: 0.5 μV.	Noise floor (MDS)[1]: 24.9 MHz –136 dBm 28 MHz –132 dBm AM, 10 dB (S+N)/N, 1-kHz tone, 30% modulation: 29 MHz 0.42 μV
FM sensitivity, 12 dB (S+N)/N: 0.25 μV.	For 12-dB SINAD: 29 MHz 0.31 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 20-kHz spacing:[1] 24.9 MHz 81 dB 28 MHz 75 dB
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range:[1] 24.9 MHz 66 dB 28 MHz 61 dB
Third-order intercept: Not specified.	Intercept: 24.9 MHz, –37 dBm; 28 MHz, –41 dBm.[2]
FM adjacent channel rejection: Not specified.	20-kHz offset from 29 MHz, 77 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20-kHz channel spacing, 29 MHz, 53 dB.
Spurious response: IF rejection, 65 dB, image rejection: Not specified.	IF rejection: 105 dB; image rejection, 72 dB.
Squelch sensitivity: Not specified.	0.12 μV at threshold.
Audio power output: 2.5 W, THD and load unspecified.	3.0 W at 10% THD into 8 Ω.
Transmitter	**Transmitter Dynamic Testing**
Power output: CW, FM, AM, 50 W; SSB, 150 W.	AM, CW, typically 51 W; FM, typically 60 W; SSB, typically 115 W.[3]
Spurious signal and harmonic suppression: 50 dB.	53 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: 50 dB.	46 dB.
Undesired sideband suppression: Not specified.	39 dB.
Third-order intermodulation distortion (IMD) products:	See Figures 6 and 7.
CW keying characteristics: Not specified.	See Figure 8.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 200 ms. Unit is not suitable for use on AMTOR.
Receive-transmit turn-around time ("tx delay"): Not specified.	SSB, <1 ms; FM, <1 ms.
Composite transmitted noise: Not specified.	See Figures 9 and 10.

All dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
[1]500-Hz bandwidth filter not available. Bandwidth on CW is approximately 1900 Hz. See text.
[2]Intercept points calculated using noise floor method.
[3]See text.

and public address speaker—a chassis mounted SO-239 antenna jack and a six-pin rectangular dc power jack. A headphone jack is not provided. The dc power connector is physically the same as the one found on the vast majority of modern HF transceivers, but beware: the wiring configuration is different. The included dc power cable is about 10 feet long and is fused in both leads.

A massive heat sink is fastened to the underside of the enclosure. The radio does not employ a cooling fan. My operating experiences indicate that the cooling system is sufficient; I didn't encounter any instances where the heat sink became particularly hot.

The U-shaped mobile mounting bracket that's packed with the rig can only be attached toward the upper side of the enclosure. This allows you to mount the radio *under* a dashboard or shelf—not above. An extended bracket that fits below the radio is available as an optional accessory. Four thumbscrews are provided for securing the mobile mounting bracket to the chassis. Some additional mounting hardware and a microphone hanger are also included.

Documentation

The small 18-page *Owner's Manual* is adequate, though not overflowing with

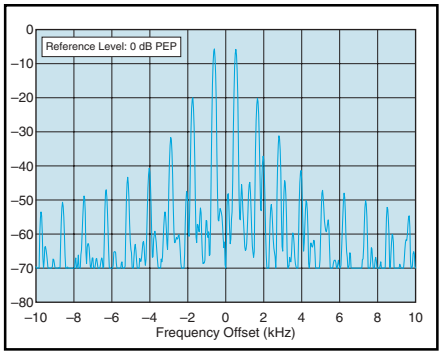


Figure 6—Spectral display of the RCI-2970DX transmitter during two-tone intermodulation distortion (IMD) testing on 10 meters. The worst-case third-order product is approximately 21 dB below PEP output, and the worst-case fifth-order product is down approximately 32 dB. The transceiver was being operated at 100 W PEP output at 28.35 MHz.

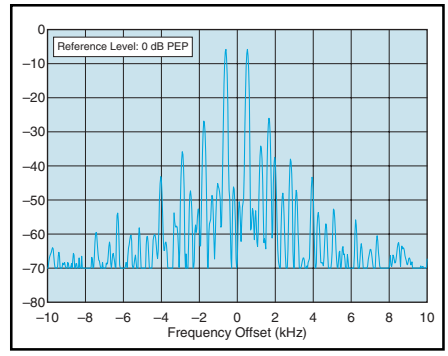


Figure 7—Spectral display of the RCI-2970DX transmitter during two-tone intermodulation distortion (IMD) testing on 12 meters. The worst-case third-order product is approximately 27 dB below PEP output, and the worst-case fifth-order product is down approximately 37 dB. The transceiver was being operated at 100 W PEP output at 24.95 MHz.

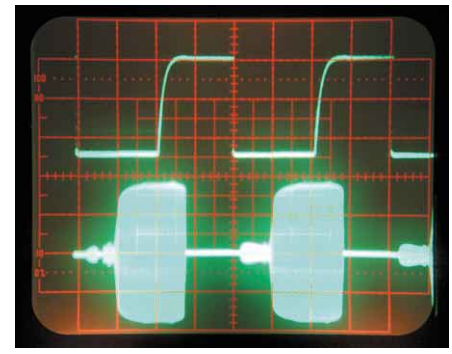


Figure 8—CW keying waveform for the RCI-2970DX showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. The transceiver was being operated at 50 W output at 28.02 MHz.

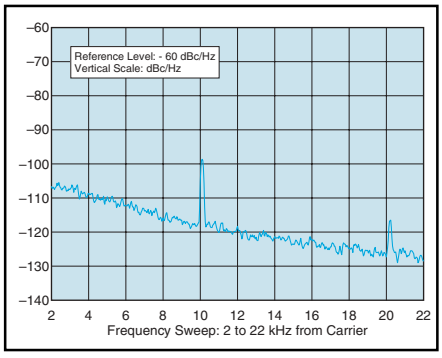


Figure 9—Spectral display of the RCI-2970DX transmitter output during composite-noise testing at 28.02 MHz. Power output is 50 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

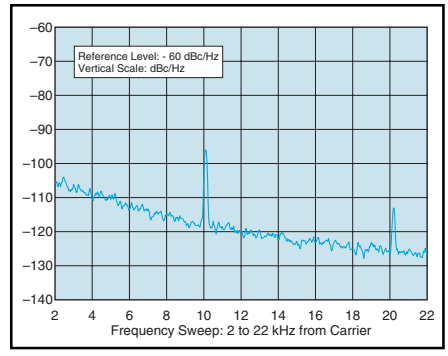


Figure 10—Spectral display of the RCI-2970DX transmitter output during composite-noise testing at 24.92 MHz. Power output is 50 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

information. A brief description of each of the controls and jacks is provided. Most operators should have little, if any, difficulty with installation and proper operation using the information provided, however. The majority of the control functions are apparent from the labels on or near the controls. After I negotiated the short learning curve, I found the radio to be relatively user friendly. Stern warnings about the consequences of unlicensed operation on the Amateur Bands are included on the carton, in the manual and on a label affixed to the top cover of the radio.

No schematic or other service information is included in the manual, but a diagram of the mike connector pin out is presented for those that want to use a microphone other than the supplied hand mike or to wire the rig up for digital mode operation. Factory service manuals are available.

Tuning

There are several different ways to set the operating frequency. The main tuning knob is perhaps the most obvious method, but you can also employ a pair of CHANNEL buttons located on the top of the microphone or ▲ and ▼ buttons on the front panel. The smallest tuning step is 10 Hz. Finer receive tuning is accomplished by use of the receive incremental tuning knob—labeled CLR (for "clarifier")—on the front panel.

The main tuning knob or buttons can be used to change the frequencies in 10 Hz; 1, 10 or 100 kHz; or 1 MHz steps. This feat is accomplished by using the radio's SHF button to move the position a small arrow icon under the digit that you wish to change. The tuning knob or keys are then employed to tune by the selected digit.

Band changing is a bit unusual. While you can move from 12 meters to 10 meters by placing the arrow under the 1 MHz digit and tuning, in order to move from 10 to 12, you've got to place the arrow under the 100 kHz digit and tune above or below the 10-meter band limits.

When the radio is in the memory mode, a MEMORY icon and the channel number appear in the display just to the left of the operating frequency. Ten memories are available and are selected using any of the same three controls that are used for VFO tuning. The memories are not "tuneable."

SSB Operation

The majority of operators will probably use this radio for single sideband operation. Let's take a look at this type of operation first.

The '2970DX supports both upper and lower sideband (lower sideband is handy for those who might want to operate RTTY). There are separate controls for the microphone gain and RF power output. VOX operation is not supported.

When I initially got on the air in this mode, I received a report from an operator in the Midwest that my transmit audio sounded distorted. After a minute or so of head scratching, I discovered that I had the microphone gain control set too high. There's no ALC level indicator on the radio, so it takes some experimentation to find the setting that works best for your particular voice characteristics. I set the knob at about mid rotation, and subsequent reports verified that the audio sounded fine.

Information on split frequency operation in the SSB mode is not included in the manual, but the radio does have this capability. Rare DX and DXpeditions

will use split frequency operation as a pileup management tool, so this can be an important feature (see "Working Split: What's the Secret?" by Duane Traver, WV2B, *QST*, May 2001). Set this up using the instructions in the manual given for FM repeater operation. Adjust the "repeater" offset value somewhere in the range that the DX is "listening up"—typically 5 or 10 kHz—and activate a positive split. On transmit, the radio should display the higher frequency. (This trick will also work in the CW mode.) While this arrangement is not as flexible as split operation on a radio that features dual VFOs, it is most definitely workable!

FM Operation

In the FM mode, the '2970DX will generate about 50 W of RF power, and the transmit audio reports were universally positive. The offset and split features that I just discussed are intended primarily for FM repeater operation. Most 10-meter FM repeaters are set up for a –100 kHz offset. One minor annoyance is that this offset information and the operating mode is not retained in the memories. If you choose to program FM repeater frequencies into the memories, you'll have to remember to switch to the FM mode and activate the split manually when you dial them up.

The radio is not equipped with a CTCSS encoder. Internal provisions, however, are made to facilitate wiring in aftermarket tone boards—such as those offered by Communications Specialists. Inclusion of this feature would have greatly enhanced the viability of this radio for the 10-meter FM enthusiast. Due to the DX propagation characteristics of 10 meters, many of these repeaters are CTCSS tone protected so as to reduce interference between repeater systems that share the same frequency pairs.

CW Operation

Ranger Communications has not completely forsaken the CW operator in the design of the RCI-2970DX (as was the case with one 10-meter monobander that we recently reviewed), although this transceiver would not be the radio of choice for a serious CW aficionado.

A narrow CW filter is not provided—nor is one available as an option—and the receiver's CW bandwidth is in the "barn door" category: about 1900 Hz. This can make copying a desired signal under even moderately busy band conditions an exercise in concentration!

A single CW signal will also appear on both sides of zero beat. (You can, however, verify that you've got a CW signal properly tuned by taking a quick listen for the signal in the LSB mode. If it's there, you're tuned correctly.)

A straight key or an external keyer connects via an $^1/_8$-inch phone jack on the rear panel. Keying is semi break-in. The CW sidetone level and pitch is fixed, and sounds to be about 1200 Hz. Power output on CW is limited to about 50 W.

So What are the Other Mode Switch Positions For?

The RCI-2970DX is also capable of operation in the AM mode. You'll find a moderate amount of 10-meter AM activity between 29.0 and 29.3 MHz. Maximum RF output power in this mode is around 50 W.

The bandswitch also includes a PA position. This activates a "public address" system. In this "mode" the transmitter is disabled and amplified microphone audio is available at an independent external speaker jack on the rear panel. (Keep in mind that the use of public address systems in vehicles may be subject to local restrictions.) This feature might also come in handy as a means of checking the sound of the transmit audio when testing alternative microphones or setting levels for digital operation. When testing microphones, keep careful tabs on the volume setting though, or feedback will result.

Lab Test Results

When looking over the receiver performance data that appears in Table 2, it's important to note that the numbers for the noise floor, blocking dynamic range and two-tone third-order IMD dynamic range are at the minimum CW bandwidth available (1900 Hz in this instance). Whenever possible, the Lab makes these measurements at 500-Hz bandwidth. Consequently, you shouldn't use these figures to make direct comparisons to the numbers we've reported for others units that were taken at the 500-Hz bandwidth. While the radio does exhibit blocking when subjected to strong, close in signals, it's not quite as bad as numbers in this range would typically indicate.

One rather poor performance characteristic that does merit attention is the transmitter IMD performance on 10 meters, as depicted by Figure 6. The second-order IMD products are down only 21 dB.

The power output that we measured on SSB fell short of the 150 W figure that's specified for this parameter. Ranger Communications reports that this was due to improper final adjustment at the manufacturer, and that they have taken steps to ensure that current production units will meet this specification. A second unit that we looked at (provided by Ranger) measured 156 W on 10 meters and 146 W on 12. Our original product review unit also slightly missed its specification for SSB carrier suppression.

Conclusion

So where does the RCI-2970DX fit in today's market? On the positive side, I think it can carve out a unique place for itself. With its 150 W of RF output, it is certainly much more powerful than any of its competitors. It can be used on all common modes. Its SSB power output can be throttled down to few watts, so it doesn't have to be a power hog (PSK-31 anyone?).

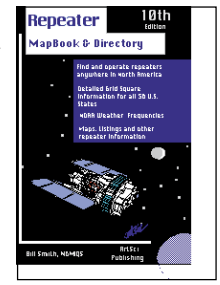
If your main interest is casual operation in the upper HF spectrum, it might fit the bill as your primary station rig. With its limited receiver dynamic range though, you'll probably want to avoid connecting it to high gain antennas or diving into the fray under crowded contest conditions. For general rag chewing and casual CW operation on 10 or 12 meters, and for the majority of mobile operations, the RCI-2970DX has what it takes to get the job done.

Manufacturer: Ranger Communications Inc, 401 W 35th St—Suite B, National City, CA 91950; 877-536-0772, fax 702-262-0780; **rci@rangerusa.com**; **www.rangerusa.com**. Price: $430. QST

NEW BOOKS

TENTH EDITION OF REPEATER MAPBOOK NOW AVAILABLE

◊ Artsci Publishing says the new 10th edition of *The Repeater MapBook* is packed full of frequency and access data for hundreds of open repeaters in North America. This edition continues to provide detailed grid square information, NOAA weather frequencies, band and mode charts, and everyone's favorite—Bob Simpleton's Guides.



Listing cities, towns, highways and byways, the 180-page *Repeater MapBook* leads you open repeaters you can use. The book's database is updated on the Web at **www.artscipub.com/repeaters**.

Price: $9.95. For more information, contact your favorite Amateur Radio bookseller, point your Web browser to **www.artscipub.com**, or contact Artsci Inc at PO Box 1428, Burbank, CA 91507; tel 818-843-4080, fax 818-846-2298. QST

TECHNICAL CORRESPONDENCE

REGARDING "A SIMPLE FIXED ANTENNA FOR VHF/UHF SATELLITE WORK"[1]

By L. B. Cebik, W4RNL, 1434 High Mesa Dr, Knoxville, TN 37938-4443; **cebik@cebik.com; www.cebik.com**

◊ The volume of instant mail and e-mail resulting from the article on "turnstiled" Moxon rectangles for satellite work has been both surprising and satisfying. It indicates that there is high interest in both the antenna and the activity of communicating via amateur satellites. However, the questions have fallen into patterns that suggest a few follow-up notes on building the antennas and adapting them to other frequencies.

2-Meters

The key question about the 2-meter (145.9 MHz) version of the antenna involves using aluminum rod other than the 3/16-inch material specified in the article. Aluminum rod and tubing is available from such sources as Texas Towers (**www.texastowers.com**) at very reasonable prices. However, for those who cannot find the 3/16-inch stock at local hardware suppliers, Table 1 shows dimensions. The letter designations correspond to those in Figure 1 (a reprint of Figure 5 of the original article). I've included 4-mm stock because there have been some European inquires about the antenna.

Round each value to the tolerances of your construction method. Proportionally, the gap between tail ends (dimension C) shows the largest change with changes in stock diameter, since the end coupling between elements—a critical component in the operation of the Moxon rectangle—depends largely upon the diameter of the facing ends.

Significant interest in adapting the antenna design to aeronautical mobile activity in Europe has resulted in requests for the dimensions suited to 137-MHz use. Table 2 provides the necessary dimensions.

435.6-MHz Antenna

The most common questions surrounding the UHF version of the antenna involve the cables used as the phasing line and matching-section line. Several sharp-eyed readers caught my failure to connect the braid between the turnstile matching section and the main 50-Ω feed line in Figure 1 of the original article.

A number of new antenna builders have tried to adapt coaxial cables at hand to the task. Although those cables may work on the 2-meter version, some can cause troubles with the UHF antenna. I used the very thin and flexible RG-174 for the phasing line. My paralleled 75-Ω cable is adapted from TV use. The Wireman (**www.thewireman.com**) in South Carolina has a quantity of this in stock; it is only about 0.15 inches in diameter.

The use of thin cable for the phase line allows the phasing line to turn back with a very small radius **U** without disturbing the cable characteristics. The paired phasing line calls for a few extra words of comment. The total line length listed in the article for cables with a 0.66 velocity factor includes the leads and connections. Proper operation of the cable requires a good bond between both the inner and outer conductors at each end and the shortest feasible leads to the antenna feed point. Fatter cables very often require longer leads with more than a minimal spread between leads, and these factors may disturb the desired impedance transformation at the higher frequency, where we are working with only a few inches of line.

At the junction of the parallel cable set and the main feed line, I recommend a direct splice rather than the use of connectors. With care, you can solder and seal the junction of the center conductors. Then, the main cable braid may be spread to allow good solder contact with the joined braid from the parallel section lines. A product like Plasti-Dip[2] seals the junction. Tape the main feed-line section to the support mast to ensure that the junction receives no strain. The main feed-line section can be terminated just below the antenna elements with standard connectors for convenience. For 440 MHz, however, it is desirable to use the lowest-loss connectors available. BNCs, SMAs and other such connectors appear to work well. The main feed line

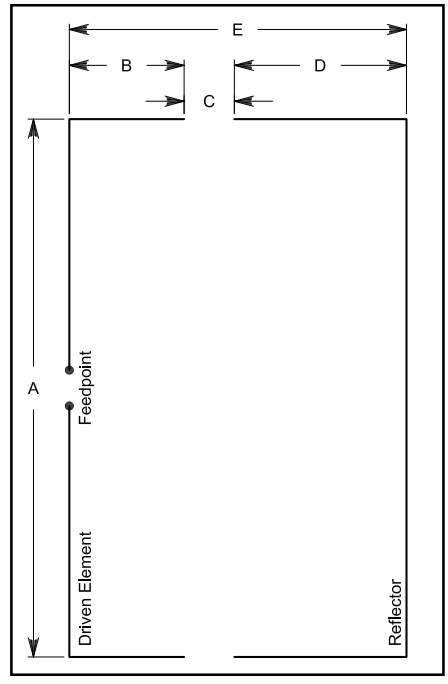


Figure 1—The basic dimension of a Moxon rectangle. Two identical rectangles are required for each "turnstiled" pair.

[1]L. B. Cebik, W4RNL, "A Simple Fixed Antenna for VHF/UHF Satellite Work," *QST,* Aug 2001, pp 38-41.

[2]Plasti-Dip is sold at many hardware and home-improvement stores. PLASTI DIP International, 3920 Pheasant Ridge Dr, Blaine, MN 55449; tel 800-969-5432, fax 763-785-2058; **PDI@PLASTIDIP.com**; **www.plastidip.com**.

Table 1
Dimensions for 145.9-MHz Turnstile Antenna with various Material Diameters

Dimension	Stock Diameter			
	1/8″	3/16″	1/4″	4 mm
A	29.122	29.052	29.000	739
B	3.930	3.806	3.712	98
C	1.285	1.398	1.484	34
D	5.580	5.594	5.604	142
E	10.794	10.798	10.800	274

Table 2
Dimensions for 137-MHz Turnstile Antenna with various Material Diameters

Dimension	Stock Diameter			
	1/8″	3/16″	1/4″	4 mm
A	31.025	30.951	30.896	787
B	4.204	4.074	3.975	105
C	1.350	1.469	1.560	36
D	5.940	5.955	5.966	151
E	11.494	11.499	11.501	292

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

from the antenna connector to the operating position should be the lowest-loss cable you can obtain.

Ideally, although outside the scope of my shop facilities, the 435.6-MHz version of the antenna might lend itself to fabrication on crossed and slotted fiberglass boards with the antenna elements, phasing line, and matching section etched onto the boards. This mode of construction would result in nearly zero-length leads and resolve many construction issues. Inquiries into adaptations of the antenna for frequencies as high as 2400 MHz suggest such construction as perhaps the most feasible method for upper-UHF work. Unfortunately, considerable experimentation might be required to obtain a correlation between the dimensions using standard materials and the etched adaptation.

Those who have difficulty in obtaining parts for the 440-MHz version of the antenna or who have difficulties building a satisfactory version may wish to build a single Moxon rectangle for the UHF band. A single rectangle with the dimensions listed in the article will provide a simple direct 50-Ω feed-point match that needs no phasing line or matching section. The pattern will be a very broad oval, with the wider part broadside to the antenna. The simplified antenna may well provide satisfactory performance to get started, with the turnstile reserved for phase two of one's growth in satellite operation.

I hope these supplemental notes lead to further construction successes and to more experimentation and adaptation with the antennas.

REGARDING "DRIVE BELTS FOR HEATH AND OTHER GEAR"[3]

By Charles Hansen, Ocean, NJ; **cmhj@concentric.net**

◊ RadioShack stores have a gadget called the Measur-A-Belt II. It has three brass ferrules on a slide-rule device. You place the old belt over two of the ferrules, one for small belts, the other for large ones, up to 10 inches, and extend it to take up the belt slack. The device gives you belt measurements in centimeters and inches. (There is a correction factor for worn belts.) The device has a slot width gauge to find the belt's cross-sectional width.

Once you have found the cross-section and inside circumference, you can order a PRB-Line replacement from Tandy.

◊ There is nothing about this device or replacement belts on the RadioShack Web site. I suspect that only older RadioShack stores have the device and that for loan, not for sale. Nonetheless, you may find a similar measuring gauge and replacement belts at local electronics-repair shops. A search of the Web for sources of replacement belts found a few resources, although replacement belts, as such, seem to be scarce. This is sad because modern elastomers are so much durable than the originals. Table 3 lists some possible belt suppliers from the Web. From what I could see, O-rings come in standard sizes (thickness × maximum circumference): $^1/_{16} \times 16^7/_8$, $^3/_{32} \times 31^3/_{16}$, $^1/_8 \times 57^1/_4$, $^3/_{16} \times 82^3/_4$ and $^1/_4 \times 82^3/_4$ inches. You can also look up a good source of general repair information on the Web at **www.repairfaq.org/REPAIR/F_audiofaq2.html**.—*Bob Schetgen, KU7G, Technical Correspondence Editor*

[3]W. Wornham, NZ1D, "Drive Belts for Heath and Other Gear," *QST,* Apr 2001, p 83.

Table 3
Possible Replacement Belt Suppliers from the Web

Electronics Drive Belts

Electronix Corporation, 1 Herald Square, Fairborn, OH 45324-5144; tel 937-878-1828, fax 937-878-1972; e-mail **sales@electronix.com**; **www.electronix.com/**

Ken's Electronics, 2825 Lake St, Kalamazoo, MI 49048-5807; tel 616-345-4609; e-mail **ken@kenselectronics.com**; **www.kenselectronics.com**

Maplin Electronics PLC, National Distribution Centre, Valley Rd, Wombwell, Barnsley, South Yorks, S73 0BS UK; e-mail **doyoudo@maplin.co.uk**; **www.maplin.co.uk/**

METCO Electronics, 969 Falls Rd, Shelburne, VT 05482-7034; tel 802-985-3505; e-mail **tt@metcoelectronics**; **www.metcoelectronics.com**

O-Ring Suppliers

Marco Rubber & Plastic Products, Inc, 334 Clark St, North Andover, MA 01845; tel 800-775-6525, fax 978-688-6915; **www.marcorubber.com**. Their Web site includes an O-ring standard-size chart.

O-Rings West, Inc, 1111 N 98th St #3, Seattle, WA 98103; tel 888-722-2602, 206-522-2602, fax 206-522-2621; e-mail **sales@oringswest.com**; **www.oringswest.com/**

A PROPOSED DEFINITION OF 'T' FOR PSK31 SIGNAL REPORTS

By Robert S. Stein, W6NBI, 1849 Middleton Ave, Los Altos, CA 94024-6849; **w6nbi@arrl.net**

◊ Although I am a relative newcomer to PSK31, one of the first things that struck me was the seemingly antiquated use of the RST reporting system, in which the "T" report is meaningless. I attempted to use the simpler two-digit RS system, but found that some of the integrated logging programs require three digits.

Table 4
Proposed T Quality Scaled Based on IMD

Nominal IMD	*IMD Range*	*T*
3	4 and under	1
6	5 to 7	2
9	8 to 10	3
12	11 to 13	4
15	14 to 16	5
18	17 to 19	6
21	20 to 22	7
24	23 to 25	8
27	26 and over	9

Therefore, I have been trying to come up with a reporting system that is meaningful without the necessity of referring to a table of values. I think that I have come up with a viable solution.

If you divide the absolute IMD value (disregarding the minus sign) by 3, the "T" report will be that number rounded to the nearest integer. For example, and IMD of 27 would be T9. Likewise, an IMD of 26 (26/3 = 8.67) is also T9. An IMD of 25 (25/3 = 8.33), becomes T8. Anything over 27 is also T9. Thus we come up with the values in Table 4.

Similarly, an IMD of 4 or less is T1. There has been some discussion as to the minimum IMD possible; this does not negate the system but may establish a floor greater than T1.

When I posted this proposal on the PSK31 reflector and newsgroups, I got about a dozen responses. Most of them were highly favorable. There does not seem to be much activity on the QTH reflector or the E-groups. On the latter, my messages remained the last posted for two or three days.

To explain and publicize this reporting system, I include, and suggest that operators automatically include, a statement similar to the following in your transmissions:

"I am using a new RST reporting system in which the 'T' report is an indication of your IMD. Multiply 'T' by –3 to arrive at your nominal IMD report. T9 indicates an IMD report of –26 dB or better."

Technical Correspondence items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given idea will work for your situation, we make every effort to screen out harmful information.

Letters for this column may be sent to Technical Correspondence, ARRL, 225 Main St, Newington, CT 06111, or via e-mail to **tc@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

ARRL Petitions for New 60-Meter Amateur Band

An ARRL petition filed in late July could result in a new high-frequency band for US amateurs. In accordance with action taken at the July Board of Directors meeting, the ARRL has asked the FCC to allocate 5.250 to 5.400 MHz to the Amateur Service on a domestic (US-only), secondary basis.

The FCC promptly put the petition on public notice, assigning a rulemaking number, RM-10209, and inviting comments until September 12. Even if the FCC eventually okays the petition, it's likely to be several years before the new band becomes available.

In its petition, the ARRL told the FCC that the proposed allocation would aid emergency communication activities by filling a "propagation gap" between 80 and 40 meters, particularly for emergency communications during hurricanes and severe weather emergencies. The ARRL also said a new 150-kHz allocation at 5 MHz could relieve overcrowding on 80 and 40.

The ARRL has proposed that General class and higher amateurs be permitted to operate CW, phone, data, image and RTTY on the new band running maximum authorized power. No mode-specific subbands were proposed. If allocated to the Amateur Service on a secondary basis, hams would have to avoid interfering with—and accept interference from—current occupants of the spectrum, as they already do on 30 meters.

The ARRL said that its successful WA2XSY experimental operation between 1999 and this year demonstrated that amateur stations can coexist with current users and that the band is very suitable for US-to-Caribbean paths. In comparisons with 80 and 40 meters, the WA2XSY operation also showed the 60-meter band to be the most reliable of the three.

The ARRL said it determined from a search of frequency files that the band 5.250 to 5.400 MHz has the fewest assignments in the US and that the total number of assignments in the band from 5.1 to 5.45 MHz had dropped significantly over the past few years. The 150-kHz bandwidth is necessary, the ARRL said, to allow amateurs flexibility to determine an operating frequency over "a sufficiently wide range as to avoid interference to fixed and mobile services."

"An amateur allocation in this band would improve the Amateur Service's already exemplary record of providing emergency communications during natural disasters when even modern communications systems typically fail," the ARRL concluded. "HF Amateur stations are a necessary backbone in international disaster relief involving, for example, Caribbean countries, and the proposed allocation would provide seamless propagation path coverage between the United States and Caribbean nations, and the United States' own possessions and commonwealths there."

An amateur allocation in the vicinity of 5 MHz has long been an objective of the International Amateur Radio Union. The IARU's Administrative Council has approved a long-term goal of "a narrow allocation, even on a shared basis in the vicinity of 5 MHz."

The subject of an international 5 MHz Amateur Radio allocation is not on the agenda for World Radiocommunication Conference 2003, nor has it been proposed for subsequent WRCs. Proposals are pending in Europe for a band around 5 MHz, however, and the band 5.245 to 5.445 MHz is being studied as a possible candidate for the Amateur Service in the United Kingdom. Efforts are under way to get authorization for an experimental operation there.

A copy of the ARRL petition is available on the ARRL Web site, **www.arrl.org/announce/regulatory/5MHz**.

ARRL, AeroAstro Square Off Over 2300-2305 MHz

In a spectrum battle pitting Amateur Radio against a commercial interest, the ARRL and AeroAstro filed comments with the FCC in August to bolster their respective—and competing—proposals for 2300 to 2305 MHz. ARRL has petitioned to elevate the Amateur Service from secondary to primary status on the band and requested that no commercial operations be introduced. AeroAstro seeks co-primary status with the Amateur Service to accommodate a Miscellaneous Wireless Communication Service satellite-based position-monitoring system.

The FCC put both petitions on public notice in July. There is no primary occupant at 2300-2305 MHz.

The ARRL characterized AeroAstro's petition as "a Trojan horse" and came out with both barrels blazing. "There is nothing contained in the four corners of the AeroAstro petition that would indicate the extent of compatibility between incumbent and future Amateur operation and the open-ended MWCS operation proposed by AeroAstro," the ARRL asserted. Given the unpredictable and mobile nature of Amateur Radio and AeroAstro's proposed use, the League said, "There is no possibility whatsoever of coordination of operations between auctioned MWCS and Amateur operations in the band."

In its subsequent reply comments on the AeroAstro proposal, the ARRL called on the FCC to put an end to commercial encroachment on amateur allocations at 2.3 and 2.4 GHz. "It is time for the Commission to stop those encroachments, because they have gone too far already," the ARRL said.

AeroAstro claims in its comments that the 1 W spread-spectrum uplinks of its proposed Satellite Enabled Notification System (SENS) and Amateur Radio can share the 5 MHz of spectrum and still protect the nearby NASA Deep Space Network. While asserting that it "does not seek to cut back current Amateur operations in the band," AeroAstro also called on the FCC to impose severe power and antenna limitations on hams at 2300-2305 MHz.

Under the AeroAstro petition, amateurs would be limited to 100 W output and antennas with a beamwidth no greater than 5° for "narrowbeam" operation such as Earth-Moon-Earth communication. For other operation, AeroAstro wants the FCC to limit amateurs to 25 W EIRP.

"This is totally unacceptable," the ARRL retorted in its comments. "It is pre-

Rick Lindquist, N1RL ♦ Senior News Editor

clusive of most Amateur operation in the band." The current situation, where no service is primary, is preferable to such a sharing arrangement, the ARRL said.

A co-primary allocation such as AeroAstro proposes also would make no provision to mitigate interference. AeroAstro's mobile SENS consumers, the ARRL said, "would not be able to meet any standard of responsibility in addressing interference avoidance and remedies relative to Amateurs."

The ARRL said the FCC already has made "adequate accommodation" for services such as the one AeroAstro has proposed "without compromising the 2300-2305 MHz Amateur allocation."

AMSAT DETAILS NEW SATELLITE PROPOSAL, KICKS OFF FUND DRIVE

AMSAT has fleshed out some details of its next Amateur Radio satellite. Preliminary plans call for the new bird to have capabilities similar to those now offered by AO-40, plus a digital transponder that will be different from anything now available in Amateur Radio satellites. A campaign was begun to fund the new satellite project—dubbed "Project JJ" and now planned to launch in 2004.

AMSAT-NA President Robin Haighton, VE3FRH, has promised an open design process and invited comments and suggestions. Twenty of AMSAT-NA's designers and officers were on hand at a planning meeting July 14-15 in Denver to hammer out some project parameters.

In a President's Letter, Haighton said current plans call for the satellite to

FCC News

FCC ACTION PUTS AMATEUR ALLOCATION IN PERIL

The FCC has included a primary Amateur Service allocation among bands it plans to examine to support the introduction of advanced wireless services, including third-generation (3G) mobile systems. Meeting August 9, the FCC said it will seek comments on reallocating some spectrum in the 2390 to 2400 MHz amateur segment as well as in the non-amateur 1.9 and 2.1 GHz bands for unspecified mobile and fixed services.

The FCC adopted a *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking* that explores additional bands to support advanced wireless and 3G services. The FCC said the further proceeding supplements the record of its January 2000 advanced wireless spectrum proposals by providing "new allocation options," adding that it would "seek comment on the benefits and costs of each." The FCC invited public comment in late August.

The Commission said it "intends to explore spectrum options that would complement, rather than substitute for" alternatives identified in the January 2000 NPRM. Besides 2390 to 2400 MHz, the additional bands are 1910-1930 MHz, 1990-2025 MHz, 2150-2160 MHz, and 2165-2200 MHz. The 2390-2400 MHz band is also available for certain unlicensed uses under FCC Part 15 rules.

The 2390-2400 MHz band was reallocated from federal government to exclusive non-government use pursuant to the Omnibus Budget Reconciliation Act of 1993. In 1995, when the FCC elevated Amateur Radio from secondary to primary status on the band, it also allocated the spectrum for use by unlicensed Part 15 devices. The FCC said it reasoned that hams and unlicensed devices had proven able to share spectrum, and it wanted to preserve adequate spectrum for Amateur Radio. At around that same time, the FCC also concluded that an allocation for certain proposed wide-area, high-power Fixed and Mobile services "would be incompatible with amateur use."

In seeking comments specific to the 2390-2400 MHz band, the FCC said it now wants to know if the earlier sharing concerns still hold and if they would preclude allocating the band for advanced wireless services.

Noting that Amateur Radio previously shared the band with the federal government, the FCC also invited comments on reinstituting such a sharing arrangement and what type of allocation might be feasible. "We also seek comment on the impact on the amateur services of further shared use," the FCC said.

In addition to 2390 to 2400 MHz, the Amateur Service has primary allocations in this part of the spectrum at 2402 to 2417 MHz. The ARRL has asked the FCC to grant the Amateur Service primary status at 2400 to 2402 MHz, and Imlay said he's optimistic the petition will be granted. The AO-40 satellite has been successfully using that band for downlink telemetry and transponder operation and AMSAT plans a similar downlink for its next satellite project. The ARRL also has re-petitioned the FCC for primary status at 2300 to 2305 MHz.

Amateur Enforcement

♦ **FCC scrutinizes Georgia ARRL VEC exam session:** The FCC has announced the audit of a second ARRL VEC Amateur Radio examination session. The ARRL VEC alerted the FCC to discrepancies in the May 19, 2001, exam session in Statesboro, Georgia, and forwarded relevant documents, prompting the FCC audit. The FCC also is auditing a May 10 ARRL VEC exam session in Trumbull, Connecticut.

ARRL VEC Manager Bart Jahnke, W9JJ, says the 11 volunteer examiners listed on the Test Session Report remain suspended pending the outcome of the FCC audit. Suspension is standard operating procedure in such situations, he explained.

In an letter to the VEs originally sent July 23 but revised August 3, FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said that based on the evidence he's seen, volunteer examiners at the May 19 session used exam question sets and Morse text identical to those used at several recent exam sessions. Hollingsworth said that apparently contradicts the intent of §97.509(f) of the Amateur Service rules, which prohibits administration of a "compromised examination." Hollingsworth also said it appeared that test candidates had been shown, or had access to, the Morse code answer key for the examination administered.

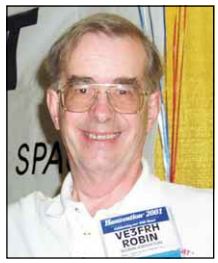
All nine applicants at the May 19 session qualified for a new license or upgrade. At the FCC's direction, all applications are being held by ARRL VEC, pending the outcome of the FCC audit.

The FCC's letter of inquiry went out to volunteer examiners Ellie Waters, W4CJB; Cheryl L. Waters, W4CLW; Joanne D. Sharpe, KF4WFN; John W. Sharpe, WA4BE; Joseph A. Horne, N4ZAJ; George B. Grant, KF4WPU; Robert T. Jernigan, W4RTJ; Kathy L. Lanier, KD4MVY; Marshall R. Thigpen Jr, W4IS; Lawrence A. Lewis, K4RRR; and Charles F. Roberts, AI4A.

Jahnke said that while information provided to ARRL VEC after the session indicated that Roberts and Lanier were not at the May 19 session, they remain suspended for now along with the others listed.

Hollingsworth has asked the 11 VEs to detail their roles at the Statesboro session and to explain any relationship between the Morse and theory tests administered at recent examination sessions and the ones used on May 19.

offer SSB uplinks on 435 MHz (U band) and 1.2 GHz (L band) and a downlink on 2.4 GHz (S band). It also will have a digital time-domain multiple-access (TDMA) L-band uplink with an S-band downlink; a 145 MHz (V band) telemetry beacon; gain antennas for U, L, and S-bands; and omnidirectional antennas for initial commands.



AMSAT President Robin Haighton, VE3FRH.

The new satellite will be placed into an orbit akin to that of AO-40, providing hours of daily access.

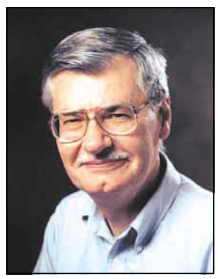
Haighton told ARRL that Project JJ planners still were looking at the possibility of including a U band transponder for Mode U/V work. "It hasn't been ruled out and hasn't been ruled in," he said.

Haighton is especially enthusiastic about the proposed TDMA digital transponder, which would handle digital voice-mode communication. "I liken it to the introduction of SSB back in the days of AM," he said. "I think it's going to be a lot of fun."

More information is available on the AMSAT-NA Web site, **www.amsat.org/**.

CANDIDATES VIE FOR VICE DIRECTOR IN THREE DIVISIONS

There will be one new director on the ARRL Board in January. Southwestern Division Vice director Art Goddard, W6XD, will move up from the back bench to succeed outgoing Director Fried Heyn, WA6WZO. A director since 1984, Heyn has decided not to seek another term. The only real suspense in this fall's balloting will be the outcome of contested races for vice director in three divisions.


Southwestern Director-elect Art Goddard, W6XD.

In the Pacific Division incumbent Vice Director Bob Vallio, W6RGG, faces a challenge from Gerald D. Griffin, K6MD. In the Southeastern Division, West Central Florida Assistant Section Manager Paul J. Toth, NA4AR, and Georgia SM Nelson E. "Sandy" Doanhue, W4RU, will contend for the seat being vacated by Vice Director Evelyn Gauzens, W4WYR, who is not seeking a new term after 22 years of service. In the Southwestern Division, Edward J. Stearns, AA7A, and San Diego SM Tuck Miller, NZ6T, will face off for the seat Goddard is vacating.

In addition to Goddard, those unopposed for directors' seats are incumbents Jim Maxwell, W6CF, in the Pacific Division; Walt Stinson, W0CP, in the Rocky Mountain Division, Frank Butler, W4RH, in the Southeastern Division and Coy Day, N5OK, in the West Gulf Division. Those unopposed for vice directors' positions are incumbents Warren G. "Rev" Morton, WS7W, in the Rocky Mountain Division; and Dr David Woolweaver, K5RAV, in the West Gulf Division.

Ballots go out by October 1 to ARRL members on record in the affected divisions as of September 10. The completed ballots are due back at ARRL Headquarters by November 16.

WEST VIRGINIA MEMBERS ELECT NEW SECTION MANAGER

West Virginia gets a new Section Manager October 1. In membership balloting, Hal L. Turley, KC8FS, narrowly defeated incumbent SM O. N. "Olie" Rinehart, WD8V, 252 to 235. Rinehart has served as SM since 1994. Turley, of S Charleston, has been licensed 35 years. An Official Observer since 1995, he's an active DXer and holds an Amateur Extra ticket.

In the only other contested race, incumbent San Francisco SM Leonard Gwinn, WA6KLK, outpolled former SM John Wallack, W6TLK, 374 to 126. Gwinn had been appointed to complete Wallack's term following Wallack's resignation in 1999.

Colorado is also getting a new SM. Jeff Ryan, N0WPA, was the only candidate to replace Tim Armagost, WB0TUB, who did not run for re-election. An Amateur Extra class licensee from Colorado Springs, Ryan holds appointments as an Official Emergency Station and Assistant Section Manager.

Incumbent Section Managers ran unopposed in six other ARRL sections. Re-elected were Kyle Pugh, KA7CSP, Eastern Washington; Sandy Donahue, W4RU, Georgia; Phineas J. Icenbice Jr, W6BF, Los Angeles; Jerry Boyd, K6BZ, Sacramento Valley; E. Ray Taylor, N5NAV, South Texas; and Harry Lewis, W7JWJ, Western Washington.

Votes were counted August 21 at ARRL Headquarters. All terms are for two years beginning October 1, 2001.

ARRL ANNOUNCES AMATEUR RADIO INTERFERENCE ASSESSMENT PROJECT

The ARRL has inaugurated the Amateur Radio Interference Assessment (ARIA) project. The effort will involve amateur volunteers across the country to assess the noise levels primarily from unlicensed devices in bands above 400 MHz. ARRL plans to conduct ARIA as a "real-world" noise study.

ARRL President Jim Haynie, W5JBP, has advised the FCC that the League will contribute its results to an overall radio noise study sponsored by the FCC Technological Advisory Council. The TAC study will look into whether noise generated by low-power unlicensed Part 15 devices is on the rise and whether it's adversely impacting other services.

ARRL's role will be to measure radio noise in the amateur bands above 400 MHz, with initial emphasis on the band 2400-2450 MHz, where Bluetooth and IEEE 802.11b-protocol wireless local area networks are gaining popularity.

Long-term tests starting next year will assess noise trends on the UHF/microwave bands over a period of several years to determine if the situation is staying the same, getting worse or getting better.

"If it's getting worse, as some suspect, we will then be armed with factual data to develop a strategy for continued Amateur Radio access to the UHF/microwave spectrum," said ARRL Technical Relations Manager Paul Rinaldo, W4RI.

ARIA is attempting to identify volunteers to participate in the program. Initial volunteers should be willing to review the test plan, have receiving equipment and antennas capable of covering the 2400-2450 MHz band in a vehicle, and be able to report results in a timely manner. Rinaldo asked that "qualified and motivated" individuals e-mail their qualifications to **aria@arrl.org**.

VECs HUDDLE IN GETTYSBURG

The difficulty of setting up Amateur Radio volunteer examination sessions in remote areas was a prime discussion topic as representatives of 12 of the 14 active Volunteer Examiner Coordinators gathered for the annual meeting of the National Conference of Volunteer Examiner Coordinators.

Moderating the July 27 and 28 session in Gettysburg, Pennsylvania, was Conference Chairman Win Guin, W2GLJ. ARRL VEC Manager Bart Jahnke, W9JJ, and ARRL Vice President Kay Craigie, WT3P, represented the ARRL VEC and the League. Several FCC officials also were on hand.

Jim Wiley, KL7CC, representing the Anchorage VEC and Alaskan amateur licensing interests, described the unique difficulties in getting examinees and vol-

Scouts, Indiana Kids Talk to ISS

They were happy campers indeed July 25 at the Boy Scout National Jamboree at Virginia's Fort A.P. Hill. That's because several of them got to speak directly with astronaut Susan Helms, KC7NHZ, operating NA1SS aboard the International Space Station. The contact was arranged as part of the Amateur Radio on the International Space Station program. Various K2BSA youth staff members took turns handling the radio gear for the contact.

An audience of about 200 Scouts and Scout leaders was on hand at K2BSA for the early morning contact. About a dozen Scouts elicited answers from Helms to their questions about life aboard the ISS, such as whether weightlessness affects eating or sleeping.

"It doesn't affect it at all up here as far as we're concerned," Helms replied. "We still eat like pigs and sleep like babies." Her jaunty answer elicited a hearty laugh from the earthbound Scouts.

Among other things, Helms told the Scouts that the newly installed airlock will allow crew members to do space walks directly from the ISS as required and not have to wait for a shuttle mission.

Helms said life aboard the ISS requires crew members able to "adapt to unusual environments and also work well with other people, and not everybody has that skill." She said her particular jobs aboard the ISS have involved operating the robotics and serving as computer network administrator for the ISS.

Following the contact, ARISS Operations Chairman Will Marchant,KC6ROL, who was among those observing, delivered the first International Space Station NA1SS QSL card to the K2BSA staff.

On July 31, 17 Indiana elementary and middle schoolers got up extra early to speak via Amateur Radio with ISS Expedition 2 crew member Jim Voss. The youngsters, who attend five Hobart-area schools, gathered before 4 AM at Joan Martin Elementary School to participate in the Amateur Radio on the International Space Station contact. All 17 got to ask a question of Voss, who was in high spirits.

In answer to one youngster's question, Voss said the most unexpected thing he'd encountered in space was when the three main ISS computers had problems at the same time. "We never thought that would happen," he said. "Luckily, the people on the ground who support our flight were able to figure out what to do, and we were able to solve the problem and all of our computers are working properly."

As for the most exciting thing, Voss told the students that space walks have been "a remarkable experience" for him each of the four times he's gone out. Being launched into orbit was "quite an exciting ride," he said. Getting into space takes about eight minutes, he explained, but then it takes another two days to catch up with the ISS.

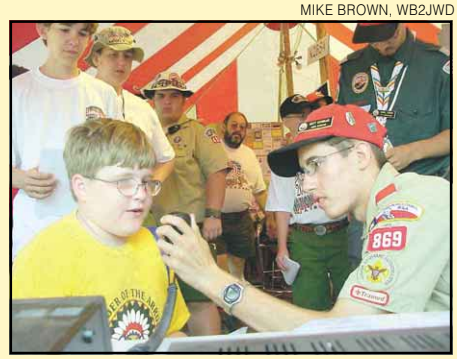
Before signing off, Voss urged the youngsters to continue studying space and to "reach for the stars."

Mike Frank, KF9WW, who handled Earth-station chores at the school, called the contact "a huge success." Hams on the school's roof assisting with the antennas reported a spectacular visual sighting of the ISS. "Unfortunately, most of us missed that part of the excitement," Frank said. The ISS is about 210 miles above Earth.

Voss and the Expedition 2 crew of Susan Helms, KC7NHZ, and Crew Commander Yury Usachev, RW3FU, returned to Earth in late August. Replacing them aboard the ISS was Expedition 3 crew commander Frank Culbertson, KD5OPQ, and his Russian crewmates—Mission Pilot Vladimir Dezhurov and Flight Engineer Mikhail Tyurin.

ARISS is a cooperative program of ARRL, AMSAT and NASA. More information is available at the ARISS Web site, **ariss.gsfc.nasa.gov**.

MIKE BROWN, WB2JWD



Scouter Matt Schwaab, KC5SIX (right), takes the controls of K2BSA, as another Scout speaks to Susan Helms and his fellow campers await their turns.

DEANNA VANDIVER

Kyle Olson takes his turn at the microphone during the July ARISS contact from Joan Martin Elementary School in Indiana. Assisting is Mike Frank, KF9WW. On the right is the school's science and computer coordinator Debbie Matthys.

unteer examiners together in the remote areas of Alaska. Applicants would either have to travel to less-remote sites or the VEC would have to deploy VE teams to various remote areas. A committee—with Wiley as chair and Fred Maia, W5YI, of the W5YI VEC and Jahnke as members—will attempt to resolve the issue.

In a report on the effects of restructuring, RC Smith, W6RZA, of the Greater Los Angeles VEC concluded that restructuring has been successful in turning around the decline in Amateur Radio growth. "The prospects for future growth, although more modest than earlier anticipated, are markedly improved," his report asserted.

The FCC's Riley Hollingsworth followed up on exam integrity issues that arose last year in Puerto Rico and elsewhere. He said he sent 128 letters last year requesting that applicants re-test at FCC offices. Only 20 ever appeared for retesting, he said, and 88 of those who failed to appear were from Puerto Rico. Hollingsworth advised the VECs not to accredit any new volunteer examiners in Puerto Rico without first clearing it with the FCC. He also warned VECs to adhere to the rules by carefully screening applications and verifying the signatures of examiners.

Chosen as chairman for the coming year by the NCVEC delegates was John Creel, WB3GXW, of the Laurel VEC. The delegates also elected Guin as vice chair; Steve Sternitzke, NS5I, as secretary, and Ray Adams, W4CPA, as treasurer. Adams, a past NCVEC chairman, was recognized with a plaque for his contributions to the Question Pool Committee.

The three current QPC members—Jahnke, Maia and Chairman Scotty Neustadter, W4WW, were reappointed. Following the meeting the Laurel VEC tapped former FCC staffer John Johnston, W3BE, as its QPC representative.

In Brief

• **FCC collecting date-of-birth info on Form 605:** The FCC again is collecting date-of-birth information on its FCC Form 605. The information is a required entry (on line 11a) of the Form 605 as modified in March 2001 for both Amateur Radio and commercial operators, including Restricted Radiotelephone applicants. The FCC has said it's not making the information public but will use it for internal purposes. The FCC stopped collecting and publishing dates of birth several years ago. The National Council of Volunteer Examiner Coordinators' version of the form, NCVEC Form 605—the one most new and upgrading amateur applicants encounter—does not yet require a date of birth, nor is one required of online applicants. It is expected to be required in the future, however.

• **FCC levies $10,000 fine for unlicensed hamming:** The FCC has levied a $10,000 fine on an East Palo Alto, California, man for transmitting without a license on amateur frequencies. Earlier this year, the Commission had proposed forfeitures totaling $17,000 in the case of Joshie Yasin Nakamura Sr, who also is known as "Mervyn Ehambrave" and "Marvin Eugene Barnes." The FCC's *Forfeiture Order*, released July 6, offered no explanation for the discrepancy in the figures. The fine stemmed from complaints about Nakamura to the FCC that date back to late January through March of 2000. The Commission says it heard from the amateur community and from members of the ARRL Amateur Auxiliary that an unlicensed station was operating on several amateur frequencies. Nakamura reportedly is being detained by state authorities on unrelated felony charges and did not respond to the earlier FCC notice.—*FCC*

• **Hams erect a repeater for the National Weather Service:** Utah hams Eldon Kearl, KB7OGM, and John Lloyd, K7JL, teamed up to provide a NOAA Weather radio station, transmitting from a hilltop overlooking the southern end of Bear Lake. In the course of building and maintaining Amateur Radio repeaters in northern Utah, Kearl and Lloyd saw the need for a stronger NWS signal into the Bear Lake Area. Because of mountain interference, many locations in the area were not able to receive the weather radio signal from Logan Peak. "Amateurs provided the site, a UHF receiver, installation, and will provide power maintenance for the transmitter site," said David Toronto, warning coordination meteorologist for the National Weather Service. NWS provided the UHF link transmitter, UHF transmitter, maintenance, weather radio frequency, and a continuous signal to the transmitter from the Salt Lake City office, he said.—*David Toronto/NWS*

• **Iowa ham loses appeal in tower bid:** *The Hawk Eye* newspaper in Burlington, Iowa, recently reported that a ham there lost an Iowa Court of Appeals bid to gain approval for a 70-foot backyard tower. ARRL Life Member James Sereda, K0TJ, had failed three times to get Zoning Board of Adjustment approval and had gone to the Appeals Court. Sereda's efforts to erect the tower have been going on since 1998. After two trips to the city board, he prevailed in getting a three-judge Appeals Court panel to call the Board of Adjustment's earlier ruling illegal. The court held that since the Burlington board didn't put its reasoning in writing, the decision was arbitrary and therefore illegal. In January 2000 the Board voted a third time to deny Sereda's permit, this time providing a written rationale. In a unanimous opinion, the Zoning Board of Adjustment reasoned that Sereda's proposed tower would dwarf nearby homes and harm his neighborhood's character. The Board said that to grant approval would set a precedent of allowing such structures in a residential neighborhood.

• **Tower fall claims the life of Texas amateur:** A fall from an Amateur Radio tower July 8 claimed the life of ARRL member Bob Smart, W5TBV, of Georgetown, Texas. Smart reportedly fell from his 75-foot tower while adjusting his beam antenna. His wife, Ellice, N5RRO, who had been assisting him from inside the house, came outside to find him on the ground. His climbing belt reportedly was not attached to the tower.—*Phil Duff, NA4M*

• **Vote on *QST* Cover Plaque Award:** The winner of the *QST* Cover Plaque Award for July was Ed Krome, K9EK, for his article "Getting Started with AMSAT-OSCAR 40." The winners of the *QST* Cover Plaque Award for August were Garry Shapiro, NI6T, and Tom Harrell, N4XP, for their article "Kingman Reef 2000 DXpedition." Congratulations, Ed, Garry and Tom! The winner of the *QST* Cover Plaque award—given to the author of the best article in each issue—is determined by a vote of ARRL members. Voting takes place each month on the Cover Plaque Poll Web page, **www.arrl.org/members-only/qstvote.html**. As soon as your copy arrives, cast a ballot for your favorite article.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, Louisiana, North Carolina, Pacific, San Diego, South Dakota, and Virginia: 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 December 7, 2001. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before January 2, 2002, to full members of record as of December 7, 2001, which is the closing date for nominations. Returns will be counted February 15, 2002. Section Managers elected as a result of the above procedure will take office April 1, 2002.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 2002. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the April 2002 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Field & Educational Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Rosalie White, K1STO, Field & Educational Services Manager*

Support Your Local and Section Net!

By Richard Webb, KB0RUU, ARRL Iowa Section Traffic Manager and Manager of the NTS Tenth Region Net, Cycle 2

I'm a regular traffic handler. Many of you aren't. I've heard all the reasons before. The litany goes something like this:

• Most of that traffic isn't really third party traffic anymore. I remember the days of the Korea and Vietnam conflicts when lots of the third party traffic was the real deal.

• I just hang on repeaters and don't understand that bit of handling messages. I thought everybody that does that is into high speed Morse.

• DX and contesting is where I'm at. That's what really separates the men from the boys.

Don't turn that page yet! I'm not asking you to devote a lot of time to handling routine formal written traffic. However, I have an ulterior motive, and I'll be right up front with you. I'm an ARRL Section Traffic Manager and an NTS Region Net Manager, and I sure hear a lot of messages go by that are advising originators that their message couldn't be delivered because there's nobody in Podunk Center to take their traffic.

Thinking about flipping that page? Don't, just yet—bear with me. You might only be asked to handle one or two pieces of traffic a year destined for your locale, so don't get too shook up about not being a brass pounder yet. However, when a real third party message comes through from some guy who wants to send greetings to Aunt Thelma we won't have to service it back because you weren't available.

What do I get out of this? That's the question that's entered your head and you're still thinking about flipping that page to get to the new products or the full page advertisements. Come on, admit it now, I know you are. But here's the kicker: I'm going to give you a number of ways that participating in your local or section phone net can enhance your enjoyment of the ham radio hobby manifold. If you decide you are interested in handling traffic in a big way, your regional and area nets will appreciate your occasional participation, too, as will the CW nets. That, my friend, is another story and entirely up to you. Still, I think you'll be surprised at the many ways you can enhance your enjoyment of our wonderful hobby by participating regularly in your local and section phone nets.

1) Help! Everyone needs some now and then. Whether it's getting PSK-31 running in your shack or finding volunteers to help you get that new sky hook up in the air on Saturday, your local or section net is a good place to make your need known.

Editor's note: You may find the meeting times and frequencies of many nets in the ARRL Net Directory, *available through the ARRL Products Catalog, or visit the Net Directory On-Line at* **www.arrl.org/FandES/field/nets/.**

2) Find that rarity! So you bought that old vintage receiver at the last tailgater that most folks passed up as a boat anchor. You're just really not having any luck getting it running, and a schematic diagram would sure help. Try your local or section net. Some old timer might be lurking in the background that remembers that piece fondly and is willing to help you out either with the schematic or talking you over the hurdles.

What is the National Traffic System?

The National Traffic System (NTS) is designed to meet two principal objectives: rapid movement of messages from origin to destination, and training amateur operators to handle written traffic and participate in directed nets. NTS operates daily and consists of four different net levels—Area, Region, Section, and Local—which operate in an orderly time sequence to effect a definite flow pattern for traffic from origin to destination.

Local Nets

Local nets cover small areas such as a community, city, county or metropolitan area, and not a complete ARRL section. They usually operate by VHF (typically 2-meter FM) at times and on days most convenient to their members. Some are designated as emergency (ARES) nets that do not specialize in traffic handling. Local nets are intended mainly for local delivery of traffic. Some NTS local nets operate on a daily basis. They provide outlets for locally-originated traffic and route the incoming traffic as closely as possible to its actual destination before delivery—a matter of practice in a procedure that might be required in an emergency.

Most local nets and even some section nets in smaller sections are using repeaters to excellent effect. Average coverage on VHF can be extended tenfold or more using a strategically located repeater, and this can achieve a local coverage area wide enough to encompass many of the smaller sections.

A local net, or "node," may also be conducted on a local packet bulletin board system where radiograms may be stored, forwarded and picked up by local operators for delivery. A Net (Node) Manager is appointed by the Section Traffic Manager to manage these functions, and assure that traffic is moved expeditiously in accordance with basic NTS principles, just like their counterpart nets on local repeaters.

Section Nets

Coverage of the section may be accomplished either by individual stations reporting in, by representatives of NTS local nets and nodes, or both. The section may have more than one net (a CW net, a VHF net, an SSB net, or even a section packet BBS, for examples). Section nets are administered by an appointed Section Traffic Manager or designated Net Managers. The purpose of the section net is to handle intra-section traffic, distribute traffic coming down from higher NTS echelons, and put inter-section traffic in the hands of the amateur designated to report into the next-higher NTS (region) echelon. Therefore, the maximum participation from section amateurs is desirable.

Steve Ewald, WV1X ♦ Public Service Specialist

3) Be better informed. The new guy in town asked you and a couple other fellows the other night if you knew of a DX packet cluster nearby. You don't do packet and don't even own a computer. Still, if you happen to check into your local or section net on a regular basis, you might have heard discussion about a packet cluster nearby and can steer the newcomer to it, making a friend and looking like an all round good guy to know. It just might be the icebreaker you need to invite him to the next club meeting.

4) Be a better Elmer. That new face at the club meeting has missed the last two test sessions you've had in your area due to work and/or family commitments. You're able to call him on the phone one fine evening and tell him about a test session within an hour's drive of his home that you wouldn't have been aware of had you not participated in your section net. He'll thank you profusely, especially if he passes that test.

5) Fellowship, or it's just plain fun! Many section nets I hear seem to have a group of folks who gather prior to the start of the net to just have a plain old rag chew. Many of these are quite fun to listen to even if you don't say much, and you can sure learn a lot. I've found valuable information on how to fix my van, troubleshoot a linear amplifier, more antenna goodies than I could ever remember, and just plain old good times chatting with these folks. Many section nets also have gatherings where you can get together and swap stories over lunch or dinner. Even if they don't, you'll sure find you know a lot more people when you show up at the tailgaters and hamfests in your area.

Did you notice the common thread that ties all of these together? I'll bet you did. The common thread is of course ...the envelope please...information gathering. We're a social hobby for the most part. Unless you fly model airplanes or enjoy lab work, you really need another station out there to communicate with. You can find folks who enjoy your particular brand of ham radio on your local and section nets, and it's free. No dues to pay, no computer connection to maintain, and no junk mail!

As an added bonus, you have a ready-made schedule opportunity when you meet with a fellow ham who shares your common interests from across your state or province. Your buddies have all loaded up, the kids are cranky and it's time to head for home. You want to meet your newfound friend for a continuation of your enjoyable eyeball conversation.

Have him meet you on your section phone net. It's a known frequency and time. You don't have to worry about your target frequency being busy. Once you make contact, leave the net and find a frequency. If you get separated in the shuffle, come back to net frequency and try again.

Here's yet another bonus about section and local nets. When cousin Herb calls to ask you if those radios you're always tinkering with can reach Seattle and find out if Cousin Fred's all right after the earthquake, you can help Herb compose a message to Fred. You'll be able to explain with some authority how the message will probably go from your station and the route it should take to reach its destination.

Be a part of your local and section net. You'll find friendly folks and plenty of opportunities to get more out of your limited hobby time and resources.

ARES ASSISTS BALLOON FEST/AIR SHOW

The Hospice League of Alamance/Caswell Counties, North Carolina, sponsors an annual Balloon Fest/Air Show as a charitable fund raiser to help support its assistance to terminally ill persons. This event (held in June) has grown to be the second largest of its kind in the Southeast and draws an attendance of several tens of thousands of people.

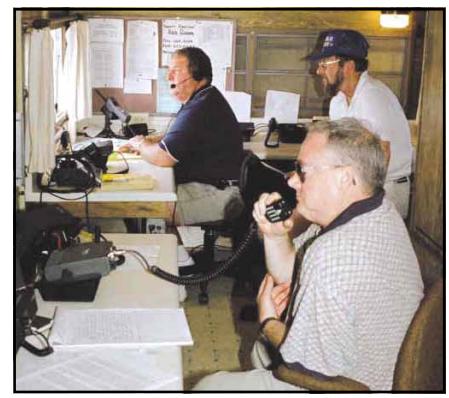
The coordination of such an event is massive, involving several months of planning, over 350 volunteers, and the cooperation of the local airport authority; fire, police and sheriff departments, emergency medical services, and Federal Aviation Administration.

Three years ago, the Hospice League contacted members of the Amateur Radio Emergency Service (ARES) and asked for assistance in planning and managing a communications infrastructure to aid in coordinating the various agencies and volunteer groups. ARES participation in the Balloon Fest/Air Show has benefited both Hospice and ARES.

ARES representatives Dwayne Ayers, N4MIO (Alamance County Emergency Coordinator) and Gene Scarborough, W4YBQ (District EC), are on the event-steering committee as volunteers responsible for event communications. Piedmont Communications Co, Inc, from Durham provided commercial two-way radios for use by Hospice volunteers. Amateur Radio operators are responsible for distribution and logistics of radios and coordination of communications between various groups. Four major groups—parking, general, administration and balloon/air show—are each assigned a specific communications frequency. Amateur Radio operators operate base stations

KE4KSJ PHOTOS

UP, UP, and AWAY. Balloonists take off on a fox and hound event.



Steve Hughes, KG4GUR, and John Webb, KG4KSX, operate the control stations, while Gary Hills, KA4KJI looks on.

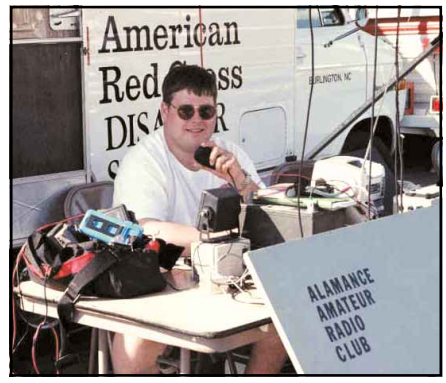
from the Communications Center located in the Alamance County Emergency Mobile Command Center to coordinate communications between all groups.

In addition, Amateur Radio operators assist with communications for police, fire and rescue. SKYWARN provides weather reports to the FAA, Weather Officer, Safety Officer, Air Boss, Balloonmeister, and Hospice administrators for the event via the Graham Repeater Association, Inc, 147.375 MHz repeater and, as necessary, the Triad SKYWARN network. ARES self-coordination is conducted on the Alamance Repeater Association 146.67 MHz repeater. Doug Fleming, KF4VTT, was responsible for a special event station located in the local American Red Cross Emergency Response Vehicle at the festival for public

viewing, demonstrations and to distribute Amateur Radio literature.

ARES has also benefited from its public service to the Hospice League. The successful planning and execution of a multi-agency, multi-frequency communications system has increased the stature and credibility of ARES as a county resource. Participation in event planning has fostered positive working relationships with not only the agencies and organizations mentioned above, but also with the Civil Air Patrol, United States Service Command, and Coast Guard Auxiliary.

A specific example arising from the interactions and an unexpected benefit to the citizens of Montgomery County has come from the Hospice association. In the winter of 2000, a severe ice and snowstorm virtually closed down the mostly rural county, blocking roads and disrupting power, telephone service, and public service communications. The only way to reach citizens needing emergency medical assistance was with National Guard vehicles, which had no communications capabilities. Ron Campbell, the North Carolina Emergency Management Coordinator for the district, contacted Gene Scarborough, W4YBQ (District EC), for assistance.



Doug Fleming, KF4VTT, operates one of the Special Events Stations.

Within hours, ARES members from several counties had established base station and provided communications operators for the National Guard. Because the operation was anticipated to go on around the clock for up to two weeks, including support for public service communications, Piedmont Communications (the supplier of radio equipment for the Balloon Fest/Air show) was contacted by Scarborough and loaned a base station and 50 portable transceivers to the Montgomery County authorities until they could restore their own system. Finally, Montgomery County has supported the organization of an Amateur Radio club (who established the county's first repeater) and ARES by the small number of Amateurs residing in the county with several emergency services personnel studying for their licenses.—*Roger Jefferson, AC4U, ARRL PIO Alamance County, NC; Dwayne Ayers, N4MIO, Alamance County EC; Gene Scarborough, W4YBQ, NC Area 10 DEC.*

Photographs by John Maynard, KE4KSJ, Triad Skywarn AEC for Alamance County.

Field Organization Reports

Public Service Honor Roll
July 2001

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.

912
NM1K
552
WA4GQS
398
K9JPS
321
W9RCW
307
N1SN
273
WB2GTG
252
N2LTC
W6SLF
237
W7TVA
230
WA5OUV
229
KA2ZNZ
228
KK3F
NN2H

223
KB2RTZ
220
AG4DL
214
N9VE
210
WA9VND
205
KB2VRO
190
KA4FZI
189
AC4CS
187
W4ZJY
KK5GY
186
WB2UVB
182
K2UL
N2CCN
181
W8YS

178
N9FHI
K6YR
173
W6IVV
171
WB5NKC
170
W4EAT
K4RBR
169
WA2MWT
168
K6YR
KA2GJV
165
AA3SB
WN0Y
162
K5UPN
N2OPJ
161
W5ZX
KB2WII
160
N2RPI

159
WA5I
158
K0IBS
W6QZ
154
N8IO
153
WB4GM
K5NHJ
152
W0WWR
150
K2BCL
149
N7YSS
K4IWW
WA4DOX
K4SCL
148
WA2YL
147
KC5OZT
145
KB1DSB

144
WA2GUP
143
N8OD
W2MTA
142
N8BV
N2YJZ
WX4H
141
WB2ZCM
W5GKH
N5OUJ
W0LAW
140
WD4JJ
W1PEX
N9BDL
139
W3BBQ
AF4NS
KC2EOT
KB2KLH
W7ZIW
138
N0SU
W3YVQ

KC2DAA
W0OYH
N2KPR
KT4TD
137
K2DN
N7IKN
136
WA2YBM
KG4FXG
KD4GR
135
NC4ML
KA1GWE
KC8CON
134
WA4QXT
N2GJ
133
KE4JHJ
W3WKE
132
AD4XV
N9TVT
KC4ZHF
N2YSI
131
KC7SRL
W9CBE
W9YCV
N3EFW
130
KG4FQG
KA4UIV
KB5WY
K5IQZ
KB5TCH
129
W4DGH
W2AKT
K9LGU
128
K4BG
W1ALE
WA0TFC
W7GB
127
W3CB
N5NAV
126
W4NTI
KB0RUU

KF6OIF
WB2QIX
W7QM
125
KB0DTI
K4YVX
NR2F
123
AA2SV
WI2G
122
KI4YV
K2CSS
KV4AN
KG2D
AB2IZ
KF5A
121
KC4VNO
W4WXA
120
K0PIZ
K7GXZ
WB2LEZ
119
WA1JVV
W3HK
W3IPX
118
N8DD
AF4QZ
W4CKS
K5DPG
WB2IVV
KA8WNO
W3OKN
K4WKT
K4MTX
W3NNL
W7LG
K7MQF
WD4GDB
N9MN
117
N7AIK
AE4MR
115
N4TAB
N3WK
KB2ETO
AC5Z
K2PB

113
KA4LRM
K0PY
WD0GUF
WB4GSS
KF4WIJ
W5MEN
112
KA0DBK
AG9G
K4BEH
KA2DBD
KT4PM
KF6YVQ
N3RB
111
W2GUT
110
K8PJ
W1QU
KA4HHE
109
WB4BIK
KC6NBI
KC6SKK
108
K1FP
KB2KOJ
WA2YOW
107
W2JG
106
KA2CQX
WB4ZNB
105
WA8SSI
KJ7SI
104
KC7SGM
KG4KCC
KM5YL
WD8DHC
103
WA7UVX
W5AYX
KA7TTY
102
W2FR
KG4EZQ
101
W4AUN

100
KC3Y
KA2YKN
99
KF4KSN
98
K5MC
KE4PAP
97
W7VSE
W4QAT
KE4GYR
WA1QAA
N3SW
96
W1JX
W4CAC
WD4MIS
95
KC2HUV
KE4WBI
94
KA1VED
N2VQA
W4VLL
KA2BCE
WB2IJH
WB4PAM
93
KD1SM
AF2K
AB4XK
K2DBK
92
KC8KYP
W1JTH
AA4AT
91
WA2CUW
90
KG5GE
W2JHO
N2HQL
W6JPH
K4JPG
W2CC
89
W4CC
KM4WC
88
KC8HTP

WB4UHC
W2PII
KD4HGU
87
AA3GV
N8NMA
N3WAV
KD5NZA
W8IM
86
WA4GLS
WD5AAH
WA4CSQ
KF4OPT
84
KG4CHW
W7DPW
WB9GIU
83
KA8VWE
N3ZKP
KE4VBA
82
K3CSX
W2LC
AA4BN
81
KE4DNO
K2SO
80
K5PY
KF4ING
78
KF4NJP
KA2ZKM
WW8D
KA2ZKM
77
KA2YDW
76
W0FCL
75
K8QIP
K6IUI
74
K1STV
KE3FL
73
KE0K
70
WD4GDB

The following stations qualified for PSHR during the month June, 2001, but were not recognized in this column last month: KK5GY 216, WA5OUV 211, K6YR 178, KF5A 107, WB2IJH 94.

Section Traffic Manager Reports
July 2001

The following ARRL Section Traffic Managers reported: AL, AZ, CT, ENY, EPA, EWA, GA, IA, ID, IL, KS, MDC, MN, MI, MO, MS, NC, NFL, NTX, NH, NLI, NNJ, OH, OK, OR, ORG, SBAR, SC, SD, SDG, SFL, SNJ, STX, TN, VT, WCF, WI, WMA, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
July 2001

The following ARRL Section Emergency Coordinators reported: CT, EWA, IN, KS, KY, LA, MI, MDC, NFL, NLI, OH, SD, SFL, STX, SV, TN, WCF, WMA, WNY.

Brass Pounders League
July 2001

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
KK3F	42	2440	2398	28	4908
NM1K	803	413	919	5	2140
KF5A	3	535	575	1	1114
WX4H	0	422	622	10	1056
W1PEX	0	891	133	26	1050
K6YR	0	388	402	0	790
N2LTC	0	369	405	14	788
WB2GTG	147	226	413	8	785
WB5ZED	19	374	308	19	720
K9JPS	0	344	32	332	708
W6DOB	1	229	423	19	672
K5UPN	21	268	296	3	588
W9IHW	0	204	207	175	586
KA1VED	6	271	271	8	556
W9RCW	0	251	49	251	551
W0WWR	2	95	408	22	527
WA9VND	15	297	176	17	505
KB0OHI	31	224	219	30	504
W9YPY	0	235	277	0	502

BPL for 100 or more originations plus deliveries: K9GU 194, N9VE 140, N5IKN 133. The following stations qualified for BPL in the months indicated, but were not previously recognized in this column: (June) KF5A 1178, N5IKN 946, K6YR 790.

Logbook of the World

The Logbook of the World was endorsed at the July 2001 ARRL Board of Directors meeting. Described as an electronic alternative to collecting traditional QSLs for awards purposes, the project goes beyond simply replacing printed cards with electronic versions. Once implemented, the Logbook of the World system will ease participation in ARRL awards programs—such as DXCC—and in awards programs of other organizations that choose to take part. The program will make use of electronic confirmations within a giant repository of QSO information maintained by the ARRL. Digital security methods will ensure data integrity and authenticity. The system also will provide an alternative to traditional QSL cards that must be collected and verified by card checkers for most awards. The following press release from the DXCC Desk came out on August 2, 2001.

Fast on the heels of approval of the "Logbook of the World" by the ARRL Board of Directors, software design to support the electronic contact-verification program is continuing apace. ARRL Membership Services Manager and LOTW Project Manager, Wayne Mills, N7NG, said the ARRL hopes soon to make LOTW software modules available to vendors for incorporation into their logging programs. These modules are being developed as part of the Trusted QSL open-source project headed by Darryl Wagoner, WA1GON. (More information about the Trusted QSL project can be found at **www.sourceforge.net/projects/trustedqsl**)

"We have been in touch with 15 or so developers of popular logging software," Mills said. "We're also looking at providing a basic, do-it-yourself program to get contact data to ARRL."

At the heart of the Logbook of the World concept is a huge repository of log data provided by operators—from individual DXers and contesters to major DXpeditions—and maintained by ARRL. Mills says the system will benefit big and little guns alike by providing quick QSO credit for awards offered by ARRL, and, it's hoped, for awards offered by other organizations as well.

Once it becomes available—which could be as early as the middle of next year—Logbook of the World will accept authenticated data directly from computerized logs via the Internet. "This is an e-mail based system that uses easy-to-obtain digital signatures for authentication," Mills said. "Once you get your digital certificate, a few keystrokes will do the trick."

Mills said the program envisions user access to the LOTW "confirmed database" so an operator can see what "matches" turn up amongst his records—such as confirmation of new DXCC entities, states or grid squares. "We'll also publish a list of logs that have been submitted."

Heading up software development is ARRL Electronic Publications Manager Jon Bloom, KE3Z, along with Web Applications Developer Mark Simcik, WA1VVB. Software specifications already have been established. Advising the project are Darryl Wagoner, WA1GON, Dick Green, WC1M and Ted Demopoulos, KR1G. ARRL staffer and well-known contester and DXer Dave Patton, NT1N, who conducted the original electronic QSL project study, is also assisting.

Mills said that he hopes to be able to announce a specific inauguration date for Logbook of the World within a few months, as the software design progresses. This is expected to be effective after October 1, 2002.

NEW DXCCs

The Board also approved a new QRP DXCC award. Applications likely will be accepted starting early next year. No QSL cards would be required, and there would be no time limits or endorsements. The award is similar in structure to the DXCC Millennium Award offered last year. In addition, the Board approved a 30-meter DXCC and the inclusion of 30 meters to the DXCC Challenge.

NEW DX REFERENCE

Rod Dinkins, AC6V, has published a new DX tool for beginning DXers called *The Amateur Radio DX Reference Guide DXing 101X*. This spiral-bound guide starts off with an introduction to DXing and goes through many aspects of the DX World. It includes chapters on equipment, operating aids, propagation, QSLing and DX secrets, and an appendix with more tips and references. With this 226-page booklet and the WWW you should be able to find the answer to just about any DXing question you have. You can see a sample of the booklet at **ac6v.com/DXSAMPLE.htm**. The booklet is available from Rod for $19.95 + plus shipping. There is a money-back guarantee if you're not satisfied. Contact Rod at **hamguide@ix.netcom.com** or Rod Dinkins, AC6V, 4982 Marin Dr, Oceanside, CA 92056-4973.

DX NEWS FROM AROUND THE WORLD

September and October are almost always great months for DXing, as we are going through the equinox. Also look for many contest DXpeditions to be QRV the week before CQ WW SSB DX Contest, which is October 27 and 28. This is usually the best time for the little guns to work some really good DX, before all the big guns come out to play in the contest. On with the DX news!

3B8—MAURITIUS ISLAND

Jose, ON4LAC, plans to activate 3B8/ON4LAC from Mauritius Island (AF-049) October 16-December 6. Jose plans to operate mostly phone, but possibly with some Pactor and RTTY.

6Y—JAMAICA

A team of five Amateur Radio operators has made notice of a trip to Jamaica in late October 2001. Team members include VE3RZ, N6JRL, AC8G, W8ILC and WA8LOW. They will be QRV with three high power stations and two 100-watt stations on 6 through 160 meters. Look for 6Y6L on CW, SSB and PSK from October 23 to 30. The group plans to have beams on 30 meters and higher with verticals on the low bands. QSL via WA8LOW.

8Q—MALDIVES

Pierre, HB9QQ, will be back in the Maldive Islands the last week of October and the first week of November. He will be QRV as 8Q7QQ from Gan Island, approximately 250 kilometers south of the equator. Activity is mostly planned for 6 meters with a 4 element wide spaced Yagi and an ICOM IC-746 with 100 watts. When 6 meters is closed look for him on 10, 12, 17 and 30 meters CW. Keep an ear on 28885.

9G—GHANA

Arliss, W7XU, Ed, W0SD, and K5AND will operate from Elmina, Ghana October 26-November 4. Elmina is 100 km southwest of the capital, Accra, and is on the Atlantic, an FB beach QTH. The three ops will have two FT-100Ds, a 3CX800 amp and a seven-element Yagi on a 25-foot mast. Two frequencies they mention are 28885 and 14345. Internet access is probable, beacon frequencies will be announced later, plane tickets are in hand, and cooperation from the Ghana Amateur Radio Society is secured, they say.

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

FR—TROMELIN ISLAND

Meteorologist Jack, FR5ZU, says he is going back to Tromelin for one month. Jack has made many trips to the remote Indian Ocean FR/T over the years, but it still ranks as #50 on *DX Magazine's* most wanted list. Jack plans to be QRV on SSB on all bands from September 6 until October 5 with an FT-850, 100 watts, to a vertical. In the past, his favorite frequencies have been 3773, 3795, 14256, 14274, 18145, 21205, 24945 and 28470. QSL direct or via his current QSL manager, JA8FCG.

H4—SOLOMON ISLANDS AND H40—TEMOTU PROVINCE

A group of Italians have announced plans to be active from New Georgia Island (OC-149) in the Solomon Islands from October 8 to 15. Afterwards they will be active from Pigeon Island (OC-065) in Temotu Province from October 17 to 23. Temotu counts as a separate DXCC entity and ranks #48 on *The DX Magazine's* "Most Wanted List." Operators include Luca, IZ6DSQ, Ant, IZ8CCW and possibly others. They will be QRV on SSB only. They will pick up their licenses, which have been issued, upon arrival.

J7—DOMINICA

Five members of the FDXPG, Bill W4WX (J75WX), William N2WB (J79WB), Bob KR4DA (J79DA), Larry W1LR (J79LR), and Clarence W9AAZ (J79AA), will be active from Dominica from October 23-30. They will do a multi-single entry in the CQ WW SSB DX Contest. They have been assigned J75J for the contest. Look for them on all bands, including 6 meters, on CW, SSB, PSK-31, and RTTY before and after the contest. All J75J QSL cards should go to QSL manager KR4DA. QSL J79WB to his QSL Manager N2OO direct and all others to their home calls. The team has a Web site at **www.geocities.com/j79wb/index.html**.

KH0—NORTHERN MARIANAS

JH7IMX will activate Saipan in the Northern Marianas, KH0, September 28 through October 2. The call will be KH0/K7WD. QSL to his JH7IMX home call.

KH4—MIDWAY ISLANDS

German operators Rudi, DL7VFR, and Tom, DL2RUM, have announced they plan to team up again. This time the two will head for the Pacific Ocean to be QRV in late September from the Midway Islands. They plan to be QRV from September 20 to 29 as KH4/DL7VFR and KH4/DL2RUM on 6 through 160 meters CW, SSB and RTTY. Tom notes that 30 meter operations could be a little difficult as there is some kind of interference from some of the other activities on the island. Suggested frequencies are as follows: CW—1823, 3513, 7003, 10103, 14023, 18073, 21023, 24903 and 28023. SSB—1845, 3795, 7060, 14195, 18145, 21295, 24945 and 28495. RTTY—14082, 21082 and 28082. QSL via their home calls. Tom, DL2RUM, has set up a Web page at **www.qsl.net/dl2rum/**.

OX—GREENLAND

It is now possible to work XP1AB again. XP1AB will be used from Sondrestrom on the west coast of Greenland during the CQ WW SSB DX Contest on October 27 and 28. XP1AB was last used in 1960s and it will now be possible to work this special call again. Sondrestrom is in CQ zone 40; ITU Zone 5 and IOTA reference NA-018. During the OX2K DXpedition in May-June 2000 (see **www.qsl.net/ox2k**) the team set-up an operating room to be used by radio amateurs all over the world. The group also established a local club and the call sign is XP1AB. The team expects to arrive on October 24. There they will use the first few days to get all the equipment together. If they have time, look for them to be QRV on all HF bands and 6 meter with their home calls/OX. CW activity is expected before and/or after the contest. The team plans to leave on October 31. QSL via OZ1ACB, direct only. More details can be found on the XP1AB Web site at **www.qsl.net/xp1ab**.

PY0—TRINDADE & MARTIM VAZ ISLANDS

Several Brazilian operators have announced plans for an October expedition to Trindade Island. They will have two stations on for two or three days, using the calls ZW0TB on phone and ZW0TW on CW. Planning began in January. ICOM has signed on as the lead sponsor. The group also has the support of the Brazilian Navy, which has a base there and of Anatel, the Brazilian Telecommunications Agency. The official Web site, under construction, is **www.radiohaus.com.br/trindade.htm**. The operators are PU2RYW, Fran; PY2NW, Claudio; and PY2QI, Erwin, with PY2KQ, Ben, handling QSL chores and other support. Watch your favorite DX bulletin for the latest details.

TI—COSTA RICA

Bill, AK0A, will be operating from Henry's, TI2HMG, QTH from September 25 to October 9. He'll be QRV on RTTY, PSK, MFSK, CW and SSB, in that order, on all bands. This includes entry in the CQ WW DX RTTY Contest and the TARA PSK Rumble. QSL via AK0A with SASE for USA or/and DX via the W0 bureau. Call will most likely be TI2/AK0A. He will try for a special contest call.

V6—MICRONESIA

Look for Sho, JA7HMZ, and Hisa, 7L4IOU, to be active from Pohnpei Island (OC-010), Micronesia from September 28 to October 4. This will be a digital DXpedition with activity on RTTY, SSTV and PSK31. Sho will use V63DX, while Hisa will use V63XC. QSL via their home calls. JA7HMZ, Shoji Igawa, 17 Shirogane, Yokobori, Ogachi, 019-0204 JAPAN. 7L4IOU, Hisami Dejima, 2-11-13 Minamikoiwa, Tokyo, 133-0056 JAPAN. During the CQ WW RTTY DX Contest they will multi-op as V63XA. QSL via JA7AO, Tokuro Matsumoto, 3-62 Okachimachi, Yuzawa, 012-0856 JAPAN. To request a bureau QSL send an e-mail to **ja7ao@jarl.com**.

VP8—SOUTH GEORGIA & SOUTH ORKNEY ISLANDS

Mike, GM0HCQ, plans to be back in the South Atlantic later this year and early next year. He plans to be at King Edward Point, Cumberland Bay West, South Georgia during the following dates as VP8SGK: November 24-30 2001, January 10-11 2002, March 4-6 2002. He also expects to be at Factory Cove, Borge Bay, Signy Island, South Orkney Islands during the following times as VP8SIG: November 17-22 2001, January 5-8 2002, January 28-30 2002, February 27-March 2 2002. Keep an eye on your favorite DX Bulletin for the latest news on this one.

3D2—CONWAY

If you missed the 3D2CI Conway Reef DXpedition earlier this year you've got another chance. Raymundo, YS1RR, reports the mostly Yugoslavian team, head by Hrane, YT1AD, expects to be back on the reef between October 1 and 10. Team members include YT1AD, YU7AV, YZ7AA, YU1AU, YU1DX, Z32ZM, RZ3AA, K1LZ and possibly YT6A. They will have 2 stations and be QRV on all bands from 6 to 160 meters on CW, SSB and RTTY. They will have one call for CW and another for SSB and RTTY.

The expected budget for this operation is $45,000 (USD) and donations are being sought. Donations maybe sent to YS1RR. YU1AA and VE3EXY will be pilot stations for this operation. A web site has been set up at **http://www.kragujevac.co.yu/3d2**. QSL CW QSOs via YT1AD, Hrane Milosevic, 36206 Vitanovac, YUGOSLAVIA and SSB & RTTY QSOs via Z32AU, Dragan Kostevski, PO Box 35, 6000 Ohrid, Macedonia.

KH1—BAKER & HOWLAND ISLANDS

The expected September-October 2001 DXpedition to Baker and Howland Islands by Hrane, YT1AD, and company has now been postponed until early May 2002. The group claims to have received provisional permission from the United States Fish and Wildlife Service in Honolulu. They plan to have 10 Amateur Radio operators along with 2 scientists from USFW on the island from May 2 to 11. Ray, YS1RR, says the approximate cost of this DXpedition is $65,000 (USD). Each team member will be paying $2,500 (USD) plus airline and hotel expenses. Anyone interested in joining Hrane can contact him via e-mail to **yt1ad@eunet.yu**. Donations for this trip can also be sent to YS1RR. More details are expected in the next two months.

4W—EAST TIMOR

Carlos Poinho, CU3FT, an active DXer from the Azores Archipelago and a Telecom Tech. for the Portuguese Air-Force, is on a tour of duty for UNTAET in Dili, East Timor. His license was received from the United Nations in New York and he plans to be active as much as possible as 4W/CU3FT. Special attention will be made on the WARC bands and 6 meters, especially during the upcoming F2 season. Poinho will be able to help continue Amateur Radio in this fledgling country and to keep the East Timor Amateur Radio Association (ETARA) working together with local authorities for a future licensing authority after the full independence of East Timor. QSL via CT1EEB, Jose Emanuel Ribeiro de Sa, PO Box 79, P-3860 Estarreja, Portugal.

WRAP UP

Well, that's all for this month. Thanks for all the DX news, letters, pictures and newsletters. Thanks this month go to AK0A, KE3Q, N1RL, N2WB, N7NG, OZ0J, OZ6OM and *The Daily DX*. Until next month, see you in the pileups!—*Bernie, W3UR* QST

222-MHz Sporadic-E

The 135-cm band is an oddity, as it is not generally recognized for amateur use in most parts of the world. Only a few nations in the Americas, most notably the US and Canada, permit amateur operation in this region. (CW and SSB are now allowed in the US only in the 222 to 225-MHz segment. Formerly, the 135-cm band began at 220 MHz.) It fills an interesting gap between 144 and 432 MHz, largely because ionospheric propagation undergoes some dramatic changes in this part of the radio spectrum. Propagation via meteor scatter and aurora are still useful, but sporadic E (E_s) is rare. Thus, any E_s activity at 222 MHz will attract interest.

Over the past 55 years, only three episodes of 222 MHz E_s have been documented—and all of those have been since 1987. This past July 8, K5LLL and VE3AX completed yet another 222-MHz E_s contact, only the fourth such event ever reported. The circumstances of these four events share some similarities (all were made during intense periods of 144-MHz E_s, for example), but curious differences and anomalies among them that cannot be explained easily.

Historic Contacts

The first reported 220-MHz contact made in association with sporadic-E took place on the morning of June 14, 1987. Strong and widespread E_s propagation reached 144 MHz across the South sometime prior to 1500. K5UGM (EM12 in central Texas) had been looking for someone with 220-MHz equipment and finally found W5HUQ/4 (EM90 in northern Florida) on 144 MHz. It took two attempts on 220 MHz, but at 1544, they finally received 60-dB-over-S9 signals and quickly exchanged information for the first 220-MHz contact apparently made via sporadic E. The distance was 1500 km.

The next two 222-MHz E_s contacts were made on the evening of June 21-22, 1994. Much of the eastern third of the US had been experiencing intense and widespread 2-meter sporadic E since 2250. Several contacts were in the 2300 to 2600-km range, a bit long for what were presumably single-hop paths, but imbedded among the frenzied activity were several in the 1200 to 1500-km range. WD4AFY (EM92 in southeastern Georgia) was aware of the significance of the short contacts and announced on 144 MHz that he was listening on 222 MHz. At 0047, WD4AFY found W9UD (EN41 in northern Illinois) on 222 MHz and the pair quickly completed over a 1331-km path. SSB signals were 59 both ways, but they were rough sounding, like aurora.

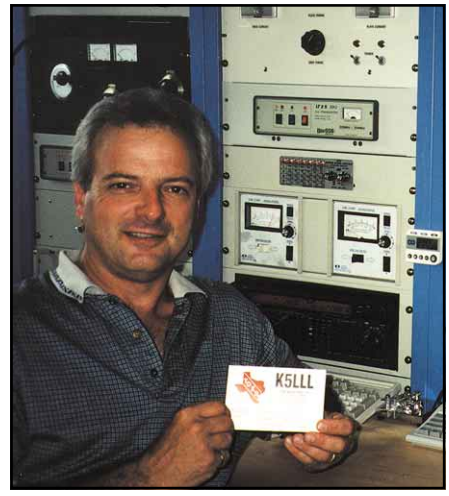


Figure 1—Peter Shilton, VE3AX, at his station in Cayuga, Ontario, holding QSL card from K5LLL for a 2088-km 222-MHz sporadic-E contact.

Nearly an hour later at 0138, W9UD was joined by neighbor NN9K, and the pair duplicated the earlier 222-MHz QSO with WD4AFY. While all this was going on, WB4WTC (EM95 in North Carolina), had his large 144-MHz array was pointed west toward the mid-path area of the W9UD-WD4AFY contact, looking for the characteristic aurora-like distortion of field-aligned irregularities (FAI). He was rewarded with several stations from Texas and Florida via skewed FAI paths.

The third 222-MHz E_s event occurred on the afternoon of February 13, a most unusual time of year for this sort of propagation. Stations in the Southwest experienced two unusually intense E_s openings on the evenings of February 12-13 and 13-14. Two-meter paths on both evenings got quite short, alerting perceptive operators that 222-MHz contacts might be possible. Nothing happened on the first afternoon, but after 0130 on February 14, 2-meter signals between south Texas and Southern California became quite strong. W5UWB (EL17) and N6HKF (DM13) made contact on 144 MHz and switched over to 222 MHz at 0135, where they immediately found each other with loud signals over the 1967-km path. Five minutes later, W5UWB made a second 222-MHz E_s contact with W6QIW (DM04) at 2195 km. QRM prevented additional 222-MHz contacts.

This Month

October 13	Mid-Atlantic States VHF Conference (Trevose, PA)
October 13-14	ARRL EME Contest
October 14	Excellent EME conditions
October 21	Orionids meteor shower peaks

Most-Recent 222-MHz E_s Contact

On this past July 8, a strong and sustained 144-MHz sporadic-E opening across the lower Mississippi River valley became evident as early as 1415 and lasted five hours. Several pairs of stations had been trying 222 MHz throughout the opening with little result. Finally, Ron Marosko, K5LLL (EM10 in central Texas) and Peter Shilton, VE3AX (FN02 in southern Ontario, see Figure 1), who had made contact on 144 MHz at 1816, hooked up on 222 MHz at 1832 with 55 to 57 signals. This sixth-ever 222-MHz E_s contact lasted about 10 seconds before signals faded out.

About the same time K5LLL and VE3AX found each other on 222 MHz, Sam Whitely, K5SW (EM25 in eastern Oklahoma) reported several short-range contacts on 144 MHz. At 1828, Sam hooked up with KK4CA (EM75 in central Tennessee), just 976 km away, implying an MUF close to 200 MHz. Several other 2-meter contacts about this time were shorter than 1200 km. The timing and proximity of the midpoints of the short 144-MHz contacts and the lone 222-MHz contact suggests that they were made via the same unusually dense sporadic-E region. (See Table 1 and Figure 2.)

Discussion

Although much amateur and professional writing has explored the phenomenon of sporadic E, much remains unexplained. It is well established that sporadic E is characterized by unusually thin and dense patches or clouds of ions (mostly

Emil Pocock, W3EP ♦ Box 100, Lebanon, CT 06249 (Voice 860-642-4347, fax 860-594-0259) ♦ w3ep@arrl.org

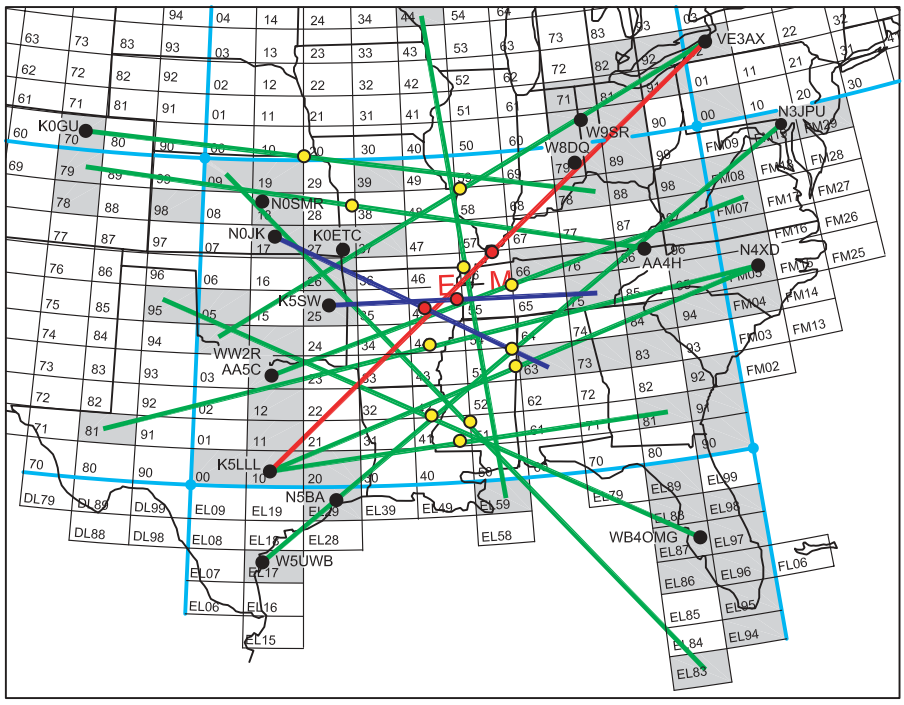


Figure 2—Sporadic-E opening of July 8, 1415-1915 UTC. Shaded grids indicate 144-MHz activity. Black circles show grids of reporting stations with calls. Representative 144 MHz paths are shown in green with midpoints as yellow circles. Two 144-MHz contacts shorter than 1000 km are shown in blue with red midpoints. The only 222-MHz contact is shown in red with a red midpoint. The path midpoints and presumed intense sporadic-E moved generally northward from Louisiana to Missouri.

electrons) that collect in the E layer between 95 and 110 km altitude. Sporadic E is extremely efficient at reflecting radio waves in the 20 to 100-MHz range and sometimes higher. Single-hop signals are usually strong and clear, even for modest stations. High power and large antennas are not necessary to make sporadic-E contacts, even at 222 MHz.

The longest single-hop contact that can be expected at any frequency is about 2300 km, assuming that a typical sporadic-E layer exists at 105-km altitude. The longest distances occur when the operating frequency is near the MUF of a particular E_s region. As the MUF rises above the operating frequency, the single-hop path length shortens. This basic relationship can be used to calculate the MUF when operating frequency and path length are known.

Thus when 50-MHz contacts become shorter than 400 km, the MUF for the responsible sporadic-E region is nearly 144 MHz. A pair of 144-MHz stations 2300-km apart could then complete a sporadic-E contact using the same midpoint as the much shorter 50-MHz path. VHFers have long used this basic MUF principle to anticipate E_s openings on 50, 144 and even 222 MHz by observing activity on lower frequencies.

There is no reason to believe that sporadic E behaves any differently as the MUF approaches 222 MHz, although this happens rarely. What then could be expected when the MUF reaches 222 MHz? First, the openings would probably be quite short lived, as the MUF rarely gets to 222 MHz and is unlikely to stay that high for very long. Second, signals would be strong and clear, as they typically are for signals near the MUF. Third, the mostly likely 222-MHz contacts would be in the 2000 to 2300-km range. Shorter contacts imply an MUF that is much higher than 222 MHz, a most doubtful circumstance. Fourth, simultaneous 144-MHz contacts using the same E_s region at midpoint would be shorter than 900 km.

It is clear that not all of the reported 222-MHz contacts made during intense sporadic-E events met each of these four expectations. The durations of the 222-MHz openings were all quite short, some just a matter of 10 or 20 seconds at a time. Signals were also generally quite strong in each case, which surprised some of the operators, but participants during the 1994 episode described rough-sounding audio, similar to aurora. In addition, the three relatively short 1300 to 1500-km contacts made during the 1987 and 1994 episodes are not consistent with sporadic-E models. The three most recent contacts in the 1950 to 2200-km range more nearly fit the conventional profile of path distance, signal strength and quality for E_s signals near the MUF.

Finally, each of the pairs of stations made contact on 144 MHz just prior to switching over to 222 MHz. For practical purposes, these can be considered nearly simultaneous events. If so, they cannot be explained by conventional means, if it is assumed that the same sporadic-E region supported both 144 and 222-MHz contacts. Even so, at least one separate 950-km contact at 144 MHz occurred at about the same time—and with a path midpoint in the same general area—as the most recent 222-MHz E_s contact. This more nearly approximates accepted sporadic-E models.

Speculation

These six 222-MHz contacts made during four separate E_s events present different sorts of problems. Those made in 2000 and 2001 most nearly fit the expectations in all regards, save that 144-MHz contacts were made nearly simultaneously over the same paths. How can this circumstance be incorporated into existing E_s models?

It is easy to speculate. It may be that a passing meteor could briefly raise a small region of the E-layer MUF from something higher than 144 MHz to 222 MHz. Tilted sporadic-E layers suggest another possible scenario. Two E_s clouds with MUFs less than 220 MHz, separated by a suitable distance and tilted in opposite directions, might account for a 222-MHz chordal path using two shallow reflections.

It may not be necessary to resort to novel solutions when simpler ones are available. Sporadic-E regions are dynamic phenomena that are not stable or uniform. Thus, the MUF of sporadic-E clouds vary considerably over time and space. MUF fluctuations are responsible

Table 1
222-MHz Sporadic-E Contacts

Date	Time	Calls	Distance (km)
1987 June 14	1545	W5UGM (EM12)—W5HUQ/4 (EM90)	1500
1994 June 22	0047	W9UD (EN41)—WD4AFY (EM92)	1331
	0138	NN9K (EN41)—WD4AFY (EM92)	1330
2000 Feb 14	0130	N6HKF (DM13)—W5UWB (EL17)	1967
	0140	W6IQW (DM04)—W5UWB (EL17)	2195
2001 July 8	1832	K5LLL (EM10)—VE3AX (FN02)	2088

for much of the rapid fading observed during sporadic-E openings. It is thus conceivable that the MUF of localized patches within a single E_s cloud may briefly exceed 222 MHz, perhaps like the peaks of waves on an ocean, when the average MUF is already quite high.

The short 1300 to 1500-km 220-MHz contacts present another sort of problem altogether. They cannot be explained in terms of conventional sporadic-E propagation, simply because they imply an MUF much higher than 220 MHz, which is most unlikely. The simultaneous 144-MHz contacts and the rough-sounding signals in at least one of the cases point in another direction—ionospheric scattering. Upper D-layer and lower E-layer ionospheric forward scatter can be observed daily to some extent on 144 MHz over 1500-km paths. It may be that this existing scattering region was intensified or otherwise modified by the adjacent intense sporadic E in such a way as to support 222-MHz forward scatter with strong signals.

The observation of simultaneous FAI (another E-layer phenomenon) during the 1994 event also suggests the possible involvement of field-aligned ionization. Ordinary FAI paths are skewed, like aurora, but exhibit MUF-like levels that are much higher than the sporadic E with which they are associated. The 222-MHz contacts were all reported late in the 144-MHz E_s openings, when FAI might be expected to begin forming.

With only a few sketchy examples, it is difficult to come to any firm conclusions about the nature of 222-MHz contacts associated with intense sporadic-E. It seems likely that two different phenomena may be responsible—one for 1300 to 1500-km contacts and another for the 1950 to 2200-km range. The former are too short to be explained in model E_s terms, and they exhibited other uncharacteristic qualities. The latter come much closer to established ionospheric models, nagged only by the simultaneous 144-MHz contacts.

ON THE BANDS

Sporadic-E events dominated the on-the-air activities for July, including the spectacular five-hour opening on 144 MHz. Aurora and auroral E made some feeble attempts to attract interest during the month and two tropospheric openings provided some longer-than-usual contacts in the Midwest and along the East Coast. In addition to those mentioned in the summaries, thanks to K1HC, W1RMA, AA1VL, WA2AMU, K2OVS, WV2V, KD4KZY, WA4LOX, W4MW, W5EU, K5XX, KD5BBC, WA5IYX, N7DB, K7ICW, W8UV, K9AKS, DF2ZC, G4UPS, YV4DDK and the Web-based UKSMG Announcement Page and DX Summit for their reports. Dates and times are UTC throughout.

Six-Meter Sporadic-E DX

Transatlantic paths remained quite active through July, with contacts reported on at least 20 days. Openings from the East Coast to Western Europe have become so common that they hardly merit special mention anymore, so routine has this path become in recent years. More interesting is the number of days stations west of the Appalachians worked into Europe and North Africa. Table 2 summarizes the transatlantic activity for the month.

Nearly lost among the routine paths were some unusual contacts and some spectacular openings. On the morning of July 3, K0GU (DN70) heard strong 49.750-MHz video signals, presumably from Eastern Europe. He began "CQing" immediately on 50.103-MHz CW and soon received an answer from UT5JCW in Ukraine! The distance was nearly 9700 km and followed a great-circle path that skirted the auroral zone, much like the Pacific Northwest to Netherlands contacts last month. Nothing else out of the ordinary was reported that day.

K2RTH/4 (EM95) and others in Florida had the transatlantic path to themselves on the afternoon of July 7. Among the long list of prefixes K2RTH logged were SP, DL, OE, 9A, S5, YU and Z3 (Macedonia), represented by Z32ZM and Z32AU. That is a nice string of countries in anyone's book, especially as the Macedonian contacts appear to be a first for any US station.

The single most spectacular opening in terms of duration, signal strength and coverage on both sides of the Atlantic took place on July 29. On this side, stations as far westward as Illinois, Indiana, Kentucky and Tennessee made it across to Western Europe. East Coast operators found conditions especially good to southeastern Europe, including SV (Greece), YO (Romania), LZ (Bulgaria), UR (Ukraine) and TA (Turkey). Yes, the perennial leaders in the Northeast nabbed most of these rare countries. VE1YX logged 240 contacts, including stations in Bulgaria, Romania and UX0FF in Ukraine for his DXCC entity #152. K1TOL had similar success while running more than 100 Europeans, adding YM0KA (Turkey) for his #143 in the process. This also is a US first.

Scattered stations across much of the US worked into the Caribbean, Central and even South America on July 7, 9, 12-13, 20-21 and 22, at least. Prefixes mentioned most often included 8R, 9Y, CO, FG, HI, HR, KG4, KP2, KP4, PJ2, PZ5, TI, XE, YN, YV and ZF. N0JK (EM17) worked LW3EX at 2239 on July 7 from Kansas, and noted that the Argentinean also made contacts into Oklahoma, Illinois and perhaps other states. This is an unusual path for midsummer, especially as it is most unlikely to have been entirely via sporadic E.

Other unusual activity centered on Greenland. During the early evenings of July 16, 30 and 31, much of the Northeast (south to Maryland and west to Ohio) heard the VE8BY (FP53), OX3VHF (GP60) and OX6SIX (HP15) beacons quite loudly. This went on for up to an hour or two at a time. Signals were often very raspy and subject to wild fluctuations in signal strength, up to 60 dB over S9 in Connecticut. OX3NUK (GP44 on the west coast of Greenland) made about 30 contacts between 0045 and 0200 on July 16, and he was on hand with VY0AAA (FP53 on Baffin Bay) to give out contacts on July 30 and 31.

It is tempting to attribute these openings to auroral E, but the K index did not exceed three during these periods, which is normally required for auroral E to expand out of its usual arctic range. It was also a bit early in the evening for auroral E, which usually appears around midnight local time. These three events and the recent sporadic-E openings from the northwestern US to Europe suggest some unusual activity in the southern auroral zone rarely observed previously.

Europeans continued to make occasional runs into Central and South America during July, but rare DXCC entities at single and double-hop range scattered across North Africa, the Middle East and the western reaches of Asia provided plenty of action. Interesting calls included 3A2MW (Monaco), 5A1A (Libya), 3V8CB (Tunisia), SU9ZZ (Egypt),

Table 2
Transatlantic 50-MHz Activity in June

Date	*Time*	*North America—Europe and Africa*
2	1410	VE9AA—I
	1930-2125	VE1, 9; W1-4 (FL)—[CU3], CN, CT, EH
3	1652	K0GU (CO)—UT5JCW
4	2115-2220	W1, 2—CT, EH
5	1200	W3—[CU3]
	2055-2315	VE1, 9; W1, 2—CN, CT, EH, I, IS0, 9H
6	2230-2340	W2, 4 (VA), 8 (OH)—CN, CT, EH
7	1135-1400	WP4KJJ—EI, G, PA, OZ, SM, DL, 9A, I, SP
	1415-1515	K2RTH/4—ON, I, S5, YU
	1900-0100	W4 (FL)—CT, EH, GW, G, PA, ON, F, EH6, I, 9A, S5, YU, Z3, OE, DL, SP
8	1150-1350	VE1, 9; W1-3, 5 (NM), 7 (AZ), 8 (OH)—[CU3], EH8
9	1605	K1SIX—EH
11	1319	VE1YX—I
13	1250-1400	W1, 4 (FL), 0 (MO)—EH
	2150-2325	W1, 3—[CU3], CT3, EH8, CN, CT
14	1550-1710	W3, 4 (NC), 5 (TX)—CT, EH
	1845-2230	VE1, 9; W1-3, 5 (TX), 8 (OH), 0 (MO, KS)—CU3, EH8, CT, EH, 9H
15	1120-1455	VE1, 9; W1—[CU3], EH
	1630-1900	VY2, VE1, 3, 9; W1-4 (VA, NC), 5 (TX), 8 (OH)—CT, EH, EH6, 9H
	2100-2340	W1, 3, 5 (AR, OK, TX, NM), 8 (OH), 9 (IN), 0 (CO)—EH8, CT, EH, 9H
18	1356	W5OZI—G0JHC, [GM] 19
	1505-1530	VO1, W4 (FL)—ON4ANT
21	1137	K1SIX—EH
	1400-1545	VE9, W1, W4 (FL)—ON, SM
	2050-2100	K1SIX—G
22	1025-1315	W1-4 (GA, FL)—CU3, EH8, CT, EH, 9H
	1900-2130	W1-3, 8 (OH)—CU3, EH, EH6, EI, GM, G, GU, F, PA, ON, I, 9H
24	1150-1245	W3EP/1—CT, [EH]
28	1159	W1RMA (ME)—YO
	1600-1750	FP; W1-4 (FL), 5 (TX)—GW, G, ON, DL, I, S5, 9A
29	1235-1430	FP; VE9; W1, 4 (NC, FL), 5 (TX)—CT, EH, GW, G, I
	1545-1615	W4 (FL)—GM, G, ON
	1915-2355	VO1; FP; VE1, 9; W1-4 (NC, KY, TN, FL), 8 (OH), 9 (IN, IL)—EI, GI, GM, GW, G, GD, PA, ON, F, HB9, DL, OK, OE, I, 9H, S5, 9A, YU, SV, LZ, YO, TA, UR
30	1200-1305	VO1, VE3, W1, 2—GM, ON, DL

*State abbreviations are in parentheses, and country prefixes in brackets indicate heard only.

432-MHz Standings

Published 432-MHz standings include call-area leaders as of August 1. For a complete listing, check the Standings Boxes on the World Above 50 MHz Web pages at **www.arrl.org/qst/worldabove/**. To insure that the Standings Boxes reflect current activity, submit reports at least every two years by e-mail to **standings@arrl.org**. Printed forms are available by sending a request with SASE to Standings, ARRL, 225 Main St, Newington, CT 06111.

Call Sign	QTH	States	DXCC	Grids	Best DX (km)
AF1T *	NH	24	7	—	1375
K1LPS *	VT	22	3	33	1357
K1TEO	CT	22	3	101	1900
K1UHF	CT	20	2	64	1604
W3EP/1	CT	19	2	50	1760
W1AIM	VT	16	2	40	1323
KU2A	NH	12	2	28	998
WA1HOG	NH	10	2	22	745
WA2ZFH	NY	16	1	30	898
K1JT	NJ	13	1	25	757
K2KIB	NJ	13	1	25	487
W2FCA	NY	13	2	32	646
W3HHN	NY	13	2	27	1180
AE3T	PA	23	2	—	—
K3KEL	PA	15	2	23	1025
WA3DMF	MD	10	1	13	603
WA4MVI *	SC	50	12	—	1771
W4TJ *	VA	43	40	190	—
KD9KP	TN	34	1	101	1680
K4MRW	AL	30	2	134	—
K4RF	GA	28	2	96	1742
K4ZOO	VA	24	2	74	1444
AA4H	TN	21	1	56	1737
NB2T	FL	20	1	22	1294
W4EUH	GA	20	2	53	1180
W4WTA	GA	18	1	54	1319
WB5APD	GA	11	1	30	1111
W5LUA *	TX	50	—	—	—
W5RCI *	MS	47	26	224	1775
WB5YWI	OK	19	1	71	—
AA5C	TX	18	1	100	1721
W5UWB	TX	11	1	27	2167
N5HYV	LA	10	—	44	—
K6TSK	CA	5	2	50	4125
AJ6T	CA	4	2	32	3672
K6QXY	CA	4	3	36	3794
KC6ZWT	CA	4	2	48	3934
N6RMJ	CA	4	3	46	4017
W7HAH *	MT	47	41	195	—
W7ID *	ID	26	13	85	—
WA7KYM	WY	13	1	50	1323
WA8WZG *	OH	41	20	158	1844
K8MD	MI	31	2	113	2166
W8PAT	OH	28	2	67	1631
K2YAZ	MI	26	2	104	2167
N8KOL	OH	22	2	73	1235
KB8O	MI	15	1	50	—
WA8EOJ	OH	11	1	40	869
N8PUM	MI	10	2	31	—
WB9SNR	IL	35	2	109	1420
K3SIW/9	IL	31	2	126	1450
W0UC	WI	21	2	100	1471
KA9UZW	WI	20	2	68	1681
W9JN	WI	14	2	74	1402
K0RZ *	CO	43	45	248	1116
W0JRP	MO	25	2	94	1750
W0OHU	MN	25	2	103	1842
KA0PQW	MN	22	2	—	1814
KD0PY	IA	22	1	71	1380
N0LL	KS	21	1	113	1690
W0GHZ	MN	21	2	92	1430
N0NZ	NE	20	1	39	1224
W7XU/0	SD	18	1	94	2040
K0SQ	MN	17	2	75	1295
K0CJ	MN	16	2	2	1375
KM0T	IA	14	2	77	1151
KB0VUK	MN	13	2	63	1124
K0AWU	MN	12	2	30	1555
N0UK	MN	11	2	55	992
NE0P	IA	11	1	17	1200
N0KE	CO	10	1	38	—
WA2HFI/0	MN	10	2	39	932
VE1ALQ *	NB	32	31	175	—
VE3DSS	ON	15	2	—	—

*Includes EME contacts
— Not provided

SV9CVY (Crete), HZ1MD and 7Z1SJ (Saudi Arabia), ET3VSC (Ethiopia) and EK6AD (Armenia). Many of these stations are within proven sporadic-E range of the US. There was little unusual activity from the rest of the world this month.

Expeditions

John Walker, WZ8D, operated on 6 meters using C6AIE (FL16) from the Bahamas, June 21 to July 2. He tallied over 1300 contacts in 48 states (missing only Hawaii and Minnesota), all Canadian provinces (save Nunavut and the Northwest Territories) and six additional countries. His efforts to make contacts into Europe yielded only partial calls with EH and T9.

Pat Rose, W5OZI, was on 6 meters as KG4ZI (FK29) at Guantanamo Bay, June 29-July 5. AA5XE, who accompanied Pat, operated as KG4XE. They made 280 QSOs, all but five with US stations. Propagation was mediocre and operating conditions were difficult, as the base is surrounded by hills and power lines.

Peter Beedlow, NN9K, led a group of Midwesterners, including K9WM, KB9LIE and K9OT, to Miquelon Island (GN17) off the Newfoundland coast, July 26 to August 1. The group's primary goal was to activate the WARC bands, but Pete got 6 meters on the air with an IC-706 and a dipole, after the primary 6-meter antenna failed. During two openings on July 28 and 30, Pete ran 76 Europeans in 16 countries as far eastward as Germany and Slovenia, but logged only 28 US and Canadians in VE2 and W1-4 call areas.

144-MHz Sporadic-E

This month's lead has already revealed that an unusually intense and long-duration 2-meter sporadic-E event took place on the morning of July 8. Figure 2 provides a graphic summary. CO2OJ (EL83) and several Florida stations began making contacts into North Texas, Oklahoma, and adjacent states by 1415 via an unusually intense sporadic-E region centered over the lower Mississippi River. During the following five hours, this intense E_s region drifted nearly due north, supporting hundreds of 2-meter sporadic-E QSOs. Typical paths were in the 1200 to 2200-km range, primarily east west across the lower Mississippi Valley.

More than four hours after it began, the most intense E_s region reached the Arkansas-Tennessee border area, where it appeared to intensify further. Several 144-MHz contacts shorter than 1200 km were made after 1825, implying an MUF that was approaching 200 MHz. The lone 222-MHz two-way took place at 1832. Two-meter contacts continued for another 45 minutes, as the active region appeared to take a more northwesterly track. Stations as far westward as Colorado were able to take part in the opening during this final phase.

Chip Margelli, K7JA (DM03), reported a more modest 2-meter E_s the previous day, at 0125 July 8. He and WB6NOA (DM13) hooked up with N0LL (EM09). The entire opening lasted fewer than 15 minutes.

Tropospheric Ducting

A tropospheric duct extended along the East Coast from North Carolina to Nova Scotia over the weekend of July 21-22. Signals were strong on 144 to 1296 MHz, even if most contacts were shorter than 1000 km. K4QI (FM06) in North Carolina worked VE1IW (FN84) on 144 MHz over a 1660-km path, probably the longest link of the opening.

Tropospheric conditions were also good across the upper Mississippi valley on July 29 and 30. Stations as far-flung as northern Michigan, Manitoba, western Kansas, Tennessee and western New York were able to make 144 and 432-MHz contacts over 1000 to 1400-km paths. N8PUM (EN66) worked N0KQY (DM98) on 144 and 432 MHz for his longest QSOs of the opening. VE4MA (EN19) hooked up with stations as far southward as Illinois and Indiana, including N9LR (EN50) on both 144 and 432 MHz and WB9Z (EN60) on 144 MHz. WB9UWA (EN50) made it as far as western New York (FN12) on 144 MHz and completed with VE3AX (FN02) while running just 35 W.

VHF/UHF/MICROWAVE NEWS

The Mt Airy Radio Club hosts the 25th Mid-Atlantic States VHF Conference on October 13, 2001, at the Radisson North East Hotel in Trevose, Pennsylvania. The Hamarama Hamfest opens the following day at 8 AM. Details can be found on the Pack Rats Web page at **www.ij.net/packrats/** or contact John Sorter at **JohnKB3XG@aol.com** or call 610-505-6940.

FEEDBACK

K7RWT should have been included in Table 2 in September's column, which featured 6-meter contacts from the Pacific Northwest to Europe on June 10. K7RWT (CN85) made two QSOs into the Netherlands (PA) and Belgium (ON) between 1742 and 1750. QST

VHF/UHF CENTURY CLUB AWARDS

Beverly Fernandez, N1NAV
Senior VUCC Technician

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid locators (indicated in *italics*) for each band listing. The numbers preceding the call signs indicate total grid locators claimed. The numbers following the call signs indicate claimed endorsement levels. The totals shown are for credits given from June 13, 2001 to August 10, 2001.

The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on *ARRLWeb* at **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

1126 K8ROX
1127 W6OMF
1128 K1ZN
1129 AA7A
1130 KC0BMF
1131 K5GMX
1132 NH6CJ
ZS6WB 500
K0CS 400
WA0FQK 125
K1WVX 350
KB2TGU 300
WA2HFI/0 300
WT3P 200
W3HHN 350
N3AO 100
N4MM 725
KE4SCY 200
AB5A 250
K6IPF 325
WX7M 300

Satellite
100

107 W3BW
108 K6CCC
K5OE 500
W5ADC 200

QST

How Much is Too Little? The Wilderness SST

I gently finessed the frequency control on the Wilderness Radio SST, carefully tuning for stations in the on-air bedlam called the CQ WPX Contest. Twenty meters was crowded…really crowded. The limited tuning range and sharp IF filter of the SST made the job of finding stations a little more challenging than normal.

Ah! There's OK1CF calling CQ TEST, nice and loud at about 30 WPM. I hit the button on the Logikey K-3:

K7SZ
K7SZ 599 337
RR 599 001 TU GL
K7SZ TU CQ TEST OK1CF

And so it started. On a whim I had decided to put the SST-20 on the air for the WPX contest just to see what the little rig was capable of doing. Over the next 46 minutes I worked 20 Qs, all DX contacts but 3. Most of the stations responded to my call on the first attempt. Oh, I forgot to mention, I was running only *900 milliwatts*! Of course the TH7 helped, but that only made up about 5 dB, so my ERP was slightly over 3 W, neglecting transmission line losses.

Over the course of the 48-hour contest I managed a total of 2 hours and 18 minutes of operating time, which netted 50 contacts, 24 DXCC entities, four continents and a whole lot of F-U-N! After the milliwatting experience was over, I sat back, truly amazed at the performance of this tiny transceiver.

Recently, I had rediscovered this QRP transceiver kit from Wilderness Radio. In 1997, Team Wilderness shrank the extremely popular NorCal-40A to produce the Simple Superhet Transceiver or SST. Designed by Wayne Burdick, N6KR, as the "ultimate" backpacking rig, this little monobander is just the ticket for those who desire an extremely compact, low power radio for use on the trail.

The SST comes in three flavors—40, 30 and 20 meters. It features a three-pole IF crystal filter and VXO tuning, which is restricted to about 6 or 7 kHz on 40 meters, 10 or 11 kHz on 30 meters, and about 15 kHz on 20 meters, depending upon which varactor diode is used in the kit. There are mods available to expand this tuning range, and we'll look at those a bit later.

There is plenty of audio to drive a pair of stereo headphones. The SST boasts a RF gain control, front panel volume control, AGC circuitry, signal indicator LED, and only 16 mA current drain on receive! Power output is variable from below 300 mW to about 2 W on most models. There are also several published mods that detail how to get slightly more power output from the SST. Basically this consists of dropping the value of R10 on pin 2 of the Buffer/Drive U5 to 150 or 120 Ω and replacing the RF amp with an MRF-237.

Specs on the SST were included in a *QST* article,[1] but I'll highlight some of them here for reference: Receive sensitivity: –139 dBm, Blocking dynamic range: 112 dB, IMD dynamic range: 92 dB. Now remember, this is a "Minimalist Radio" with a very small parts count. In my on-air tests, the SST receiver proved to be a darned good performer, all things considered. Lab specs are fine, but they really don't tell the whole story. There are those who will disagree with this last statement, but remember, we are working with a very simple superhet design with a nominal parts count. While there *are* design trade-offs with the SST, it's operator skill that ultimately prevails.

[1]Notes appear on page 95.

The SST is normally powered from a dc supply between 10 and 16 V or you can use a 9-V lithium battery with a small change in circuitry, as outlined in the manual. The lithium battery can then be placed inside the SST case, producing a very compact, portable CW station.

The "Minimalist Concept"

Although the SST is at home on the trail, it has also picked up quite a following among QRPers who use it in the ham shack. The idea of using a simple rig like the SST to pursue ham radio has a certain romantic appeal to many QRPers. After all, didn't our ham radio forefathers accomplish seemingly impossible feats of long-haul communications using primitive equipment? With the SST that thrill is back! Just ask Ade Weiss, W0RSP, who recently worked DXCC on 30 meters using a Wilderness SST for one third of the contacts. Way to go, Ade! The SST seems to have acquired cult status among other QRPers I've talked to. This is one fun radio!

Currently, the K7SZ shack is home to both a 30- and a 20-meter version of this tiny rig. I use them for portable work as well as some genuine fun using my 40-meter Extended Double Zepp and TH7 Yagi. The performance of the SST, when I'm using a really good antenna, is amazing. Both of my SSTs have the power output dialed back to 1.5 W, which is more than adequate for general CW contacts and can, upon occasion, bust a pileup.

Mods Anyone?

The SST positively screams to be modified.[2] Not that the rigs aren't usable

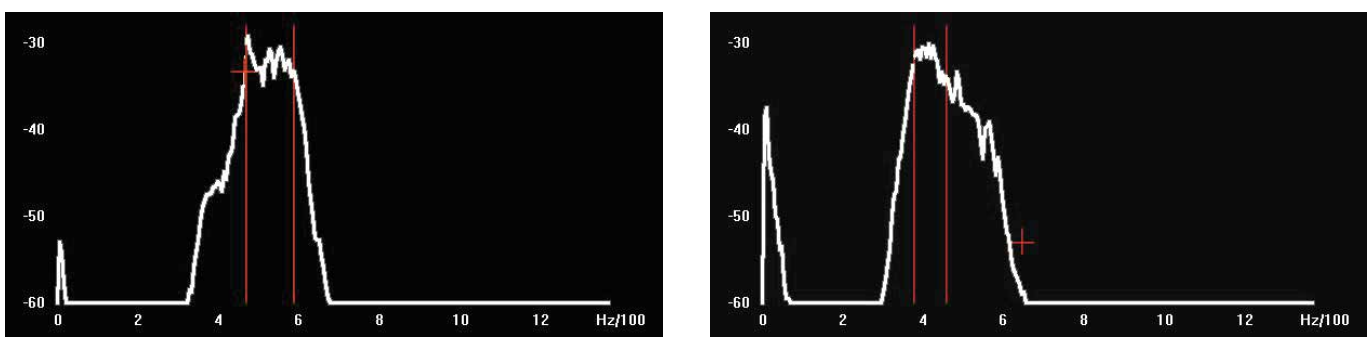


Figure 1—At A, the response of the stock SST filter. At B, the SST filter response after it was modified per the SST manual. Notice that the center frequency dropped after the mod. For that reason, I went back to the normal filter and learned to tune slowly.

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

The SST-20, with the dual varactor diodes and switching arrangement visible—before the K1EL keyer module was installed.

Both the 20- and 30-meter SSTs have custom aluminum knobs—a nice touch.

in the stock configuration. A few simple circuit changes will yield a much more "creature friendly" radio, however. My SST-30 is one of the original kits first produced in 1997, while my SST-20 is from the latest production run. There were some circuit changes between these two production models.

One of the first mods I performed was to increase the IF bandwidth by replacing the four capacitors in the crystal filter. Figure 1A shows the IF bandwidth of the stock SST IF filter as per the kit. Notice that this is an extremely narrow filter and tuning becomes critical with such a narrow passband. Figure 1B shows the modified filter passband using the values suggested in the manual.

While I do not really like the stock filter, looking at the two Spectragram displays, you can see that, after the mod, the overall passband has widened somewhat, but the center frequency has shifted downward considerably. After additional experimentation, I decided to go back to the original design.

Mod number two: adding a 1-µF electrolytic capacitor to pin 7 of the LM386 audio amplifier to reduce instability under large signal loads. This was done on the SST-30 *only*, as the later production rigs have a 2.2-µF electrolytic cap included on the board.

The SST-20 was a very different story. Even with the 2.2-µF cap from pin 7 to ground, the receiver would break into oscillation on loud signals. Out of desperation, and after a lot of troubleshooting, I replaced the LM386 audio amp chip (I know, I know, they *never* go bad!) and increased the bypass cap to a 10-µF tantalum before I was able to tame this critter.

The SST has an input for a straight key but not for paddles, so I added a $^1/_8$-inch stereo jack on the rear panel for the paddle input and mounted a K1EL K-9 memory keyer[3] inside the SST. This nifty little PiC keyer is on a small circuit board that tucks nicely into almost any rig needing an internal memory keyer.

I definitely wanted more tuning range, especially on the SST-20. A SPST toggle switch was added to the front panel to switch between the two varactor diodes and provide an expanded tuning range. In addition to using both varactors, I also added a second 18-MHz crystal in parallel to the original 18-MHz VXO crystal, to further increase the tuning range. This mod is not without some experimentation. Adding the second crystal can easily result in a tuning range in excess of 50 kHz! This makes tuning very difficult.

Reducing the modified tuning range requires juggling the value of RFC3. The maximum tuning range for the 270 degree potentiometer supplied with the kit is about 30 kHz. I followed Cam Hartford's, N6GA, advice and reduced the value of RFC3 from 5.6 µH to about 4.7 µH. The total VXO swing, switching between the two varactor diodes, is about 28 kHz and offers coverage from 14.038 to 14.066 MHz with only 3 kHz of overlap. Not too bad for a crystal controlled rig!

Soldering an 18-kΩ resistor across the 10-kΩ main tuning potentiometer (from the wiper to the high side of the control) does a lot to linearize the tuning. This results in signals that are spread out over the rotation of the tuning control and not bunched up at one end or the other.

Neither varactor diode would give me the tuning range I wanted (10.105 to 10.118 MHz) on the SST-30. I substituted another 14.318 MHz crystal (20 pF load capacitance), for the standard series crystal furnished with the kit, but still had the same tuning range. I didn't want to use a switch to select between the two diodes, so I paralleled a second crystal across the existing one and ended with a range of 10.097 to 10.120 MHz, using the MV-209 varactor. This was ideal for what I needed so I left well enough alone, although I did have to reduce RFC3 from 12 µH to 9.5 µH using a 6.8-µH and a 2.7-µH inductor in series. No linearizing resistor was needed on the SST-30 as the rig produced a tuning range of about 11 kHz on each side of the control.

I have used both rigs to work lots of DX contacts as well as two way QRP QSOs. There is really nothing quite like the SST. It's a perfect blend of simple, analog technology and gutsy design. Its diminutive size belies its capabilities. This little rig's got a lotta heart!

In conclusion, the Wilderness Radio SST kit offers both the neophyte and the experienced home-brewer a great project that combines innovative engineering with an RF platform that begs to be modified. Can this Minimalist Rig be considered a "real radio"? I definitely think so, and so do many others who've followed my comments and exploits on the QRP-L Reflector.[4] Once you build and modify a SST, you will have the satisfaction of using a rig that is tailored precisely to your particular operating style. The price is definitely right: $89 including Priority Mail shipping. Contact "QRP Bob" Dyer, KD6VIO, at Wilderness Radio, PO Box 734, Los Altos, CA 94023-0734, tel 650-494-3806 or drop by the Wilderness Radio Web site at **www.fix.net/jparker/wild.html** for a look at the SST and the rest of the Wilderness product line.

Notes

[1]Tracy, M., KC1SX, "QRP Transceiver Kits: Six Reports from the Field," *QST*, Dec 2000, pp 28-32.

[2]AL7FS cumulative e-mail message archive regarding SST mods is available from the G3YCC Web page at **www.g3ycc.karoo.net**

[3]K1EL Keyers: **members.aol.com/k1el/** for the latest on keyers and RTTY firmware.

[4]To subscribe to the QRP List Reflector, send an untitled message to the listserver: **listproc@lehigh.edu** and in the text say "subscribe qrp-l." The listserver sends back a confirmation message; once you reply, you will be added to the list. QST

COMING CONVENTIONS

HAWAII STATE CONVENTION

October 13, Honolulu

The Hawaii State Convention, sponsored by the Koolau ARC, will be held at the Rainbow Marina Community Center at Pearl Harbor, next to the *Arizona* Memorial visitor entrance. Doors are open 7:30 AM to 5 PM. Features include flea market, vendors, manufacturer displays, VE sessions (7:30 AM, reservations recommended), technical presentations (with Ed Hare, W1RFI, ARRL Hq Lab Supervisor), forums, information tables for most Oahu Radio Clubs, handicapped accessible, free parking, refreshments. Talk-in on 146.58. Admission is $2 (single), $5 (family). Tables are $5 (8-ft). Contact Walt Niemczura, AH6OZ, 812A N Kalaheo Ave, Kailua, HI 96734; 808-263-3872; **ah6oz@arrl.net**; **www.pilikia.net/karc/hamfest**.

PACIFIC DIVISION CONVENTION

October 19-21, Concord, CA

The Pacific Division Convention (Pacificon 2001), sponsored by the Mt Diablo ARC, will be held at the Sheraton Hotel at Concord's Buchanan Airfield, Concord Ave; E on Concord Ave from Hwys 242 or 680; about 28 miles E of San Francisco. Doors are open Friday 8 AM to 10 PM, Saturday 6 AM to midnight, Sunday 7 AM to 3 PM. Features include opening breakfast (Saturday, 6:45 AM, $12.50; special guest speaker Riley Hollingsworth, K4ZD, Special Counsel for the FCC Enforcement Bureau), vendors, exhibitors, forums and seminars, antenna seminar (Friday, 8 AM to 5 PM, $10), Exhibitor "shootout" (Friday, 7:30-10 PM), T-hunts (beginner and advanced), banquet (Saturday, 7 PM, $35; special guest speaker ARRL President Jim Haynie, W5JBP), Special Events Station, satellite station, Wouff-Hong ceremony, Scout Jamboree on-the-Air station, ATV coverage, VE sessions (Saturday and Sunday, 9 AM to noon; Technician through Extra Class, nominal fee). Talk-in on 147.06. Admission is $10 in advance, $15 at the door. Contact Terry Matzkin, KE6WRE, c/o PACIFICON, Box 272613, Concord, CA 94527-2613; 925-820-5848 or 925-932-6125; **tickets@pacificon.org**; **www.pacificon.org**.

September 22-23
Virginia State, Virginia Beach*

October 7
Connecticut State, Wallingford*

November 17-18
Indiana State, Fort Wayne

December 1-2
Southeastern Division, Palmetto (Tampa), Florida

***See September *QST* for details.**

GEORGIA STATE CONVENTION

November 3-4, Lawrenceville

The Georgia State Convention, sponsored by the Alford Memorial RC, will be held at the Gwinnett County Fairgrounds, 2405 Sugarloaf Parkway; from I-85 southbound, take Hwy 20 to Sugarloaf Parkway. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 3 PM. Features include flea market, tailgating, major manufacturers, exhibitors, commercial vendors, forums, contests, camping, refreshments. Talk-in on 146.76. Admission is $6 in advance, $8 at the door ($6 for students, under 12 free). Tables are $20 (flea market), $85 to $105 (exhibitors). Contact Randy Bassett, KR4NQ, Box 1282, Stone Mountain, GA 30086-1282; 770-663-4244 (x-3989); **kr4nq@bigfoot.com**; **www.totr.radio.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

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 **October 1** to be listed in the **December** 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 (Dothan)—Sep 29;** setup Friday 3-8 PM, Saturday 6-8 AM; public Saturday 8 AM to 3 PM. *Spr:* Wiregrass ARC. Wiregrass Recreation Center, 6th Ave. Vendors, computers, VE sessions (promptly at noon; preregister, send business SASE to George Stokes, WA4MZL, 507 Santolina Rd, Dothan, AL 36303), free parking, free coffee. *TI:* 145.43, ragchew 147.34. *Adm:* $3. Tables: $13 (6-ft, wall with power, limited number), $9 (center); chairs provided while available (Stanley Harrell, KE4WDG, 334-677-5547; **ke4wdg@aol.com**). Kari Davis, KD4EXZ, 1822 W Cook Rd, Dothan, AL 36301; 334-677-7485.

†**Alabama (Montgomery)—Nov 10;** setup Friday 3-8 PM, Saturday 6-8 AM; public 9 AM to 3 PM. *Spr:* Montgomery ARC. S Alabama State Fairgrounds, Garrett Coliseum, Federal Dr; I-65 to Exit 6, go W on Eastern Bypass to Hwy 231 N Exit (about 3 miles), take left at light, go about 2 miles to Fairgrounds on right. Hamfest/Computer Show, inside flea market, tailgating ($5 per vehicle space), vendors, forums, VE sessions (8 AM, on site; bring original and copy of your current license, picture ID, $3 fee), RV and camper hookups, free parking. *TI:* 146.84, 146.92 (Ragchew), 147.18, 444.5, 444.45. *Adm:* $5. Tables: advance $13 (by Nov 5), $15 (after Nov 5). Phil Salley, K4OZN, 7173 Timbermill Dr, Montgomery, AL 36117; 334-272-7980 (after 5 PM CST); **k4ozn@arrl.net**; **w4ap.org**.

Arkansas (Bentonville)—Sep 22. BCRO (Shirley), 501-451-8626.

California (Concord)—Oct 19-21, Pacific Division Convention. See "Coming Conventions."

†**Colorado (Golden)—Oct 20,** 8 AM to 2 PM. *Spr:* Rocky Mountain Radio League. Jefferson County Fairgrounds, 15200 W 6th Ave; Indiana Exit from 6th Ave. ARRL forum (9 AM), VE sessions (10 AM), refreshments. *TI:* 145.22. *Adm:* $4. Tables: $10. Ron Rose, N0MQJ, 13481 W Alaska Pl, Lakewood, CO 80228; 303-985-8692; **n0mqj@arrl.net**; **rmrl.hamradios.com**.

†**Colorado (Longmont)—Sep 23,** 8 AM to 1 PM. *Spr:* Boulder ARC. Boulder County Fairgrounds, Nelson and Hover Rds; I-25 to Exit 240, W on Hwy 119 (becomes 3rd Ave), W on 3rd Ave to Main St (Hwy 287), S on Main St to Florida Ave, W to corner of Nelson and Hover Rds. Demos and forums (Microwave, QRP, PSK-31, DX), VE sessions. *TI:* 146.7. *Adm:* $5 (adults), $3 (ages 13-17), under 13 free. Tables: advance $10, door $15 (plus admission). Randy Cassingham, K0RCC, Box 17362, Boulder, CO 80308-0362; 303-664-5366; **k0rcc@thisistrue.com**; **www.thisistrue.com/barc.html**.

†**Connecticut (Waterford)—Oct 27;** setup 9 AM; Auction starts 10 AM. *Spr:* Tri-City ARC. Senior Citizens Center, Waterford Municipal Complex, Rte 85; S of Exit 77 off I-395 or N of Exit 82 off I-95. Auction (bring your items to be auctioned), handicapped accessible, refreshments. *TI:* 146.97 (156.7 Hz). *Adm:* Free (Bid Cards $1 each). Darryl DelGrosso, WA1DD, 860-443-7799; **DDelgrosso@aol.com**.

Florida (Jacksonville)—Oct 6. Willis Layfield, KD4UJK, 904-765-1104.

†**Florida (Jacksonville)—Oct 27;** setup Friday 3-9 PM, Saturday 6:30 AM; public 8 AM. *Spr:* Greater Jacksonville Hamfest Assn. Morocco Shrine Auditorium, 3800 St John's Bluff Rd, S of Beach Blvd (US 90), just N of The University of North Florida Campus; I-95 S to JTB (John T Butler), turn left, go approximately 3 miles to St John's Bluff Exit, turn left, go 4 miles to Auditorium on left. Major commercial booths (Richard Smythe, KF4PBL, 904-739-9713; **rsmythe2@bellsouth.net**), dealers, swap tables (Bill Lenoir, KE4HQG, 904-272-0944; **ke4hqg@aol.com**), tailgating (Gordon Mason, WB4JQZ, 904-269-8714; **gdmascop@mediaone.net**), forums, VE sessions, refreshments. *TI:* 146.76. *Adm:* advance $5, door $6. Deborah Lusk, KG4ADZ, 4473 Hudnall Rd, Jacksonville, FL 32207; 904-739-9713; **rsmythe2@bellsouth.net**; **www.jacksonville.net/~lrich/JAXHAMFEST.html**.

†**Florida (Ormond Beach)—Sep 29;** setup 7 AM; public 9 AM. *Spr:* Daytona Beach ARA. 1098 N US Hwy 1 (Hwy in Ormond Beach), approximately 1/2 mile N of Iron Horse Saloon. Exhibitors, VE sessions (10:30 AM). *TI:* 147.15 (107.2 Hz). *Adm:* $3. Tables: $5. John Munsey, KB3GK, 19 China Moon Dr, Ormond Beach, FL 32174; 904-677-8179; **munseyj@mindspring.com**; **dbara.org**.

Florida (Plantation)—Oct 13. Robin Terrill, N4HHP, 954-583-3625.

†**Florida (Port St Lucie)—Nov 10,** 6 AM to 2 PM.

†ARRL Hamfest

Gail Iannone ♦ Convention Program Manager

Spr: Port St Lucie ARA. St Andrew's Church, 295 NW Prima Vista Blvd; from I-95 take Exit 63C, go E to Church; from US 1 go to Prima Vista Blvd to Church. Free parking, refreshments. *TI:* 146.955. *Adm:* $3 each, 2 for $5, 5 for $10. John Cruz, KT4VI, 1004 Sunrise Blvd, Fort Pierce, FL 34950; 561-465-9533; **brothercruz@cs.com**.

Florida (Starke)—Oct 13. John Bradley, KU4AY, 904-782-1185.

†**Florida (Tampa)—Oct 13,** 8 AM to 3 PM. *Spr:* Egypt Shrine Temple Radio Assn. Egypt Shrine Temple Complex, 4050 Dana Shores Dr, W side of Tampa International Airport; FL 60 to Eisenhower Blvd to George Rd, turn left and go to 1st stop sign, turn right to Dana Shores Dr to Complex. Inside air-conditioned flea market, tailgating ($5 plus admission), forums, DXCC card checking, VE sessions. *TI:* 146.94. *Adm:* $5. Tables: $10. Keith Dean, KA4JLW, Box 4500, Tampa, FL 33677-4500; 813-879-2449; **kwdean@gte.net**.

†**Florida (Umatilla)—Nov 3.** *Spr:* Lake ARA. Umatilla High School Annex, 200 Block Central Ave; located on Hwy 19, directly across from Umatilla Police Station. Inside vendors, outside tailgating ($7), VE sessions. *TI:* 147.255. *Adm:* $5. Tables: $10. John Gabele, W8KCE, 11146 Springdale Ave, Leesburg, FL 34788; 352-394-2723; **w8kce@aol.com**; **www.qsl.net/k4fc**.

†**Georgia (Augusta)—Oct 13;** setup Friday 6-8 PM, Saturday 6-9 AM; public 9 AM to 3 PM. *Spr:* ARC of Augusta. Evans Middle School, 4318 Washington Rd. New and used equipment vendors, dealers, tailgating, forums (ARRL, ARES), VE sessions (9 AM). *TI:* 145.49. *Adm:* $5. Tables: $10 (plus admission). Henry Arostegui, KN4AV, 2013 Ashley Dr, Augusta, GA 30906; 706-793-1625 (home) or 706-796-5472 (work); **kn4av@bellsouth.net**.

Georgia (Lawrenceville)—Nov 3-4, Georgia State Convention. See "Coming Conventions."

†**Georgia (Rome)—Oct 20-21;** 8 AM to 5 PM. *Spr:* Northwest Georgia ARC. Rome Memorial Gymnasium at Barron Stadium, 201 W 3rd St; 1 block N of Broad St, between N 2nd Ave and 5th Ave in downtown Rome. Swap and Shop, commercial vendors, dealers, antique radio display, VE sessions, tailgating (free), Special Event Station, free parking, refreshments. *TI:* 146.94 (88.5 Hz). *Adm:* Free. Tables: Free (first-come, first-served). Ed Byars, WB4FGM, 12 Azalea St SE, Rome, GA 30161; 706-235-2048; **biged5341@aol.com**; **www.wavegate.com/~chall/Home.html**.

Hawaii (Honolulu)—Oct 13, Hawaii State Convention. See "Coming Conventions."

†**Illinois (Beardstown)—Oct 7,** 8 AM to 5 PM. *Spr:* Illinois Valley ARC. UFCW Union Hall Local 431, Arenzville Rd; 1/2 mile S of Rte 125 (across from Excel Plant). Swapmeet, vendors, VE sessions (by reservation only; Tim Childers, KB9FBI, 217-245-2061; **kb9fbi@arrl.net**). *TI:* 146.715 (103.5 Hz), 443.95. *Adm:* $3. Tables: vendors must provide their own. Butch Tritsch, KB9LZP, RR 1, Box 31B, Frederick, IL 62639; 217-322-2803; **bruce@jacil.org**.

Illinois (Decatur)—Oct 7. Jerry Sebok, N9RBQ, 217-423-2095.

†**Illinois (Godfrey)—Oct 20,** 8 AM. *Spr:* Lewis and Clark RC. Lewis and Clark Community College, River Bend Arena, 5800 Godfrey Rd; on US Rte 67, 25 miles N of downtown St Louis, MO and 4 miles N of Alton, IL. Indoor flea market, commercial vendors, ARRL booth, VE sessions (all classes; preregistration required for "no code" exams, walk-ins accepted for all other exams; Richard Morgan, KF9F, 618-466-2306), handicapped parking, free parking, refreshments. *TI:* 145.23. *Adm:* advance $2 each or 3 for $5; door $3 each or 2 for $5. Tables: $10 (618-254-9465). Dennis Hutchins, WA9RD, Box 553, Godfrey, IL 62035; 618-377-5033. **dhutchins@mtsinet.com**; **www.ezl.com/~lmiller/lcrc.html**.

†**Illinois (Oakbrook Terrace/Chicago)—Oct 14;** setup 7 AM; public 8 AM to 1 PM. *Spr:* Chicago ARC. Entrance at Park View Dr, N from Cermak Rd (22nd St), 1 block W of Rte 83. Vendors, tailgating, free paved parking. *Adm:* advance $4, door $5. Tables: free space (bring your own tables). Melissa Meneely, KB9QWZ, c/o CARC, Box 410535, Chicago, IL 60641-0535; 773-384-7514; **carc_inc@hotmail.com**; **www.chicagoarc.com**; or Dean, NB9Z, 708-331-7764.

†**Illinois (Salem)—Oct 13,** 8 AM to 1 PM. *Spr:* Centralia Wireless Assn. Salem Community Activity Center, Oglesby St; Rte 37 N to Oglesby St. Dealers, vendors, tailgating, refreshments. *TI:* 147.27. *Adm:* $2 each or 3 for $5. Tables: $10. Daisy King, AA9EK, 776 Bethel Rd, Sandoval, IL 62882; 618-532-6606; **bking@accessus.net**.

†**Iowa (Davenport)—Nov 4,** 8 AM to 2 PM. *Spr:* Davenport RAC. Mt Joy Airport National Guard Hangar; 1/2 mile N of I-80 and 1/2 mile W of Hwy 61. Hamfest/Computer/Electronics Flea Market, vendors, free parking. *TI:* 146.88, 146.64. *Adm:* advance $5, door $6. Tables: $12 (8-ft, electrical hookup $1 additional). Dave Mayfield, W9WRL, 1819 7th St, Moline, IL 61265; 309-762-6010 or hamfest line 309-757-1880; **hamfest@gwltd.com**; **www.w9wrl.com/hamfest**.

Iowa (Des Moines)—Oct 28. Rod Ivers, KI0BW, 515-278-9945.

†**Kansas (Holton)—Oct 6,** 6 AM to 6 PM. *Spr:* Atchison County ARC. Jackson County 4-H Fairgrounds, intersection of US 75 and K-16 Hwys; I-70 to Topeka, Exit 358 to US 75 N, approximately 33 miles on US 75 N to Holton. Tailgating ($3 under cover, $1 outdoors; both include 1 admission), APRS demonstration. *TI:* 146.775. *Adm:* $1. Joel Breakstone, K1CQ, Box 73, Valley Falls, KS 66088; 785-945-3763; **joel@ksdot.org**.

†**Louisiana (Lake Charles)—Oct 20,** 8 AM to 3 PM. *Spr:* Southwest Louisiana Amateur Repeater Club. Habibi Shrine Temple, 2928 Pack Rd; off Hwy 171, 3 miles N of I-10, at Exit 33. Flea market, swap tables, dealers, VE sessions, LCARC information meeting, campsites, refreshments. *TI:* 146.72. *Adm:* Free. Tables: $15 ($5 additional for power). Charlie Blankenship, WB5NXD, Box 7244, Lake Charles, LA 70665; 337-478-7566; **wb5nxd@yahoo.com**.

Massachusetts (Cambridge)—Oct 21. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Michigan (Kalamazoo)—Oct 21;** setup 6 AM; public 8 AM to 3 PM. *Sprs:* Kalamazoo ARC and SW Michigan AR Team. Hazel Grey Bldg at Kalamazoo County Fairgrounds, 2900 Lake St; I-94 to Sprinkle Rd (Exit 80 N), Sprinkle Rd to I-94 Bus Loop, left to Olmstead Rd to Lake St to Fairgrounds. Hamfest/Computer Show, ICOM representative will be in attendance, trunk sales ($5 per space), VE sessions (George, **k8gar@arrl.net**), campsites with electricity and water, free parking, refreshments. *TI:* 147.04. *Adm:* advance $3, door $4. Tables: $12 (8-ft). Charlie Burgstahler, K8BLO, 6658 Carlisle, Kalamazoo, MI 49048; 616-349-4041; **charlieb@net-link.net**; **www.qsl.net/k8blo/hamfest.htm**.

†**Michigan (Lansing)—Oct 14;** setup 6 AM; public 8 AM to 2 PM. *Sprs:* Central Michigan ARC and Lansing Civil Defense Repeater Assn. The Summit, in Capital Centre, 9410 Davis Hwy (Dimondale); Exit 98B off I-96 (Lansing Rd N), go 1/8 mile E to The Capital Centre entrance. Complete indoor Amateur Radio and Computer Swap, vendors, VE sessions (registration 9:30 AM, testing at 10 AM, walk-ins welcomed but pre-registration is strongly recommended; 517-589-5263; **n8vys@voyager.net**), ARRL forum (9:30 AM), Weather forum (11 AM, with Kaz Fujita, son of the late Tetsuya Fujita, the man who originated the "F Scale"), Fresh Water DXpedition forum (12:30 PM). *TI:* 145.39, 146.52. *Adm:* advance $5, door $6, under 13 free. Tables: advance $10.50, door $12.50. J. Ervin Bates, W8ERV, Box 27321, Lansing, MI 48909-7321; 517-676-2710; **w8erv@arrl.net**; **www.qsl.net/lcdra/hamfair.org.html**.

†**Michigan (St Joseph/Benton Harbor)—Nov 4,** 8 AM to noon. *Spr:* Blossomland ARA. Playland Bingo Hall, 1050 E Nickerson Ave; take I-94 to Exit 28, then N 1/2 mile on M139 to Nickerson, E on Nickerson, 1/4 mile to Playland Hall on right. VE sessions. *TI:* 146.82. *Adm:* advance $3, door $4. Tables: advance $4, door $5. Duane Durflinger, KX8D, 1051 Main St, St Joseph, MI 49085; 616-982-0404; **comdac@comdac.com**; **www.comdac .com/bara**.

†**Michigan (Warren)—Oct 21,** 8 AM to 1 PM. *Spr:* Utica Shelby Emergency Communications Assn. Italian/American Cultural Center, 28111 Imperial Dr; I-696 to Exit 24 (Hoover Rd), N on Hoover to 12 Mile Rd, E on Hoover past hospital to Imperial Dr, S 1 block on Imperial Dr. Indoor swap, seminars (PSK-31, APRS, others), VE sessions (9 AM), refreshments. *TI:* 147.18 (100 Hz). *Adm:* $5. Tables: first $15, additional $10 each. Delphine Wrona, KC8JSH, 17516 Brill Dr, Clinton Twp, MI 48035; 810-791-4669; **delwrow@att.net**; **www.useca.org**.

†**Minnesota (St Paul)—Oct 27,** 8 AM to 3 PM. *Spr:* Twin City FM Club. St Paul River Center, Kellogg and W 7th St; Marion St/Kellogg Blvd Exit off I-94. Hamfest/Computer Expo, flea market, vendors, seminars, VE sessions. *TI:* 146.76. *Adm:* advance $6, door $8. Tables: $20. Amanda Roberts, KG0AY, 3153 263rd St W, Northfield, MN 55057; 651-460-6050; **kg0ay@pclink.com**; **www.hamfestmn.org**.

†**Mississippi (Starkville)—Sep 29,** 9 AM. *Spr:* ARRL Mississippi Section. McKee Park, adjacent to MFJ Plants. Annual ARRL "Day in the Park." Tailgating, tour of MFJ plants, refreshments. *Adm:* Free. Malcolm Keown, W5XX, 14 Lake Circle Dr, Vicksburg, MS 39180-9715; 601-636-0827 (home) or 601-634-3232 (work); **w5xx@arrl.org**.

†**Missouri (St Louis)—Oct 27,** 7:30 AM to 1 PM. *Sprs:* St Louis ARC and Gateway to Ham Radio Club. Kirkwood Community Center, 111 N Geyer Rd; I-270, S from I-64, Dougherty Ferry Rd, E to Geyer Rd, S to hamfest. Halloween Hamfest, indoor swap tables, forums, VE sessions, refreshments. *TI:* 146.91. *Adm:* advance $1 each or 6 for $5; door $2 each or 3 for $5. Tables: commercial $15 (with electricity), noncommercial $10. Steve Welton, W0SLW, 9847 Arv-Ellen Dr, Affton, MO 63123; 314-638-4959; **slw@partyline.net**; **www.halloweenhamfest.org**.

†**New Jersey (Washington Township)—Oct 6,** 8 AM to 2 PM. *Spr:* Bergen ARA. Westwood Regional High School, 701 Ridgewood Rd; from Rte 17 N or S to Linwood Ave, go E to Pascack Rd, N on Pascack, 1/4 mile to Ridgewood Rd, E on Ridgewood to High School. Vendors ($10 per space), VE sessions (8-10 AM only; bring original FCC license, a photocopy, positive ID), DX card checking, lots of parking, refreshments. *TI:* 146.79. *Adm:* $5 (nonham spouses and children free). Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Washington Township, NJ 07676; 201-664-6725; **jjjoyce@cybernex.net**; **www.bara.org**.

†**New Mexico (Deming)—Sep 22,** 7 AM. *Spr:* Deming ARC. Old K-Mart Building Parking Lot, 2320 E Motel Dr and Country Club Rd. Tailgate only ($2.50 per space), free Friday night camping, free parking, free coffee and donuts. *TI:* 146.82. *Adm:* Free. Millie Gromatzky, KA7LYR, 1803 S Shelly Dr, Deming, NM 88030; 505-544-4298; **kw7d@swnm.com**; **www.zianet.com/darc**.

†**New Mexico (Socorro)—Oct 27,** 8 AM to 4 PM. *Sprs:* Socorro ARA, NM Tech ARA, and the City of Socorro. NM National Guard Armory, US 60 W; go W on Hwy US 60, Armory on left past Socorro Hospital. Swapfest, dealers, tailgating ($5), lectures and presentations (HF operations, satellite operations, DXing, Morse Code), ARRL forum, 2-meter foxhunt, VE sessions (noon; registration starts at 8 AM). *TI:* 146.68 (100 Hz). *Adm:* Free. Tables: $5. Al Braun, AC5BX, 722 California St, Socorro, NM 87801; 505-835-3370; **ac5bx@juno.com**; **www.ees.nmt.edu/sara/hamfest.html**.

†**New York (Lake Placid)—Oct 13,** 8 AM to 4 PM. *Spr:* Northern New York ARA. Lake Placid Horse Show Grounds, Rte 73; from the S take Exit 30 on Northway, stay on Rte 73, Show Grounds are across from Sky Jumps. Hamfest/Computer Show, commercial vendors, seminars, Special Events Station, VE sessions. *TI:* 145.11 (123.0 Hz). *Adm:* advance $3, door $4. Tables: Free. Chuck Orem, KD2AJ, 3981 State Rte 22, Plattsburgh, NY 12901; 518-563-6851; **kd2aj@arrl.net**; **www.geocities.com/nnyara**.

†**New York (Lindenhurst)—Oct 28;** setup 7 AM; public 9 AM to 2 PM. *Spr:* Great South Bay ARC. Knights of Columbus Hall, 400 S Broadway. Flea

information, refreshments. *TI:* 146.685 (136.5 Hz). *Adm:* $6. Tables: advance $18, door $25 (6-ft, includes 1 admission, limited electricity available; Walter Wenzel, KA2RGI, 631-957-0218). Lenore Dunlop, N2KYP, c/o GSBARC, Box 1356, W Babylon, NY 11704; 631-785-0826; **info@gsbarc.org**; **www.gsbarc.org**.

New York (Pompey Hills)—Oct 6. RAGS, 315-698-4558.

†**New York (Queens)—Oct 21;** setup 7:30 AM; public 9 AM to 3 PM. *Spr:* Hall of Science ARC. NY Hall of Science Museum Parking Lot (Flushing Meadow Corona Park), 47-01 111th St. Electronics and computer equipment, commercial dealers, tailgating ($10 per space), ARRL info, VHF tune-up clinic, VE sessions (10 AM; Lenny Menna, W2LJM, 718-323-3464, leave message), free parking, refreshments. *TI:* 444.2 (136.5 Hz), 146.52. *Adm:* $5, under 12 free. Stephen Greenbaum, WB2KDG, 85-10 34th Ave, Jackson Heights, NY 11372; 718-898-5599 (eves only); **wb2kdg@bigfoot.com**; **www.qsl.net/hosarc**.

†**Ohio (Ashland)—Oct 14,** 8 AM to 2 PM. *Spr:* Ashland Area ARC. Ashland County Fairgrounds, 2042 Claremont Ave; I-71, Exit 186 toward Ashland, continue to Claremont Ave, turn left to Fairgrounds. Large outdoor flea market, free parking. *TI:* 147.105 (71.9 Hz). *Adm:* advance $4, door $5. Tables: advance $10, door $12. John McMurray, KC8AAR, 1126 Union St, Ashland, OH 44805; 419-281-3117; **johnamcmurray@myexcel.com**.

†**Ohio (Canton)—Oct 28;** setup 6 AM; public 8 AM to 3 PM. *Spr:* Massillon ARC. Stark County Fairgrounds, 305 Wertz Ave NW; from I-77 N take downtown exit, turn left (W) on W Tusc, turn right on Wertz Ave to Fairgrounds; from I-77 S take 4th St NW Exit, turn right (W) into Fairgrounds. All indoors, auction (10 AM, 15% commission charged on all items sold; no computer equipment), handicapped accessible, free parking. *TI:* 147.18. *Adm:* $5, under 12 free. Tables: $10 (8-ft, with free electricity). Terry Russ, N8ATZ, 3420 Briardale Circle NW, Massillon, OH 44646; 330-837-3091; **marc.hamclub@juno.com**; **www.qsl.net/w8np**.

Ohio (Garfield Heights)—Nov 10. Laura Lonczak, 216-663-3258.

†**Ohio (Georgetown)—Nov 10,** 8 AM to 3 PM. *Spr:* Grant ARC. ABCAP Gym, 200 S Green St; from Cincinnati 275 to SR 125 exit E to Georgetown, building at intersection of SR 125 and Green St. Handicapped accessible. *TI:* 146.73. *Adm:* $2. Tables: $1. Dot Silman, KB8TQU, 937-446-2234; **Huggee@Bright.net**.

†**Oklahoma (Kingston)—Oct 26-27;** setup Friday 3 PM, Saturday 7 AM; public Friday 3 PM to Saturday 5 PM. *Spr:* Texoma Hamarama Assn. Lake Texoma Lodge, on Hwy 70, 5 miles E of Kingston. Flea market, tailgating ($5), dealers, programs, club events, VE sessions, RV parking (Joe's Campground). *TI:* 147.39 (118.4 Hz). *Adm:* $7. Tables: $15. N. T. "Len" Carlson, K4IWL, 972-519-0521; **k4iwl@arrl.net**; **www.angelfire.com/tx5/TexomaHamarama/**.

†**Oregon (Rickreall)—Oct 20,** 9 AM to 3:30 PM. *Spr:* Mid-Valley ARES. Polk County Fairgrounds, 520 South Pacific Hwy; W of Salem where Hwy 22 meets 99W. Swap tables, ARES/RACES get-together, commercial dealers, meetings and seminars, VE sessions (preregistration required; Bob Boswell, W7LOU, 503-623-2513, **w7lou@arrl.net**), self-contained RV camping ($10 per night), handicapped accessible. *TI:* 146.86. *Adm:* advance $5, door $6, under 13 free. Tables: $15 (with power), $13 (without power). Bud Smith, N7BUD, Box 132, Monmouth, OR 97361; 503-838-0266; fax 503-838-0262; **n7bud@arrl.net**; **www.teleport.com/~binder/swap.html**.

Pennsylvania (Lancaster County)—Oct 6. Dave Phillips, W3CWE, 717-872-6578.

†**Pennsylvania (Sellersville)—Oct 21;** setup 5 AM; public 7 AM to 2 PM. *Spr:* RF Hill ARC. Sellersville Firehouse, Main St (Rte 152), 5 miles S of Quakertown and 8 miles N of Montgomeryville; from Montgomeryville go N on Rte 309 to Telford Exit (Rte 152), right at bottom of ramp, left at stop light, 1½ miles to Firehouse. Vendors, VE sessions (10 AM to 1 PM, all classes; bring documents). *TI:* 145.31. *Adm:* $5. Tables: $12 each (indoor, 5 or more $10 each); $6 (outdoor 9-ft frontage space, bring your own table). Linda Erdman, KA3TJZ, 2220 Hill Rd, Perkiomenville, PA 18074; 215-679-5764; **rfhillarc@yahoo.com**; **www.rfhill.ampr.org**.

Pennsylvania (Trevose)—Oct 13. Mid Atlantic States VHF Conference; John Sorter, KB3XG, 610-505-6940; **JohnKB3XG@aol.com**; **www.ij.net/packrats**.

†**Pennsylvania (Wrightstown)—Oct 14;** sellers 6 AM, buyers 7 AM. *Spr:* Mt Airy VHF RC (PACKRATS). Middletown Grange Fairgrounds, Penns Park Rd. Flea market, refreshments. *TI:* 224.58, 146.52. *Adm:* $6, nonham spouses and under 13 free. Tables: $10 (outdoor car space), $15 (8-ft, indoor table). Joe Keer, W3KJ, 468 Cheswyck Dr, Harleysville, PA 19438; 215-256-1464; **packrats_w3ccx@yahoo.com**; **www.ij.net/packrats**.

Quebec (Montreal/Longueuil)—Oct 27. Micheline Simard, VE2XW, 450-446-0477.

†**South Carolina (Myrtle Beach)—Nov 10,** 7 AM to 2 PM. *Spr:* Grand Strand ARC. Old Myrtle Beach Air Force Base, Red Cross Building, 2795 Pampas Dr; from US 501 to 17 Bypass, go S on Bypass to 2nd traffic light, turn left, follow signs. Huge outdoor flea market and tailgate area ($5 per space), VE sessions (11 AM), BeachFest Grill. *TI:* 145.11. *Adm:* Free. Tables: Bring your own. Gordon Mooneyhan, KE4HXL, Box 2328, Myrtle Beach, SC 29578-2328; 843-448-9379 or 843-238-0800; **ke4hxl@gte.net** or **beachfest2001@hotmail.com**; **www.w4gs.org**.

South Carolina (Rock Hill)—Oct 6. Sheila Parrish, KG4CDF, 803-328-5983, **coy@cetlink.net**.

†**South Carolina (Sumter)—Oct 27,** 8 AM to 4 PM. *Spr:* Sumter ARA. Sumter Fairgrounds, American Legion Fair Building, 700 W Liberty; I-95 to Rte 378 W, turn right onto Alice Dr, left on Liberty, go 3 blocks. Flea market, tailgating, forums, VE sessions. *TI:* 147.015. *Adm:* $6. Tables: $8 (limited). Carl Ecabert, AA1MD, 6105 Dubose Siding Rd, Sumter, SC 29153; 803-469-7183; **aa1md@sumter.net**; **www.geocities.com/CapeCanaveral/2695/sara.htm**.

†**Tennessee (Chattanooga/East Ridge)—Oct 27,** 8 AM to 4 PM. *Spr:* Chattanooga ARC. Camp Jordan Arena, 323 Camp Jordan Rd; E of I-75, Exit 1. Flea market, dealers (Barbarra Gregory, WA4RMC, 423-629-7911, **wa4rmc@aol.com**), VE sessions, Special Events Station. *TI:* 146.79, 444.1. *Adm:* $5. Tables: $15 (electricity $15). Louise Carter, KE4DGW, 107 S Bragg Ave, Lookout Mountain, TN 37350; 423-821-4043; **ke4dgw@msn.com**; **www.hamfestchattanooga.com**.

†**Tennessee (Oak Ridge)—Oct 13,** 9 AM to 3 PM. *Spr:* Oak Ridge ARC. The Fraternal Order of Eagles, 1650 Oak Ridge Turnpike; Illinois Ave to Oak Ridge Turnpike, turn left on Oak Ridge, location is on right going W on Turnpike. Swapfest, inside dealers, outside tailgating, handicapped parking, free parking. *TI:* 146.88. *Adm:* $5. Tables: $10. David Bower, K4PZT, 512 Elkmont Rd, Knoxville, TN 37922-3694; 865-670-1503; **d.bower@ieee.org**; **www.korrnet.org/orarc/**.

†**Texas (Azle)—Nov 10;** setup Friday 5 PM; public Saturday 7 AM to 3 PM. *Spr:* Tri-County ARC. Heritage RV Park, 100 Beaver Creek Dr at FM 730 S; TX FM 730, 5 miles S of Azle and Hwy 199; or 12 miles N of Weatherford and US 180. Swapmeet, tailgating ($5), vendors, technical presentations, new ham orientation, candidate ham class, forums (ARRL, APRS, UHF/Microwave Communications, AMSAT), on-the-air Special Event Station, emergency communication vehicle tours, VE sessions, RV parking ($8 per night). *TI:* 147.16 (110.9 Hz). *Adm:* $2. Tables: $10 (indoor, limited availability). Jim Aiello, N5QU, 704 Lakecrest Pkwy, Azle, TX 76020; 817-444-9465; **drjaiello@aol.com** or **tcarc-ntx@qsl.net**; **www.qsl.net/tcarc-ntx**.

†**Texas (Belton)—Oct 6,** 7 AM to 1 PM. *Spr:* Temple ARC. Bell County Expo Center; from I-35 take Exit 292, W to Center. Commercial vendors ($25 each space, with tables), indoor tailgate spaces (non-commercial, $10 each), VE sessions (all classes, 1 PM; bring copies of any CSCEs, amateur license, photo ID), handicapped accessible, refreshments. *TI:* 146.82 (123.0 Hz). *Adm:* $1. Tables: $10 (free electricity; bring your own extension cords, outlet strips, and duct tape). Mike LeFan, WA5EQQ, 1802 S 13th St, Temple, TX 76504; 254-773-3590; **hamexpo@tarc.org**; **www.tarc.org**.

†**Texas (Denton)—Oct 20,** 8 AM. *Spr:* Denton County ARA. Denton Civic Center, 515 N Bell Ave; E of center of town, corner of McKinney Ave and Bell Ave. VE sessions. *TI:* 146.92 (110.9 Hz). *Adm:* advance $5, door $7. Tables: $10 (first table), $5 (for each additional). Clint Miller, KD5BYY, 1914 W Oak St, Denton, TX 76201; 940-390-5338; **cmiller@dentonhamfest.org**; **dentonhamfest.org**.

†**Texas (Houston)—Oct 20;** setup 8-9:30 AM; public 9:30 AM to 3 PM. *Spr:* Clear Lake ARC. Bay Area Community Center, 5002 NASA Rd One; from downtown Houston take Gulf Freeway S (IH45) to NASA Rd One, go E 5 miles. Vendors, foxhunt. *TI:* 442.75, 146.64. *Adm:* $3, under 12 free. Tables: $15 (first-come, first-served). John Taylor, KD5IHO, 16931 Hibiscus Ln, Friendswood, TX 77546; 713-504-1403; **kd5iho@swbell.net**; **www.clarc.org**.

†**Texas (Odessa)—Nov 2-3.** *Spr:* West Texas ARC. Holiday Inn Center, 6201 E Hwy 80; 3 miles E of downtown Odessa. Forums, VE sessions. *TI:* 145.47, 444.425. *Adm:* $3. Tables: $10. Craig Martindale, W5BU, 1719 Rosewood Ave, Odessa, TX 79761; 915-366-4521; **w5bu@arrl.net**.

†**Virginia (Stafford)—Oct 13,** 8 AM to 3 PM. *Spr:* Stafford ARA. Mt Ararat Baptist Church Parking Lot, 65 Toluca Rd; from I-95 take Exit 143B and travel W on Rte 610 (Garrisonville Rd) approximately 4.5 miles, turn N on Rte 657 (Toluca Rd). Swap n' Shop, vendors, free demo of Stafford County's Emergency Communications Bus, VE sessions, DXCC field checking, free radio checks using spectrum analyzer and SWR tester, refreshments. *TI:* 145.27. *Adm:* Free. Tables: $10 (limited). Richard Diddams, KF6UTH, 33 Brush Everard Ct, Stafford, VA 22554; 540-657-8322; **rldiddams@earthlink.net**; **www.n4nw.org/Hamfest.htm**.

†**Washington (Bremerton)—Oct 13,** 9 AM to 3 PM. *Spr:* North Kitsap ARC. Kitsap County Fairgrounds President's Hall, NW corner of Fairgrounds Rd at Nels Nelson Rd. Hamfest and Electronics Swapmeet, commercial radio dealers, computers, new and used equipment, forums, ARRL table and information, Kitsap County Emergency Communications Van, antique radios, operating stations and demos (PSK-31, APRS, DX), VE sessions (10 AM). *TI:* 146.62 (103.5 Hz), 146.52. *Adm:* $5, under 12 free. Tables: $20 (includes 1 admission, until Sep 30), commercial spaces $30; electrical connection $2 per table. Marcie Stilwell, KC7DAT, Box 2268, Silverdale, WA 98383-2268; 360-697-2797 or 360-697-9379 (Susan Johnson, AB7MD); **nkarc@yahoo.com**; **www.silverlink.net/nkarc/hamfest.html**.

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as donated ARRL publications, handouts, and other support.

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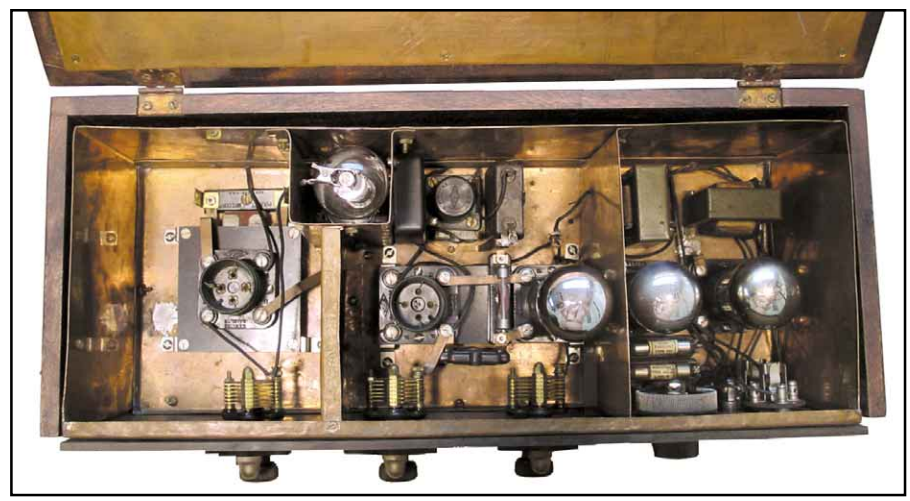
Promoting your event is guaranteed to increase attendance. As an approved event sponsor, you are entitled to advertise your event in *QST* at special rates. Make your hamfest a success by taking advantage of this great opportunity. Call the ARRL Advertising Department at 860-594-0207, or e-mail **jbee@arrl.org**.

A 1927 Homebrew Receiver

Last January I went to the "all-indoor" Frostfest in Richmond, Viginia, to exhibit some of my early ham radios. Sherry, my XYL, went along to help. This usually means trouble for me if I try to purchase too many radios. She keeps telling me that I have enough. Sometimes I'm able to slip them into the car when she's not looking. Today would not be one of those times.

After I set up my exhibit, with Sherry busy manning the display; I walked around to see what I could find. One of the first things I spotted was a table loaded with homebrew 1920s wooden-cabinet radios. I have been trying to avoid buying early broadcast radios lately, concentrating on ham equipment instead, but they were priced cheap, so I started lifting lids. The second radio I checked was very heavy and had extensive copper shielding installed. This was unusual I thought, for a broadcast radio, but then I recognized it. I remembered reading about this in one of my old *QST* magazines. It was the Shield Grid receiver.

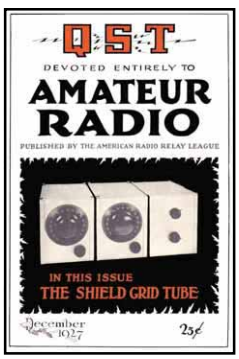
I quickly paid for it and headed for the door. I waited until Sherry was busy talking to a collector and scooted by her and put it under a blanket in the car parked outside. When I returned I found a couple of my friends laughing. They told me that I should have seen her face when she spotted me carrying the radio.



The UX-222 tube is at the top left, inside the small copper shield.

The Shield Grid Tube

The Shield Grid Tube was introduced in the December 1927 *QST*. That issue had several articles about the UX-222, complete with example schematics. The UX-222 tube would be the subject of many articles and receiver designs in *QST* over the next few years. For the first time this new tube made real RF amplification possible at 15 meters. It was the first American-made two-grid tube.



Also in that *QST* was an article by R. B. Bourne, W1ANA, about the experimental radio I just found: "Getting the Most Out of the UX-222." It used the UX-222 as an RF amplifier in a distinctively designed square shielded compartment of copper. That compartment was in turn, inside the antenna coupler compartment. It was this square shield arrangement that I recognized at the hamfest.

Comparing the article to my radio I noticed mine has an extra shield for the regenerative detector stage, separating it from the audio amplifier stage. The shielding of each stage was a great idea and continues today. There are some additional differences, such as an added stage of audio and some missing battery filtering, but it is essentially the same radio. A 15-meter coil set came with it.

One of the lessons here is to get as many old magazines as you can and read them over and over. If I had not recognized the unique shielding, I might have passed it up. Instead, I have a really interesting radio, one with some history attached to it. I asked the seller if he knew who built it. Unfortunately, he bought it at an auction, so the prior owner is unknown.

See it in my Museum

If my new job and the weather permit, my mobile "Old Radio Museum" will be at the Connecticut ARRL State Convention and Nutmeg Hamfest on Sunday, October 7, 2001 in Wallingford. I'll bring this radio along so you can see it. Look for my call letters on my hat and say hello.—*K2TQN* QST

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

KA1CRX, Robert Brough, South Hadley, MA
W1DAO, Kenneth A. Wallace, Nashua, NH
W1EU, John F. Bartlett, Marlborough, MA
WA1HVD, Robert V. Bernard, Somerset, MA
W1UDM, Bruce R. Wiggin, Sanbornville, NH
W1ZRP, Milton Roberts, Centerville, MA
WB2COP, Edward J. Kracum, Middletown, NJ
KA2DVB, Frank S. Samuel, Binghamton, NY
*W2HCW, Arnold Tamchin, Setauket, NY
W2IJJ, Gordon C. Sands, Union Beach, NJ
WB2ILL, Stanley Houghtaling, Albany, NY
W2IXR, George K. Bennison, Holland Patent, NY
W2NDM, Harold S. Pike, Cape May Court House, NJ
K2QAU, W. R. Dabb, Scotch Plains, NJ
K2SDU, Philip R. Gilbert, Hendersonville, NC
*W2TAK, David B. Harney, Syracuse, NY
KS3B, Wilbur N. Garlin, Wernersville, PA
WB3CPO, Ramon A. Sague, Miami, FL
*WA3EEE, Charles Doggett, Randallstown, MD
NQ3E, Maurice C. Ricks, Brooklyn Park, MN
WA3GLA, Philip W. Savitz, Falls Church, VA
ex-WB3HMB, Stephen N. Shaaber, Sinking Spring, PA
N3JYE, Ernest L. Angstadt, Sinking Spring, PA
WA3NGF, Leslie A. Werling, Frederick, MD
W3PXK, Albert J. Simanas, Easton, PA
K3RRZ, George W. White, Greenbay, VA
W3TDS, Marshall W. Shafer, Dripping Springs, TX
*WA3WIP, George J. Mc Culloch, Lehigh Acres, FL
K4CBH, Edward Hunnicutt, Sylacauga, AL
AC4DE, Edward Petroski, Carrabelle, FL
KD4EJQ, Jeffrey R. Newell, Fort Walton Beach, FL
WA4FMR, Rubert M. Thompson, Alamo, TN
W4FNS, Hugh T. Anderson, Greenville, SC
W4GTS, Philip J. Latta, Athens, GA
KE4KKT, John B. Rowe, Frankfort, KY
KE4MHU, George E. Skirven, Laurel Hill, FL
AD4N, John S. Erickson, Vero Beach, FL
WD4PBF, James E. McHendrix, Florence, KY
K4PHH, Harvell V. Tilley, Ethelsville, AL
KD4PHI, Thomas J. Zisa, Tulsa, OK
N4PPN, Douglas C. Parker, Raleigh, NC
WW4Q, William E. Henderson, Jacksonville, AL
KF4RIC, Chester E. McMahon, Tampa, FL
*K4RZ, Frank J. Hoose, New Bern, NC
WB4SNW, Linda S. Botts, Blountville, TN
W4UDJ, Louis F. Heerten, Birmingham, AL
*W4UXW, Randall F. Counsman, Shalimar, FL
K4YSN, Tandy Way, Tampa, FL
*ex-WD5BVJ, Ira S. Clarkson, Kemah, TX
NW5F, Joe R. Warneke, Wichita Falls, TX
K5FW, Bob J. James, Oklahoma City, OK
KB5GXE, George A. Day, Dallas, TX
W5IH, Carl T. Carlberg, Albuquerque, NM
W5KNY, Henry M. Winans, Dallas, TX
WA5POH, Henry A. Sandel, Vidalia, LA
KC5SUW, James C. Smith, Albuquerque, NM
KD5SY, D. M. "Rusty" Crooks, Ramah, NM
W5TBV, Robert T. Smart, Georgetown, TX
N5TYY, Alfred D. Lane, Greenville, MS
W5VLN, Eugene H. Hunter, Fresno, CA
N5XJS, Ralph E. Robbins, Dilley, TX
W5ZTN, Bennett L. Basore, Stillwater, OK
K6BTO, Herbert R. Adams, Bonita, CA
W6CCY, John P. Lynch, Sebastopol, CA
WA6CRN, William L. Sprague, Whittier, CA
ex-W6GLU, Ronald S. Mushin, Downey, CA
W6JXN, Walter W. Burt, Chino, CA
N6LT, Thomas F. Marshall, Las Cruces, NM
WB6ODA, Harry H. Geordan, West Covina, CA
*WA6ODQ, Walter D. Davis, Romona, CA
WB6PCR, Delton F. Flowers, Fresno, CA
WA6VFR, Herbert A. Dick, Encino, CA
K7BOG, Lloyd C. Havens, Phoenix, AZ
KC7DWU, Ivan R. Bork, The Dalles, OR
WT7H, Blaine M. Lyon, Blackfoot, ID
KH7IT, Jason M. Uehara, Honolulu, HI
W7KRI, Richard J. Furlong, Sierra Vista, AZ
W7LFX, Ellis R. Romer, Tucson, AZ
K7MAL, Joe F. Yoerger, Pahrump, NV
KK7ML, Frank C. Montrose, Coupeville, WA
W7NMO, Dale A. Cook, Vancouver, WA
W7OAW, Eugene C. Weber, Walla Walla, WA
KG7OW, Lee W. Bertrand, Enumclaw, WA
KC7PCH, Mark H. High, Yakima, WA
W7RXJ, Rodney E. Steen, Mcminnville, OR
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WA8CXV, Alvin Readnour, Reynoldsburg, OH
ex-W8FZU, Murray E. Nichols, Stevensville, MI
N8JAM, Clinton Hancock, Middletown, OH
N8JCJ, Chester F. Syjud, Westland, MI
W8LHV, Stanford M. Blose, Akron, OH
W8NNE, Basil V. White, Bay City, MI
WD8PVQ, Patricia A. Cline, Newport, OH
K8RCR, Randall C. Ramzy, Doylestown, OH
W8RJY, H. B. Honious, Miamisburg, OH
W8STB, John O. Hey, West Carrollton, OH
W8TTY, Arthur P. Kohn, Toledo, OH
WA8UNQ, Henry C. Schepperly, Okemos, MI
W8WW, Joseph A. Keller, Lake Worth, FL
KA9BWP, John W. Kennedy, Kokomo, IN
WB9GTX, John E. Douville, Sheboygan, WI
KA9HNE, William F. Kayes, Portage, IN
WA9HUV, Norman J. Foot, Elmhurst, IL
KA9ICP, Cletus L. Abts, Wisconsin Rapids, WI
K9IKS, Robert W. Ryberg, Clear Lake, MN
KA9KGW, Viola Gable, Parker City, IN
W9KPG, Harry H. Heinrich, Green Bay, WI
W9KRI, Alvah M. MacDonald, Collinsville, IL
K9LGL, Maurice C. Soldner, Greenfield, WI
KA9LLB, Anne C. Elston, Lancaster, WI
N9MMT, Jerome Carpentier, Balsam Lake, WI
W9NVM, Carl Kerstetter, Antigo, WI
W9PMJ, John D. Voss, Cicero, IL
WB9SBY, William R. Brown, Shelbyville, IN
W9SJR, Bernice T. Schmidt, Chicago, IL
*N9SY, George S. Tiffany, Janesville, WI
W9WHL, William M. Jenkins, Bedford, IN
KB9XR, Robert K. Shady, Milwaukee, WI
K9ZWU, John P. Hellwig, Cicero, IL
W0CKT, W. E. Marquart, Madison, SD
WA0EBV, Donald L. Richards, Wheat Ridge, CO
*WB0EXD, Charles L. Erickson, Saint Louis, MO
W0HJX, Samuel A. Selders, Greeley, CO
KB0JCG, Kevin H. Caton, Marion, IA
WA0LUN, James A. Schley, Lawson, MO
N0QOB, Bruce Abbey, Boone, IA
N0RK, Robert L. Keplinger, Kansas City, MO
WB0RTV, Thomas F. Slocombe, Denver, CO
N0UOV, Henry C. Donaldson, Kansas City, KS
DL1AR, Manfred Hilgeland, Wuppertal, Germany
TA2BK, Bahri Kacan, Istanbul, Turkey

*Life Member, ARRL
**Charter Life Member, ARRL
‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator

NEW PRODUCTS

TINY FRS HAND-HELD FROM MIDLAND

◊ Midland's new F-12 FRS hand-held has 14 channels and 38 subcodes designed to maximize your communications effectiveness and reduce unwanted chatter from other FRS users. The tiny water-resistant transceiver has a two-mile maximum range, VOX, channel scan, a backlit LCD, a low battery indicator, speaker and mike jacks, a flexible antenna, and more. Power is provided by three AAA batteries. A full line of accessories is available.

Price: $29.95. For more information, contact Midland Consumer Radio at 1670 N Topping Ave, Kansas City, MO 64120; tel 816-241-8500.

NEW COAXIAL CABLES FROM THE WIREMAN

◊ The Wireman has just added two coaxial cables to its line of specialty wire products. The first is an RG-213-type 50-ohm coaxial cable that is designed to be safely buried without fear of contamination (CQ113PE). The cable's center conductor, solid polyethylene dielectric and 97% copper braid meet the specification for Mil Spec RG-213/U and RG-8A/U—and add a black polyethylene jacket designed to withstand being buried. CQ113PE is priced at 45 cents a foot or less.

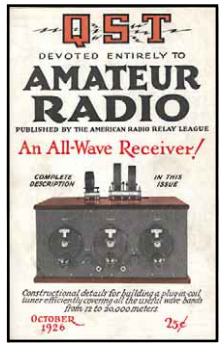
The second is a heavy-duty, low-loss, RG-217-type 50-ohm coaxial cable that's highly flexible. Designed for rotator loops or crank-up towers, the cable's natural lubricity allows it to slide easily through eyelets and guides and coil neatly into circular nesting vessels. The cable's projected lifespan is 20+ years.

For more information, contact The Wireman, Inc, at 800-727-WIRE or point your Web browser to **www.thewireman.com**. QST

Previous New Products

75, 50 AND 25 YEARS AGO

October 1926



◊ The cover photo shows an exciting new construction project—"An All-Wave Receiver!" that covers 12 to 20,000 meters. The editorial looks at the coming of autumn's good radio conditions and makes some suggestions, such as spreading out on 40 meters a little, instead of everyone crowding down near the lower band edge to work DX.

John Clayton describes the cover receiver in the six-page article, "Covering All Wavelengths." 8UX presents "There's Always Something New in Amateur Radio!"—19 cartoons, each showing a top ham news item from an earlier year, and a 20th cartoon that had only a big question mark for the forthcoming year, 1927. W. M. Sutton writes about "Aurora and Its Effect upon Radio Signals," reaching some interesting conclusions about aurora and the ham bands. "Ham," by C. E. Tamm, discusses the origin of that expression, concluding that "… 'Ham' was applied to the plodding student [landline telegrapher] because his Morse characters sounded a great deal as if they were by a huge ham, instead of a hand, on the sending key." The article "A Radio Picture Demonstration" tells how photographs were sent by ham radio at the recent Northwest Radio Trade Association show in Minneapolis–St Paul. Frank Gunther tells about "A Portable Transceiver" that he built into a lady's hat box. It's about 18×16×10 inches, weighs 30 pounds, and operates on 40 and 20 meter CW.

October 1951

◊ The cover photo shows the latest rig designed by Don Mix, W1TS—a three-band, 75-W rig with shielding and filtering to reduce TVI. The editorial tells how the ARRL is working to prevent municipalities from enacting antenna limitations. Although newspaper reports said it was the USA's 90,000 licensed amateurs that had banded together to fight the battle, the editorial points out that it was only the League's 30,000 members.

An ad on page 2 shows the brand new Collins KW-1, a rack-mounted transmitter that delivers a solid 1 kW of power on both CW and AM phone. "ARRL Wins Pennsylvania Mast Case" tells how the League's battle against antenna restrictions paid off in the Keystone State. Don Mix, W1TS, describes "A 75-Watt Transmitter for 3 Bands," with a 6AG7 crystal oscillator, a 6N7 doubler, and a push-pull 807 final. Richard Long, W3ASW, uses simple language to explain SSB in "Sugar-Coated Linear-Amplifier Theory." Using the popular 832A dual tetrode, Ralph Burhans, W8FKC, tells how to build "A Tuned-Line Amplifier for 144 and 220 Mc." Antenna guru Bill Orr, W6SAI, describes 7B4QF in "Operation Andorra," a DXpedition to put Andorra on the ham bands for the first time. "Results, 17th ARRL DX Contest" are presented, with Dick Spencely, KV4AA, the top-scoring North American entry pictured. Charles Dene, W3CPC, tells about "A Bandswitching Multiplier-Exciter," which he uses to change bands quickly and with minimum tuning requirements.

October 1976

◊ The cover photo alerts the reader to the lead article, with the caption, "Radio Astrology—can the planets tell us about radio propagation?" The editorial, "An Investment Program," looks at the near future of Amateur Radio—improvements in amateur allocations, growth of the service, a strengthened amateur satellite program, WARC-79, etc.

Ed Tilton, W1HDQ, presents "Radio Astrology," with "far-out" explanations of propagation phenomena. W. C. Smith, K6DYX, tells about building "An Inexpensive Sweep-Frequency Generator." Jay Rusgrove, WA1LNQ, describes a "1/4-Kilowatt Amplifier," to help Novices take advantage of their new, higher power limits. The education of the readership continues, with Part 8 of "Learning to Work with Integrated Circuits," by Jerry Hall, K1PLP, and Charles Watts, WA6GVC/1; and Part 3 of "Meet the Microprocessor," by Bill Thomas, WB8FGR/9, and Steve Belter, WN9SGP. "Product Review" describes the new HP-25 programmable scientific calculator, a terrific aid to amateurs and engineers, at a price of only $150. Bob White, W1CW, tells how the ARRL helps its members with incoming *and* outgoing DX QSL services, in "DX QSLs, QSLs, QSLs." Jim Morris, KH6HQG, in "Tiera Luna para Colombia," tells about a moon-bounce DXpedition to another continent. A photo in "Strays" shows Vic Clark, W4KFC, sending with a key that was used by David Sarnoff during the 1912 *Titanic* emergency, during the opening ceremonies at NN3SI, the new amateur station at the Smithsonian Institution. QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM - 1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	TELEPRINTER BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	TELEPRINTER BULLETIN				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 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 by K6YR. See "Contest Corral" in this issue. 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. QST

YL NEWS

Questions Yield Universal Answers

One of the wonderful things about Amateur Radio is how universal it is. Whether you are a ham in Dallas, Texas or Milan, Italy, a radio is a radio and propagation is propagation. Another truth is that OMs still outnumber YLs and the question I get asked most as author of this YL column has not changed over the past few years. It is "Why aren't there more women hams?" followed closely by "How can I get my wife (girlfriend, daughter, mother) interested in ham radio?"

Whenever I get a chance, I pose those exact questions to the women I meet, hams and non-hams. The non-ham women usually respond:

"It's too technical."

"I already have too many hobbies."

"It's his hobby and I don't want to interfere."

"I don't have the time."

The YLs respond:

"My friends (co-workers, family, etc) aren't interested."

This is sometimes followed by: "They think I'm strange for being involved in ham radio."

This is by no means a definitive anaylsis; just observations based on personal experience, e-mails and letters I've received. When a woman gets her ham license there is sometimes a local YL club to lend support, but there are not too many of those. Most countries have a national YL organization, and that's a good way to find other YLs that share your interests. YL contests, nets and other events like Field Day are also helpful.

Where are the new YLs coming from? Many have attended classes run by local clubs. They have been moderately successful in attracting women to the hobby. The one and two-day Technician license classes held for the past few years by the Long Island Mobile Amateur Radio Club report an increasing number of women and families attending. They make sure there are always some women hams there either teaching or assisting. Katherine Pearsall, KC2ACJ, of the Suffolk County Radio Club in New York is starting a for-women-only ham radio class that, she says, "offers a less intimidating atmosphere."

Classes are also popular in countries outside the United States. In Slovenia, Amateur Radio is practically a national pastime and is supported by the community, government and schools. They recently hosted the World Radiosport Team Championship, an international event that attracts hams from all over the world.

One woman ham I met there was Emily Thiel, P43E. She had traveled there from her home in Aruba, a small Caribbean island off the northeastern coast of South America. Like many YLs, Emily was exposed to ham radio early via a family connection. Her older brother (now P43T) was an active SWL and she grew up hearing the sounds of HF from her bedroom. "When he went away to college, his radio was all mine," she told me. "I wanted to talk to people in Australia and Europe just like my brother had done, so I started studying for the exam."

Licensing in Aruba involves taking an oral test given by two official examiner and a CW sending and receiving test at 12 WPM. Emily got her first license with VHF privileges in October of 1996 and it took only a few months for her to upgrade to the HF license. She jumped into operating within day of getting the upgrade by working the CQ World Wide SSB contest. Not the best choice, she now admits. "I had no clue what I was doing. I barely knew how to work my own." But Emily had a goal. "I knew from the ham magazines that there was a YL category and my goal was to break the existing record and get a jumpstart on my DXCC." Her final score for that contest, one of the larger and more popular ones, was 1700 QSOs and 95 countries. "It was a great experience," she said. "I truly enjoyed working so many people." Her local club, the Aruba Amateur Radio Club, is trying to renew interest in ham radio by offering new classes and actively recruiting members. She said that although about a dozen YLs have passed the P4 HF license over the years, most are not active. "There are many different reasons—family obligations and other concerns—and many never renewed their licenses, " she said.

There are new hams who can jump right in like Emily, but many others get their licenses and never even get on the air. Are they afraid? Perhaps they got their license to please a spouse or significant other? Maybe they had a bad experience on the air. One of my best friends got her license a few years ago and the first person she encountered on the local 2 meter repeater was a jammer who made lewd remarks. She shut off her radio and it took months to get her back on the air. Classes, elmering, clubs, contesting, public service, new technologies ... some people say it's a combination of all of the above that will keep a person on the air and active in Amateur Radio. Becoming a ham should be something *you* want, not something someone else wants for you. —*33, Diane K2DO*

Feedback

Correction to previously announced winning scores of the YLRL YL-OM Contest: Sitsa D. Tigaraki, J43YL (SV3AGQ) earned a total of 87,495 points (not 59,944). QST

Emily Thiel, P43E, and her station on the island of Aruba.

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ k2do@arrl.org

CONTEST CORRAL

Feedback

The Single Operator Low Power Overall plaque in the **2001 RTTY Roundup** is sponsored in memory of **NM7N**. **W6ZZZ** should be included in the SCV section with a score of 336 with 28 QSOs and 12 multipliers as a Single Op Low Power entry. The logs for **ZF2NT** and **ZF2AH** were incorrectly coded as ZL instead of **ZF** when sorted for publication. **WA6ILT** should be shown in the WMA section instead of EMA.

While correctly reported in *QST* based on the information they originally submitted, several stations submitted log files for **the 2000 ARRL 10 Meter Contest** with incorrectly marked entry category information. In fairness to them and other competitors, several changes have been made affecting Top Ten entries and some certificate winners. All awards will be based on the corrected category information. *This situation again underscores the importance that participants verify their information as correct before submitting the contest entry.* **PY2KC**'s entry was marked CW Only but was Phone Only. His score of 983,412 places him first overall in the DX Phone Only High Power Category. **PY0FF (W9VA,op)** on Fernando de Noronha had marked his entry Mixed Mode when he was CW Only. His score of 1,356,272 places him 2nd overall in the DX CW Only High Power. These changes move **LU7YS** into 10th place in the DX Mixed Mode High Power. **K4FB**'s original log was marked Multi-Op instead of Single Op Low Power, making him the WCF section winner in this category. **KB7PKC** submitted as Mixed Mode instead of Phone Only Low Power, making him the WWA section winner for the category.

In the **2000 ARRL 160-Meter Contest**, the **W6YRA** entry in the LAX section should be shown as a Multioperator entry with **WA6AYI, K6LDO, KU6T** as the operators.

In the **2000 ARRL November CW Sweepstakes**, the Single Operator Low Power winner from Canada should have been reported as **VE4VV**, making him eligible for the appropriate plaque.

W1AW Qualifying Runs are 10 PM EDT Wednesday, October 3, and 4 PM EDT Thursday, October 18. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, October 10. Check the W1AW Schedule for details.

Sep 29-Oct 1

QRP ARCI Fall QSO Party, CW, sponsored by QRP ARCI, 1200Z Sep 29 until 2400Z Sep 30. Single band, all band, high (20 15 10 6) or low (160 80 40) band. Operate no more than 24 hours. Work stations once per band. Exchange RST, state/province/DXCC entity, and ARCI number (if nonmember, send power output). 1.830 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.128. Score 5 pts/QSO w/members, 2 pts/QSO w/nonmembers on same continent and 4 pts/QSO w/nonmembers on different continents. Final score is QSO points × states/provinces/DXCC entities × power multiplier (> 5 W, ×1; <5 W, ×7; <1 W, ×10; <250 mW, ×15). Send entry to Randy Foltz, 809 Leith St, Moscow, ID 83843; **rfoltz@turbonet.com**; **personal.palouse.net/rfoltz/arci/arcitst.htm**.

Fall Classic Radio Exchange, CW and phone, Sponsored by CX Newsletter. 1900Z Sept 30 to 0400Z Oct 1. 25. 80 40 20 15 10 meters. Exchange name, RST, QTH, receiver and transmitter type (home-brewers send final amplifier tube or transistor). Work stations once per band, mode and equipment combination. Nonparticipants may be worked for credit. Score is total QSOs multiplied by the total number of different receivers plus transmitters plus QTHs worked on each band and mode. Multiply that by CX multiplier-the total age, in years, of all receivers and transmitters used, three QSOs minimum per unit (transceiver ×2; homebrew ×25, unless older). Send logs to Allan Stephen, 106 Bobolink Dr, Richmond, KY 40475; **Allan.Stephens@eku.edu**.

6-7

The TARA PSK31 Rumble (The Fall Classic). Sponsored by Troy ARA, 0000Z through 2400Z, Oct 6, PSK only. 80, 40, 20, 15, 10, 6 meters. Work stations once per band. Exchange name, state/province/DX send DXCC prefix. Operate 1 of 6 categories. The Club Challenge**,** whatever it takes to win!, 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 DX incl. your own). Mults count once per band. To be valid, scores must be received via our online score submission form found at **www.qsl.net/wm2u/score.html** or e-mail Logs to **wm2u@n2ty.org**, by the last entry date Nov 3, 2001. Logs must be available for review if requested. **www.qsl.net/wm2u/rumble.html** or **www.n2ty.org**.

California QSO Party, sponsored by the North California Contest Club, 1600Z Oct 6 until 2200Z Oct 7. Single op, multi-single, multi-multi, CA county expedition, mobile, and Novice/Tech. 160 80 40 20 15 10 6 2 meters. Send QSO number and CA county. If you're outside of California, send the QSO number and your state/province/DXCC entity. Single ops are limited to 24 hours. Multi-singles have a 10-minute rule. Single ops and multi-single are limited to one transmitted signal at a time. CW QSOs must be made in CW subbands, except on 160 meters. Work stations once per band/mode, work CA stations again as they change counties. A CA station on a county line counts for 1 QSO but multiple counties. CW—1.805 and 40 kHz up; phone—1.850 3.850 7.230 14.250 21.300 28.450; Novice—10 kHz up and 28.450. Score 2 pts/QSO on phone and 3 pts/QSO on CW. Final score is QSO points × CA counties (max 58). CA stations multiply by states and VE sections (max 58). Awards. Send logs to Alan Maenchen, AD6E, 3330 Farthing Way, San Jose, CA 95132 or email to **cqp@contesting.com**; **www.cqp.org**.

Arkansas QSO Party. sponsored by the Ozark Wireless Society. 1400Z Oct. 6 until 0500Z Oct. 7; 80, 40, 20, 15, 10 and 2 meters. CW, Phone, PSK 31, and RTTY. Categories: Single-op, multi-op, and mobile. Only one transmitted signal at a time. Frequencies: CW—40 kHz up from bottom of band; Phone—3.980, 7.280, 14.320, 21.380, 28.400, 146.52. PSK 31—3580.15, 7070.15, 14070.15, 21080.15, 28120.15. RTTY—Use freqs for ARRL RTTY Roundup. No repeater contacts. Work stations once per band and mode. AR-to-AR contacts permitted. Work mobiles again as they change +county/province/DXCC entity. Exchange: Non-Arkansas stations send signal report and state/province/DXCC entity. Arkansas stations send signal report and county. Count 1 per point per phone QSO, 2 points per QSO for all other modes, 10 points per each Arkansas club station worked, and 20 points per each QSO with W5YM (University of Arkansas). Count multipliers only once. +Multipliers for Arkansas stations: 50 states, Canadian provinces, and 1 DXCC multiplier. For non-Arkansas stations: Arkansas counties (75). Final score: QSO points × total multipliers. Awards. Send logs by Nov 1 to Arkansas QSO Party, c/o Don Banta, W5RL, 3407 Diana St, Springdale, AR 72764.

YLRL YL Anniversary Contest, CW, sponsored by YLRL, 1400Z, Oct 10 to 0200Z Oct 12 (phone Oct 24- Oct 26). All licensed women operators throughout the world are invited to participate. Exchange QSO number, RS(T), and ARRL section/VE province/country. All YLs within one of the US ARRL sections or within a Canadian province score one point for each QSO with another station located within a section or province. Score two points for each contact with a station not located within an ARRL section or province. Multiply the number of contact points by the total number of different sections, provinces and countries worked. Logs must also state the power output used. If you have 200 or more QSOs, submit a separate log for each band and submit a "dupe." Logs must show claimed score. Logs must be sent within 30 days after the end of the contest to Phyllis Shanks, W2GLB/7**,** 1345 W Escarpa, Mesa, AZ 85201-3853; **pshanks1@juno.com**; **www.qsl.net/ylrl/ylcontst.html**.

Ten-Ten Day Sprint, sponsored by Ten-Ten International, from 0000-2400Z Oct 10. Single op; multiple station, single operator (club station); single station, multiple operator (OM/XYL, family stations). AM, FM, SSB, CW and RTTY, 10 meters only. Work stations once, regardless of mode. Exchange call, name, state and 10-10 number (if member). Score 1 pt/QSO w/non-members and 2 pts/QSO w/members. Final score is QSO pts. Awards. Send logs by Oct 22 to Don Ward, W0RTV, 4514 Ferrer Dr, St Louis, MO 63129-3741. email to **donw0rtv@juno.com**. For more information see **listserv.lehigh.edu/lists/tenten-l/rules.html**.

13-14

Pennsylvania QSO Party, sponsored by the Nittany ARC, 1600Z Oct 13 until 0500Z Oct 14 and 1300Z until 2200Z Oct 14. Send serial number and ARRL/RAC section (PA stations send serial number and county). Single op QRP, medium (150 W), QRO, or CW only (150 W); multi-single, multi-multi, portable (single op or multi-single), Novice/Tech/Tech Plus, mobile, rover. Work stations once per band per mode. Work mobiles as they change counties. Stations on county lines are good for one QSO but multiple counties. Score 2 pts/CW QSO on 160 and 80; 1.5 pts/CW QSO on other bands; and 1 pt/QSO on phone. Multipliers are PA counties (67 max); PA stations add PA counties, ARRL/RAC sections and 1 for DX (150 max). CW 1.810 and 40 kHz up; phone 1.850 3.980 7.280 14.280 21.380 28.310; Novice/Tech 10 kHz up; mobiles 5 kHz below the above listed frequencies. Final score is QSO points × multipliers ×2 if QRP, ×3 if Novice/Tech; add 200 points to final score for each QSO with W3YA. PA mobiles add 500 points for each county operated from where 10 or more QSOs were made. Awards. Send logs by Nov 15 to K3YV, Nittany ARC, PO Box 614, State College, PA 16804. **na2x@arrl.net**; **www.qsl.net/narc/paqso.htm**.

FISTS CW Fall Sprint, sponsored by FISTS International CW Club, 1700Z until 2100Z Oct 13. CW only, QRP and QRO. 80 40 20 15 10 meters. Work stations once per band. Exchange name, state/province/DXCC entity, and FISTS number if you are a member (nonmembers send power output). Score 5 pts/QSO w/FISTS member and 2 pts/QSO w/nonmember. 10 points with FISTS Novice or Tech plus. Final score is QSO points × states/provinces/DXCC entities. 3.558 7.058 14.058 21.058 28.058. See **www.FISTS.org**. Send paper logs only within 30 days to Alan M. Tanner W8FAX, 3787 Trebein Rd, Fairborn, OH 45324.

21-22

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, 1800Z Oct 21 until 0200Z Oct 22. Phone and CW. No repeater QSOs. 160 80 40 20 15 10 6 2 meters. CW 50 kHz up from the bottom; phone 3.890 7.290 14.290 21.390 28.390; Novice 30 kHz up from bottom for CW. IL stations exchange RS(T) and county; others exchange RS(T) and state/province/DXCC entity. Count 1 pt/QSO on phone, 2 pts/QSO on CW. Work stations once per band and mode, and once per band/mode/county for IL mobile stations. IL 2/3/4 county border stations may count only 1 QSO (not 2/3/4) per contact to

(continued on page 113)

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

SPECIAL EVENTS

Byram, NJ: Morris Radio Club, W2YD & W6OI, 1200-2200Z **Sep 22**, celebrating Scouting Weekend and to honor the memory of Newark, New Jersey firefighter Lawrence Webb who perished in the line of duty May 22, 2001. 28.350 80-15 146.895. Certificate. Harry Hochman, K2IQN, 22 Daisy Ct, Whitehouse Station, NJ 08889.

Orlando, FL: Disney Emergency Amateur Radio Service DEARS, W4D, 1400Z **Sep 30** to 2400Z **Oct 1**, celebrating 100 Years of Magic—honoring Walt Disney, 7.265 14.265 21.265 28.465. Certificate. Harry Yust, W3GU, 16589 Menorco Dr, Winter Garden, FL 34787.

Glendale, CA: Disney Emergency Amateur Radio Service, WD6MM, 1700Z **Sep 30** to 0300Z **Oct 2**, operating from WDI, celebrating WDW & Walt Disney Birthdays, 28.475 21.375 14.275 146.940. Certificate. Disney Emergency Amateur Radio Service, Attn: Will Michael, Crisis Mgmt, 800 Sonora Ave, Glendale, CA 91201.

Alexandria, MN: Runestone ARC, W0W, 1100Z **Oct 1** to 0500Z **Oct 14** commemorating the discovery of a runestone that supports the possibility of Vikings in Minnesota in 1362. 28.150 21.150 14.150 7.250. Certificate. Bill Klundt, 509 Pine, Sauk Centre, MN 56378.

Ansonia, CT: Connecticut Radio Society, W1CRS, 1200-2200Z **Oct 6**, commemorating the 70th anniversary of the first flight of the Sikorsky S-40 flying boat. 40-10 meters, certificate. CT Radio Society W1CRS, 32 Benz St, Ansonia, CT 06401.

Radioville, IN: Porter County Amateur Radio Club, K9PC, 1500Z to 2000Z **Oct 6**, celebrating the history of Radioville. 7.246 14.246 21.346 28.446. Certificate. PCARC, PO Box 1782, Valparaiso, IN 46384.

Robbinsville, NC: Smoky Mountains Amateur Radio Team, N4GSM, 1400Z to 2000Z **Oct 6**, for the anniversary of the opening of the Cherohala Skyway. 7.242 14.242. Certificate. SMART, PO Box 517, Robbinsville, NC 28771.

Anamosa, IA: Jones County Amateur Radio Club, N0CWP, 1300Z to 1700Z **Oct 6**, during the 13th Annual Anamosa Pumpkinfest and weigh-off, 14.250. Certificate. Jim McClintock, N0CWP, 301 Vine St, Box 462, Morley, IA 52312.

Brasstown, NC: Triode ARC, KB4YSX, 1630Z to 1900Z **Oct 6**, during the autumn color celebration of Appalachian music, dance, crafts and food. 14.270. Certificate. Triode ARC, PO Box 1721, Andrews, NC 28901.

Greenfield, IN: Hancock County Amateur Radio Club, W9JWR, 2100Z **Oct 5** to 0300Z **Oct 6**, honoring James Whitcomb Riley. 7.265 14.265 21.365 28.465. Certificate. Robert Simcox, AA9XJ, 3780 S Creekside Dr, New Palestine, IN 46163.

Springfield, MA: Hampden County Radio Assn, WB1HOF, 1400Z **Oct 6** to 2000Z **Oct 7**, during the Basketball Hall of Fame Induction Ceremony, 7.225 21.325. QSL. HCRA, PO Box 562, Agawam, MA 01001.

Lady Lake, FL: Villages Amateur Radio Club, K4VRC, 1400Z **Oct 6** to 2000Z **Oct 7**, during the 2nd Annual Heritage Festival of Lady Lake, Florida. 7.260 14.260 21.360 28.460. Certificate. Richard Boehm, 1662 Garcia Ct, Lady Lake, FL 32159.

Richmond, KY: Eastern Amateur Radio Society, KE4YVD, 1500Z to 2200Z **Oct 6**, for the kickoff of the Presidential Counties Award. 7.270 14.270. QSL. Eastern Amateur Radio Society, 156 Norton Dr, Richmond, KY 40475.

Pittsburgh, PA: Steel City Amateur Radio Club, W3KWH, 1400-2200Z **Oct 6** to **Oct 7**, for the 60th anniversary of the Steel City ARC operations, 7.260 14,260 21.360 144.160. Certificate. Steel City Amateur Radio Club, W3KWH, PO Box 281, Carnegie, PA 15106.

Charlotte, NC: Mecklenburg ARS, W4BFB, 1400Z **Oct 13** to 2000Z **Oct 14**, celebrating 20th year of discovery space science museum. 14.030 14.071 21.250 146.490. Certificate. Mecklenburg ARS, 2425 Park Rd, Room 023, Charlotte, NC 28203.

Middletown, RI: Newport County Radio Club, W1SYE, 1400Z **Oct 13** to 2000Z **Oct 14**, for the 27th Norman Bird Sanctuary Harvest Fair, 7.240 14.280 21.350 28.400. QSL. Newport County Radio Club, W1SYE, PO Box 3103, Newport, RI 02840.

Nowhere, IL: Iowa Radiosport Society, W0FUN, 1500Z to 2000Z **Oct 13**, during the Royal Order of Thuggs Fram-a-stam event. 7.234 14.243. Certificate. Iowa Radiosport Society, PO Box 73, Denmark, IA 52624-0073.

Randleman, NC: Tri-County ARC, NC4AR, 1400Z to 1900Z **Oct 13**, for the 13th annual NASCAR Days Festival, 14.278 7.268 145.290. Certificate. NC4AR, PO Box 747, Trinity, NC 27370.

Houston, TX: Northwest Amateur Radio Society, W5NC, 1400Z to 1800Z **Oct 13**, to call attention to the Saddle Up For S.I.R.E Rideathon. 7.260 14.270 21.350. Certificate. W5NC, 9342 Golden Wood Ln., Houston, TX 77086-2414.

Nowhere, KS: Douglas County (KS) ARC, W0UK, 1400Z to 2100Z **Oct 13**, at the Midland Historical Association Railway southern terminus, 14.244 7.244 21.365 28.440. Certificate. Ken Blair, KC0GL, 1711 West 19th Terr, Lawrence, KS 66046.

Tupelo, MS: Tupelo Amateur Radio Club, KK5K, 1800Z **Sep 28** to 1800Z **Sep 30**, at the Tupelo Aviation Fly-In and Air Show. 14.165 21.365 3.862 7.265. QSL. Tupelo Amateur Radio Club, 429 Goodlett St, Tupelo, MS 38804.

Dallas, TX: Dallas Posse, W0CXX & W5ROK, 1300Z **Oct 19** to 1900Z **Oct 21**, during the Collins Users Conference. 14.260 21.360 28.360. Certificate. Gene Duprey, K1GD, PO Box 10154, Cedar Rapids, IA 52410-0154.

Concord, CA: Mount Diablo Amateur Radio Club, W6CX, 1600Z **Oct 19** to 2000Z **Oct 21**, at the Pacificon 2001 convention and the Boy Scout radio jamboree. 14.290 21.360 28.390. QSL. MDARC, PO Box 23222, Pleasant Hill, CA 94523.

Lakeport, MI: Michigan Salvation Army, N8SA, 2100Z **Oct 19** to 1800Z **Oct 20**, operating during the emergency disaster services conference. 14.250. QSL. The Salvation Army, 55 N Church St, Mt Clemens, MI 48046-0330.

Hillsboro, MO: Jefferson County Amateur Radio Club, KB0TLL, 1700Z to 2000Z **Oct 20**, during the Great Ozark Chili Cook Out at Sunridge Park. 7.240 147.075. QSL. Lori Robinson, KB0WWQ, 3168 Old Hwy A, Festus, MO 63028-4743.

Davidsonville, MD: Anne Arundel Radio Club (AARC), W3VPR, 1200Z **Oct 20** to 2000Z **Oct 21**, celebrating the 50th anniversary of AARC, 14.240 21.340 28.440. QSL. Anne Arundel Radio Club, Inc, PO Box 308, Davidsonville, MD 21035.

Phoenix, AZ: CADXA Central AZ DX Assn, K7UGA, 0000Z **Oct 20** to 0200Z **Oct 22**, honoring Barry Goldwater, statesman, ham. 21.275 28.475. QSL. Mike Fulcher, KC7V, 6545 E Montgomery Rd, Cave Creek, AZ 85331.

Newport News, VA: Peninsula Amateur Radio Club, W4MT, 1300Z to 2100Z **Oct 20**, commemorating raising the engine of the ironclad ship *Monitor*, 7.240 14.240 21.340 28.340. Certificate. Rick Thomasson, WB4GQA, 42 Glendale Rd, Newport News, VA 23606.

Tacoma, WA: Radio Club of Tacoma, W7K, 0000Z **Oct 20** to 0000Z **Oct 22**, commemorating the 85th anniversary of the radio club of Tacoma. Bottom of the bands. Certificate. The Radio Club of Tacoma, PO Box 11188, Tacoma, WA 98411.

Mt Sunflower, KS: Sand Hills and Trojan ARCs, K0S, 1800Z **Oct 20** to 1800Z **Oct 21**, during an expedition to highest point in Kansas, 14.260 14.035 3.920. Certificate. Mt Sunflower Expedition, PO Box DX, Colby, KS 67701.

Birmingham, MI: Izaak Walton Portable Radio Operators Club, K8JV, 1400Z to 2100Z **Oct 20**, commemorating the 1st anniversary of the founding of IWPROC. 7.041 14.061 21.061 28.061. QSL. Jim Bunting, 162 Hillboro Dr, Bloomfield Hills, MI 48301.

Rome, GA: Northwest Georgia Amateur Radio Club, W4VO, 1300-2100 **Oct 20** to **Oct 21**, for the 70th anniversary of Northwest Georgia Amateur Radio Club. 7.270 14.270 21.370 28.370. QSL. Ed Byars, 12 Azalea St SE, Rome, GA, 30161.

Nashville, TN: US Coast Guard Auxiliary, W8E, 1400Z to 2200Z **Oct 20**, commemorating the 62nd anniversary of the C.G. Auxiliary. 7.285 14.285 21.370 28.370. QSL. D.F. Stroup, 6095 Drumhill Ln, Milford, OH 45150.

Milwaukee, WI: USCG Auxiliary, K9G, 1400Z to 2200Z **Oct 20**, Commemorating the 62nd Anniversary of C.G. Auxiliary. 7.290 14.290 21.380 28.355. QSL. George R. Bores, US Coast Guard Station, 2420 S Lincoln Memorial Dr, Milwaukee, WI 53207.

Philadelphia, PA: US Coast Guard Auxiliary, K3G, 1400Z to 2200Z **Oct 20**, commemorating the 62nd Anniversary of the C. G. Auxiliary. 7.270 14.270 21.330 28.330. QSL. Daniel Amoroso, 196 Dam View Dr, Media, PA 19063.

Lake Whitney, TX: The Lake Whitney ARS and The Johnson County ARC, NZ5T, 1600-2000Z **Oct 27**, operating from the island on Lake Whitney, TX031L. 14.250 21.290 28.435. QSL. LWARS, PO Box 1181, Whitney, TX 76692.

Topeka, KS: Kaw Valley Amateur Radio Club, W0CET, 1400Z to 2200Z **Oct 27**, for the 75th anniversary of the Kaw Valley Amateur Radio Club. 28.450 21.350 14.275. QSL. Steve Hamilton, 3507 SW Kerry Ave, Topeka, KS 66611.

Brevard, NC: Transylvania County Amateur Radio Club, K4HXZ, 1800Z to 2359Z **Oct 31**, for Halloween in Transylvania County. 7.237 14.295 21.365 28.335. Certificate. TCARC, PO Box 643, Brevard, NC 28712.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Events Form" in the lower left-hand corner. You can also submit your special event information on-line at **www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; that is, a special event listing for **Jan** *QST* would have to be received by **Nov 1**. 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

By Dan Henderson, N1ND
Contest Branch Manager

2001 ARRL International DX CW Contest Results

It was hard not to be attracted to the cork-backed bulletin board attached to the wall of Colonel Frank's shack back in 1970. Most of us know the ritual by heart. Work a new country and a pushpin goes into the map displayed on the wall. In Frank's case, it was a white pin for an unconfirmed contact. Each time I visited the shack I immediately looked to see which white pins had been replaced by red-capped pins, meaning of course, a new QSL confirmation was in hand.

It's a good thing we didn't have to map out our contacts physically when operating in the 2001 ARRL International DX CW Contest. Many shacks would have quickly run out of pushpins if that had been a requirement. Conditions were not just great, in most areas they were spectacular. A total of 1,670,218 QSOs and 331,869 multipliers were claimed by the 2,418 logs submitted for the competition. Including check logs and all operators at multi-op stations, logs were received from over 2900 participants. DX entries outnumbered W/VE entries about 6:5.

Because of the limited number of multipliers DX can work, records are tougher to set from the DX side. While no DX records were established, several good contests were seen among the over 1300 DX logs received. A five-band Worked All States award could have been worked by operators willing to make the effort.

The DX Single Operator High Power category witnessed a good race between two excellent operators. In the end 8P5A with Tom,W2SC, as the operator, was able to take the top spot over Bruce, ZF2NT, 5,057,937 to 4,837,293. Tom's victory ended up being based on winning the QSO numbers battle on five of six bands. Also finishing over 4 megapoints in this category were P49V with Carl, AI6V, in the seat and KH7Z with Mike, KH6ND, holding the reins at the KH7R station.

An even closer outcome was found in the Single Operator Low Power division, where Ed, N2ED, managed the V26G station to victory over VP5GA, with George, N2GA, at the key. Ed lost the multiplier battle to George, but managed to win 3,703,320 to 3,677,208 based on a QSO margin of 73. Rounding out the 3 megapoint club for this year in the category was P40R, with Bob, K4UEE, as the operator.

To find the top DX Single Operator QRP and Assisted scores, you needed to focus away from the warm climates of the Caribbean to Europe. Congratulations to Jonas, LY5A, for taking top honors in the DX Single Operator QRP category, with a score of 865,926. Finishing second was Andre, KL7AC, operating from North Pole, Alaska. In the DX Single Operator Assisted competition, Pasi, OH1MM, came in first operating from OH0Z. His score of 3,078,030 was around 500 k better than runner-up Roland, DK3GI.

Single Operator Single Band efforts are always interesting challenges. Congratulations to Daniel, S50U (160), John, ON4UN, op of OT1T (80), Bob N4BP, op of C6AKQ (40), Jari, OH8LQ, op of OH8L (20), Jiri, OK1RI, op of T32RD, and Joe, W5ASP, op of ZF1A, for taking top honors with their respective Single Band efforts.

Good operators plus good conditions equaled great fun at the various multioperator DX entries in 2001. Congratulations go first to the ops at the perennial high finishing station at HC8N, who took first place in the DX Multioperator Single Transmitter category, with XA5T placing second. The ops at WP2Z took no prisoners in pilot-

W/VE Top Ten

Single Operator QRP

K1ZM	3,419,040
K2DM	1,248,918
K1RC	911,760
N0UR	735,300
N7IR	728,448
N1TM	710,370
KG5U	631,890
W6JTI	596,484
N9CIQ	558,054
AA1CA	503,808

Single Operator Assisted

KI1G	7,646,040
K3WW	7,055,904
K2NG	5,869,986
K1AM	4,335,120
W2GD (@N2NT)	4,282,740
AA3B	4,124,064
N3RR	3,982,230
N1EU	3,885,000
KQ3F	3,644,520
N3AD	3,579,453

DX Top Ten

Single Operator QRP

LY5A	865,926
KL7AC	468,639
LY9A (LY3BA,op)	443,385
LZ1UQ	404,721
SM3C (SM5CCT,op)	366,750
UX4UA	283,038
I3BBK	276,120
HB9BMY	229,740
JR4DAH	214,755
ON6NL	193,764

Single Operator Assisted

OH0Z (OH1MM,op)	3,078,030
DK3GI	2,597,340
YL8M	1,979,601
OK1DG	1,209,318
G3LZQ	1,163,280
ON7NQ	910,314
IK0YVV	837,567
IK3UNA	711,585
DL6KVA	641,229
PA5KT	598,230

The PJ2T team comprised of (front L-R) W0CG, WA9S, W9VA and (back) KP2L, N8BJQ and W9EFL, posted a strong third in the DX Multioperator Single category. PJ2T is the permanent contest call sign for the Caribbean Contesting Consortium.

DX Contest Pins still available

Those operators who completed a minimum of 100 contacts during the 2001 contest may still purchase the attractive commemorative pins celebrating the first ARRL International DX Contest of the new millennium. This first-time offer is certain to become a keepsake. They cost $5 per pin for US participants and $8 for DX orders and may be ordered from the Contest Branch at ARRL at 860-594-0295 with a credit card. You may also send a copy of your summary sheet along with your check to DX Contest Pin, ARRL, 225 Main St, Newington, CT 06111.

ing their station to a convincing victory over the crew at HG6N in the DX Multioperator Two Transmitter category. Leading the way in the DX Multioperator Unlimited Transmitter category with a 6 meg+ point effort were the guys operating as MD/DL5AXX, who also easily beat out their closest rivals at RU1A.

Great conditions and numerous DX stations to work for multipliers allowed ten of the thirteen overall W/VE category records to be broken. W/VE Single Op QRP winner Jeff, K1ZM, may have summed it up best when he said "probably the best overall conditions ever in an ARRL CW test… It was kind of like hitting the lottery for 48 hours." What caused Jeff to come to that conclusion? Probably his record-shattering QRP performance of 3,419,040 points—breaking the existing record by 2.2 million points. Jeff's excellent station and operating skill has raised the category bar to unimagined heights. Finishing in what would have been a record performance in any year except this was the talented George, K2DM, who's K1ZM's brother.

The W/VE Single Operator Assisted category also saw record-shattering returns and a close race as well, as Rick, KI1G, and Chas, K3WW, both broke the 7-million point barrier. In the end, Rick prevailed with a score of 7,646,040 to 7,055,904. The W/VE Single Operator Low power contest also saw a runaway winner as Dave, N2NL, took the K4XS station to a substantial victory, setting a new category record in the process with his score of 4,236,012. Dave, K1VUT, placed a solid second with a score of 2,655,270.

The W/VE Single Operator High Power race was a dogfight to the end between two of the more seasoned and battle-tested contesters. When the dust had settled, Bob, KQ2M, held on to first-place

W/VE Top Ten Breakdowns (QSOs/Multipliers)

	Score	160	80	40	20	15	10
Single Operator Low Power							
K4XS (N2NL,op)	4,236,012	37/30	230/57	714/80	859/87	698/81	840/83
K1VUT	2,655,270	24/18	135/46	565/76	423/72	700/75	598/75
N8AA	2,553,387	64/38	147/52	217/66	420/77	530/84	703/92
K1VR	2,364,120	53/38	113/51	457/68	360/82	449/72	548/87
WE1USA (WA1LNP,op)	2,350,740	94/45	124/44	208/60	546/78	531/78	527/81
NA2U	2,220,582	16/14	78/34	319/64	437/75	560/71	748/85
W2TZ	2,201,796	19/14	124/46	329/61	371/67	596/75	707/79
N4TZ	2,094,048	41/29	123/45	241/63	542/74	407/69	629/72
W1WAI	2,092,500	23/17	159/53	274/68	341/77	522/73	556/84
K3PH	2,079,702	7/7	107/39	291/64	643/82	560/77	419/73
Single Operator High Power							
KQ2M	6,388,800	67/46	360/63	956/95	1183/101	995/92	839/87
K5ZD (W4PA,op)	6,187,104	84/40	322/60	937/81	1165/102	958/92	998/87
K1DG	5,674,431	73/43	320/59	894/88	848/95	852/93	1046/91
K2UA	5,248,800	57/34	182/48	788/81	933/91	951/90	1139/88
N2IC	4,595,013	33/26	117/49	705/77	667/94	994/98	973/95
K5GN (@W5KU)	4,551,876	63/39	152/57	610/79	828/93	686/92	1063/86
VE3EJ	4,510,152	81/42	243/58	616/77	675/91	762/91	1009/85
W9RE	4,469,220	48/32	251/55	623/69	737/81	834/97	1054/86
K3ZO	4,447,266	69/42	262/59	810/76	825/79	763/87	809/76
N2LT	4,414,302	86/41	252/56	601/80	652/82	744/84	1079/88
Multioperator Single Transmitter							
W4AN	6,766,200	54/41	210/73	1019/102	913/99	899/105	1201/105
W3BGN	6,331,332	150/58	235/67	750/98	1136/101	755/103	941/105
W4MR (@AA4NC)	4,627,620	42/34	173/57	542/93	1003/99	720/94	802/93
AA2FB	4,539,381	51/38	241/62	799/88	691/89	565/98	852/98
N2XI (@W2RE)	4,445,172	38/36	203/57	490/83	816/100	648/991	931/99
Multioperator Two Transmitters							
K1AR (@K1EA)	13,198,560	101/55	761/84	1500/113	1554/125	1584/122	1596/121
N2RM	12,636,672	152/57	569/82	1392/112	1620/122	1603/121	1592/114
N3RS	11,525,958	84/52	425/80	1257/114	1490/123	1653/120	1505/110
K1KI	11,139,120	93/50	581/77	1061/103	1343/113	1701/118	1701/112
K4JA	10,879,335	104/52	334/73	1407/107	1332/113	1666/119	1442/113
Multioperator Unlimited Transmitters							
W3LPL	17,260,200	289/67	979/93	1652/122	2018/133	1881/131	1781/123
KC1XX	17,089,380	299/66	1186/102	1613/114	2044/129	1767/126	1722/123
K3LR	16,099,245	199/62	718/91	1568/119	2156/133	1851/128	1701/122
K1XM (@W1KM)	14,492,028	210/61	962/86	1325/108	2091/129	1641/121	1575/114
K9NS	14,032,956	211/63	527/84	1425/115	1565/127	1772/122	1878/123

DX Top Ten Breakdowns

	Score	160	80	40	20	15	10
Single Operator Low Power							
V26G (N2ED,op)	3,703,320	257/48	399/52	452/55	736/55	877/57	1089/57
VP5GA (N2GA,op)	3,677,208	268/48	413/51	546/54	489/57	753/59	1268/59
P40R (K4UEE,op)	3,298,464	175/43	342/47	570/55	788/56	770/56	879/55
V47X (WT9U,op)	2,641,248	61/21	333/50	631/55	597/54	679/52	756/56
J38A (K4LTA,op)	2,330,730	122/36	458/51	604/55	483/48	505/49	507/51
KH6/W6PH	2,092,224	0/0	237/50	597/57	441/55	547/55	742/55
EA8CN	1,828,827	113/31	101/29	350/52	678/54	460/52	531/55
VK4EMM	1,611,120	0/0	111/38	470/52	276/47	434/50	901/58
V73ZZ (K7ZZ,op)	1,461,393	0/0	0/0	361/51	485/53	653/54	788/55
S51TA	1,447,446	11/7	111/30	216/40	518/53	556/53	590/58
Single Operator High Power							
8P5A (W2SC,op)	5,057,937	353/51	555/54	807/56	1055/57	1128/58	1165/57
ZF2NT	4,837,392	351/52	531/56	704/57	1105/57	1072/57	1036/57
P49V (AI6V,op)	4,158,000	320/50	384/54	533/55	722/56	858/57	1383/58
KH7Z (KH6ND @KH7R)	4,112,829	239/47	421/52	663/58	679/59	872/57	1293/56
VP5U (AJ6V,op)	3,887,811	242/48	147/36	621/55	1126/58	911/57	1120/57
VP2E (N5AU,op)	3,700,443	0/0	415/51	774/56	898/57	1088/55	1278/58
C6AKW (K3TEJ,op)	3,597,660	315/52	554/55	552/54	721/58	813/58	679/53
KH6TO	3,372,390	157/43	353/50	571/54	561/54	780/59	1113/58
M6T (G4PIQ,op)	3,250,350	160/36	340/45	765/58	578/56	802/58	850/57
G0IVZ	3,205,950	222/41	425/53	438/56	661/56	736/57	868/56
Multioperator Single Transmitter							
HC8N	5,486,022	321/53	608/56	785/58	1148/58	1068/59	1417/58
XA5T	4,793,748	393/51	578/53	750/56	1077/58	1035/58	980/56
PJ2T	4,670,250	298/45	502/54	773/55	812/56	1071/57	1334/58
TM5C (@F6CTT)	3,935,274	119/30	490/50	633/53	894/54	1120/57	1102/57
EI7M	3,203,742	265/46	407/47	474/53	697/56	875/57	683/55
Multioperator Two Transmitters							
WP2Z	6,714,192	435/51	772/57	1071/59	1244/59	1432/59	1552/59
HG6N	3,734,388	99/29	382/43	725/52	829/57	1145/57	1054/56
D68C	3,610,764	3/3	110/35	539/55	1222/59	1109/58	1508/58
LY7Z	2,892,960	78/22	309/38	650/55	921/57	705/54	781/54
DL0DX	2,354,898	0/0	421/43	538/53	587/58	761/56	644/56
Multioperator Unlimited Transmitters							
MD/DL5AXX	6,055,086	283/44	670/56	1160/48	1044/58	1465/59	1421/59
RU1A	5,024,400	169/35	560/49	904/59	1657/60	1052/56	958/57
RW2F	4,961,376	305/40	559/48	1091/60	1393/59	915/58	873/57
EA4ML	4,047,120	222/38	511/47	803/57	1025/56	775/53	1044/57
9A7A	3,933,000	61/24	389/42	961/59	941/59	1125/59	893/57

DX Single Band

160 Meters

S50U	29,070
OK1TN	28,614
SM4Z (SM4CAN,op)	28,158
OM0WR	24,465
S57M	20,790
IK2DED	18,981
OK1AEZ	18,870
KP3W	17,928
9A2AJ	13,224
4N7ZZ	11,424

80 Meters

OT1T (ON4UN,op)	132,012
F5MZN	126,225
C6A/K7RE	120,042
S50A	102,789
SP8BRQ	78,192
9A6A	77,895
DJ0MDR	65,145
DJ5BV	64,170
YU1KR	58,080
NP3X (WP3A,op)	54,924

40 Meters

C6AKQ (N4BP,op)	228,114
S57DX	200,796
S53M (S53ZO,op)	194,400
YT7A	194,346
OK1DRQ	175,914
IQ2C	174,249
S57Q	165,126
OM5M (OM2RA,op)	164,976
4N1SM (YT1BB,op)	161,124
UV5I (UR6IM,op)	152,019

20 Meters

OH8L (OH8LQ,op)	270,918
RA1ACJ	267,270
F6FVY (@F6BEE)	239,304
RM4W (RW4WR,op)	217,683
TI4G	208,974
YZ9A	200,070
YU1ZZ	197,163
RZ9UA	190,152
ER0ND (UT7ND,op)	174,552
OM2IB	164,844

15 Meters

T32RD (OK1RI,op)	356,301
KL7RA	286,230
9A3GW	228,114
TI3TLS	217,710
G4BUO	216,978
F5IN	216,360
S58A	208,791
SN3A (DJ0IF,op)	203,019
PI4TUE	189,126
IT9BLB	181,482

10 Meters

ZF1A (W5ASP,op)	328,512
GM3POI	297,018
HR6/N4MO	284,400
G3TXF	264,708
F6KBI	210,672
G3WVG	208,962
OM2DX	182,799
S50C (S53MM,op)	169,455
OK2RZ	165,144
DK5QN	155,382

Single Band

160 Meters

WW2Y	63,318
W8TOP (W8UVZ,op)	36,456
K1VW	34,800
K2AXX	27,048
N8EA	22,518
K4TEA	22,176
W2VO	19,080
K3JJG	9,288
VE3OSZ	8,979
K3SWZ	8,772

80 Meters

W1MK	293,433
K3SV	63,717
KZ2I	46,134
N8SM	37,248
K2LP	29,256
W4HM	28,380
N4PL	27,720
VE3IAY	26,052
K8MD	24,750
N2FY	19,431

40 Meters

K8LV (@K8LX)	365,715
W5TM (W5AO,op)	348,552
K4VX	300,483
K9AY	266,724
K8PO	259,722
VE6JY (VE6WQ,op)	184,230
VA3TTT	175,098
W7UT	122,400
N9AU	119,595
NO4S	106,524

20 Meters

W5WMU	354,570
KO7X	150,855
VA3TTN	123,714
NO9Z	121,230
VE4IM	118,200
VE7AV	109,446
K3UOC	103,356
K0IHG	34,974
VE1AYY	31,620
W5JRP	28,380

15 Meters

N2MF	645,414
K2SS	606,810
N4PN	494,892
W2FU	460,701
K6LL/7	450,528
N4ZZ	438,192
K4OAQ	390,735
KA6A	293,412
W9OF	292,878
N7CW	284,232

10 Meters

K1ZZ	592,074
W4ZV	587,148
K5RX	480,492
KV0Q	433,440
VE9ST	431,844
N4AO	407,838
W6YA	384,780
K9AN	349,500
W9XT	332,391
N7DF	324,174

with a category record score of 6,388,800 over the strong effort of Scott, W4PA, op at the K5ZD station who finished with a final tally of 6,187,104. Both efforts marked the first time the 6 million-point mark was bettered in the category.

Three of the six W/VE Single Band categories saw new records established during the contest. Congratulations to Peter, WW2Y (160), Robye, W1MK (80) and Dave, K1ZZ (10), for setting new category marks on their respective bands. Taking top band honors, but not setting overall records, were Eric, K8LV (@K8LX) (40), Pat, W5WMU (20) and Brian, N2MF (15).

If you are looking for surprises in the Multioperator station finishes, you won't find one. All three category winners established new overall W/VE records and all three are call signs that are familiar to almost anyone who has turned on their receiver in recent years. Congratulations go to the crew at W4AN, who set a new W/VE Multioperator Single Transmitter record with a score of 6,766,200, who gained a substantial victory over the great challenge from W3BGN.

The W/VE Multioperator Two Transmitter record now belongs to the ops of K1AR, who parlayed the great station of K1EA into a record-setting performance. Their score of 13,198,560 beat back the challenge from N2RM. Finally, the Multioperator Unlimited category was once again captured by the familiar call of W3LPL, who held off a strong effort by the ops at KC1XX to win with a final score of 17,260,200.

Now is the time to start planning for the 2002 edition of the ARRL's premier DX CW operating event. I inherited Frank's corkboard map a few years ago when he became a silent key. The number and locations of some of the pins have changed, but I still keep placing pins in the map, tracking my QSOs, many coming from the annual DX CW contest. Maybe you too can add a few more pushpins in your DX map during the 2002 ARRL International DX CW contest, scheduled for February 16-17. Good luck!

SOAPBOX

Imagine the DX op's frustration when AA8TK and I kept trying to work him at the same time (AA8TC)… Great conditions, just too many distractions to spend more time at it. (K0BJ)… With 100 W and a vertical, getting those multipliers was a challenge (K1ES)… Thanks to VK2APK for very weak signal high QRN contact on 40m (K1FFX)… Probably the best overall conditions ever in an ARRL CW test. It was incredible! WOW! (K1ZM)… Where did all the Swiss stations suddenly come from? (K1LI)… First time ever over 4000 QSOs in any contest—a huge thrill! (K2UA)… Many new countries on 160! (K3SWZ)… Was 15 meters hot or what? (K4IU)… Losing the 1st 2 hours of the contest due to severe weather puts one way behind in a 10 meter effort. Difficult at best to catch up, but still enjoyed the Test! (K4WI)… Enjoyed getting back into contesting (K5GM)… First contest in 41 years of hamming, great fun (K7JIZ)… Thanks to the many DX stations for making it a great con-

W/VE Region Leaders

Tables list call sign, score, and power (A = QRP, B = Low Power, C = High Power).

Northeast Region
(New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

K1ZM	3,419,040	A
K2DM	1,248,918	A
K1RC	911,760	A
N1TM	710,370	A
AA1CA	503,808	A
K1VUT	2,655,270	B
K1VR	2,364,120	B
WE1USA	2,350,740	B
NA2U	2,220,582	B
W2TZ	2,201,796	B
KQ2M	6,388,800	C
K5ZD (W4PA,op)	6,187,104	C
K1DG	5,674,431	C
K2UA	5,248,800	C
K3ZO	4,447,266	C

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

N4IJ	315,744	A
KE4R	212,532	A
N4UY	72,384	A
KJ5TF	15,600	A
K4JO	14,976	A
K4XS (N2NL,op)	4,236,012	B
K4OGG	1,789,824	B
WO4O	1,633,329	B
N4YDU	1,628,991	B
NA4K	1,488,972	B
N4ZR	3,086,622	C
K0EJ	2,652,090	C
K4DLJ	1,446,192	C
K1TO	1,108,890	C
W3VT	964,800	C

Central Region
(Central and Great Lakes Divisions; Ontario Section)

N9CIQ	558,054	A
VE3WZ	70,446	A
VE3XL	55,500	A
VE3KQN	47,520	A
AB8DF	27,900	A
N8AA	2,553,387	B
N4TZ	2,094,048	B
VE3KP	1,384,086	B
VE3ZPD	1,356,360	B
VA3UA (@VE3MIS)	1,261,611	B
VE3EJ	4,510,152	C
W9RE	4,469,220	C
K9NW (@K9UWA)	4,146,516	C
K8GL	3,565,890	C
N9CK	2,919,483	C

Midwest Region
(Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

N0UR	735,300	A
KG5U	631,890	A
WA8ZBT	189,243	A
W0VX/5	146,700	A
N0TK	41,760	A
N5AW	1,885,509	B
NA0N	1,204,182	B
W7CT	1,166,922	B
K8EP (@W5SB)	1,005,804	B
K5WO	964,218	B
N2IC	4,595,013	C
K5GN (@W5KU)	4,551,876	C
N3BB	3,375,840	C
N6ZZ	2,460,924	C
K0IR	1,927,056	C

West Coast Region
(Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)

N7IR	728,448	A
W6JTI	596,484	A
K6XX	409,437	A
N7OU	336,960	A
W6QU (W8QZA,op)	230,832	A
VE7SZ (VA7RR,op)	1,993,164	B
W7YAQ	1,072,290	B
WO7Y	836,430	B
VE7XF	762,888	B
W6UM	641,088	B
N7RT	2,751,960	C
W7GG	2,212,326	C
K7MI	2,207,838	C
W2VJN	2,192,157	C
K4XU	2,152,722	C

Plaque Winners

Plaque Category	*Winner*	*Plaque Sponsor*
W/VE All Band CW	KQ2M	Frankford Radio Club
W/VE 3.5 MHz CW	W1MK	SM3DMP
W/VE 14 MHz CW	W5WMU	QSLs by W4MPY
W/VE 21 MHz CW	N2MF	Carl Luetzelschwab, K9LA
W/VE 28 MHz CW	K1ZZ	Green River Valley, IL ARS
W/VE Low Power CW	K4XS (N2NL,op)	Dauberville DX Association
W/VE QRP CW	K1ZM	Tod Olson, K0TO
W/VE Single Operator Assisted CW	KI1G	Pete Carter, K3VW Memorial
W/VE Multioperator Single Transmitter CW	W4AN	Northern Illinois DX Association
W/VE Multioperator Unlimited Transmitter CW	W3LPL	Alpha/Power by CrossLink, Inc
World Single Operator CW	8P5A (W2SC,op)	North Jersey DX Association
World 14 MHz CW	OH8L (OH8LQ,op)	Tom Frenaye, K1KI
World 21 MHz CW	T32RD (OK1RI,op)	Caribbean Contesting Consortium
World 28 MHz CW	ZF1A (W5ASP,op)	Ft. Wayne DX Association
World Low Power CW	V26G (KB2QWO,op)	Jim Stevens, K4MA
World QRP CW	LY5A	Jerry Griffin, K6MD
World Single Operator Assisted CW	OH0Z (OH1MM,op)	Willamette Valley DX Club
World Multioperator Single Transmitter CW	HC8N	John Brosnahan, W0UN
World Multioperator Two Transmitter CW	WP2Z	Tom De Meiss K2TD Memorial
World Multioperator Unlimited CW	MD/DL5AXX	H Stephen Miller, N0SM
Africa Single Operator CW	TZ6DX	Byron Peebles, NZ3O
Africa Multioperator Two Transmitter CW	D68C	Tom Frenaye, K1KI
Asia Single Operator CW	JH5FXP	Alamo DX Amigos
Asia Multioperator Single Transmitter CW	JA1YQH	Yankee Clipper Contest Club
Asia Multioperator Two Transmitter CW	RF9C	Oklahoma Com. Center and AH9B
Asia Multioperator Unlimited CW	JA3YBK	David Brandenburg, K5RQ
Europe Single Operator CW	M6T (G4PIQ, op)	Jerry Griffin, K6MD
Europe Multioperator Single Transmitter CW	TM5C	The Radio Place
Europe Multioperator Two Transmitter CW	HG6N	Jim George, N3BB
Europe Multioperator Unlimited CW	RU1A*	Texas DX Society
North American Single Operator CW	ZF2NT*	Potomac Valley Radio Club
North America Multioperator Single CW Transmitter	XA5T	Gary Stilwell, KI6T and Glenn Stilwell, WR6O
North American Multioperator Unlimited CW	No winner	Alpha/Power by CrossLink, Inc
South America Multioperator Unlimited CW	LW1EXU	David Brandenburg, K5RQ
Oceania Single Operator CW	KH7Z (KH6ND@ KH7Z)	Steve Franke, K9AN and John Brosnahan, W0UN
Caribbean Multioperator Single Transmitter CW	PJ2T	The YASME Foundation
Japan Low Power All Band CW	JH7DNO	Western Washington DX Club
Seventh Call Area All Band CW	N7RT	Willamette Valley DX Club
Central Division High Power All Band CW	W9RE	Society of Midwest Contesters
Central Division Low Power All Band CW	N4TZ	Mike Tessmer, K9NW
Ninth Call Area All Band CW	K9NW (@K9UWA) *	Northern Illinois DX Association

*Asterisk indicates plaque is awarded to runner-up when winner has been awarded a higher level plaque. Overall and continental plaques may be purchased from the ARRL Contest Branch. Contact **contests@arrl.org** for more information.

test (KA5KLU)… CW contesting is great! (KD7GIM)… Most fun was being given out DC multiplier on other bands... especially when D68C asked me to QSY for multiplier contacts! (KE3VV)… It never ceases to amaze me what 5 watts can do (KG5U)… This was my first contest with a computer, another world (KI0F)… All contacts 750 mW or less. HC8N was with 004 mW (KJ5TF)… The highlight was finding XX9TDX calling CQ with nobody answering (KM2L)… D68C—3 bands. TZ6DX on 40 and SU9ZZ worked with no pileup. TOO lucky (KS7T)… I have never enjoyed a DX contest this much! I worked countries I previously only dreamed of (N3FR)… Worked HC8N, MD/DL5AXX, ZF2NT, IR4T, EA4ML, WP2Z, VP5U and ED1RRL all on 5 bands. Thanks (N5RG)… Worked a UA9 Long path on 40 M with 100 W and a vertical (N9AG)… I'm not sure overall conditions can get any better! (N9JF)… I think I'm getting too old for full-weekend contests! (W1HUE)… Proud of my 100 watts and a dipole score (W3HDH)…

Bye Bye sunspots (W3PP)… My biggest thrill was a call from 9N1RB during a JA run (W6YA)… Gotta get that CW filter at Dayton (W8XC)… OK so I'm a little rusty after 20 years without ARRL-DX-Anything! I still could feel the excitement of the chase, but still couldn't get JY9NX Sunday afternoon! What a pileup! (WA2MBP)… First time in ARRL DX CW. My 25 wpm brain had trouble copying 40 wpm speed demons. But I had a ball (WF2B)… Slight delay in starting because the dog tangled with a skunk and had to be given a serious bath. The house stinks, but my score was pretty sweet (WT3P)… My first contest as dx was a great experience (C6AKP)… Had great fun, this time with a vertical for top band so I could get some multipliers there too (EA8CN)… Enjoyed 160m Sunday morning, QSO USA with only 30 W (F5RAB)…This is a note from Paul, EI5DI. I'm submitting this log for Frank who is nearly 90—is there a prize for the oldest competitor? (G2QT)… Great conditions always miss out on SD and ND (G3KNU)… Monday morning very exciting (JF2QNM)… Enjoyed my first DX operation. It was quite a learning experience (OE/K1IR)… Great time (except for the 2 hours spent in the middle of the contest discussing the location of my dipole with the local police) (R3/K3NA)… First time in many years in ARRL DX Contest and fun as always (OH2BSQ)… Wanted to make 100 QSOs to get the new 2001 contest pin... ended up with over 700 contacts... don't forget the QSL chore (ON4CAS)… Good to have the station back in action after 1995 Hurricane Luis destroyed it. Sorry about no antenna on 160 meters. Should have it installed later this year (VP2E)… Lots of fun—first ARRL DX operating as DX! It was great getting 5 band WAS in one weekend (VP5GA)…

Scores

Scores are listed by DXCC Entities and ARRL/RAC Sections. Within each Country or Section, single operator scores are listed in descending order, by power categories. Line scores list call sign, score, QSOs, multipliers, power (A = QRP, B = Low Power, C = High Power, D = Multioperator), and band (if single band). Single Assisted entries appear after all Single Operator scores, followed by multioperator scores by category. W/VE entries appear first, followed by DX entries.

CW

W/VE

Single Operator

1

Connecticut

N1TM	710,370	877	270	A
W1EQ	1,138,470	1370	277	B
N9UA	1,015,104	1088	311	B
W3TB	325,404	524	207	B
KG1D	105,135	215	163	B
KE1LR	2,178	33	22	B
N4QX	1,140	19	20	B
KQ2M	6,388,800	4400	484	C
W1WEF	4,164,300	3305	420	C
K1VDF	959,139	1349	237	C
K1RO	568,080	789	240	C
N1JW	185,166	381	162	C
KA1VMG	131,274	286	153	C
K1VW	34,800	200	58	C 160
K2SS	606,810	1790	113	C 15
WA1FCN	88,650	394	75	B 15
K1ZZ	592,074	1778	111	C 10

Eastern Massachusetts

K1ZM	3,419,040	2720	419	A
K1RC	911,760	1048	290	A
W1EM	50,007	211	79	A
K1VUT	2,655,270	2445	362	B
K1VR	2,364,120	1980	398	B
W1WAI	2,092,500	1875	372	B
K1OA	2,071,905	2165	319	B
K1HT	1,084,017	1177	307	B
K1FFX	636,012	906	234	B
N3KCJ	551,649	763	241	B
W1ZZ	440,682	607	242	B
K1EP	422,550	626	225	B
N1DC	362,076	572	211	B
WA1OLV	324,174	557	194	B
W1GOU	300,291	503	199	B
N1DS	266,526	442	201	B
W1TW	233,916	404	193	B
KR1B	187,746	377	166	B
W1EZ	149,634	306	163	B
KY1B	58,305	169	115	B
WB1FLA	45,216	157	96	B
W1MMM	42,195	145	97	B
WA1QGC	38,304	152	84	B
NF1A	36,720	136	90	B
NG1A	36,270	155	78	B
KQ1F	12,642	98	43	B
KC1WD	10,626	77	46	B
W1LK	1,666,725	1775	313	C
W1TE	1,413,360	1208	390	C
K5MA	736,596	948	259	C
K1AJ	47,880	190	84	C
K1UQ	18,270	87	70	C
W1MK	293,433	1099	89	C 80
K2LP	29,256	184	53	C 80
WG1Z	17,664	128	46	A 40
K1MC	396	12	11	B 40
K1JE/M	1,368	24	19	B 20
K1DC	216,537	811	89	B 15

Maine

W4ZGR/1	3,162	34	31	A
K1JB	279,552	448	208	B
W1EL	169,533	351	161	B
K1SWG	18,144	96	63	B
KD1OG	7,524	57	44	B
KA1IS	1,248,210	1242	335	C
K1PQS	906,300	1140	265	C
N1CGP	64,419	197	109	C
AC1O	7,425	75	33	C 40

New Hampshire

AA1CA	503,808	656	256	A
WE1USA	2,350,740	2030	386	B
W1ECT	999,651	1153	289	B
NM1W	783,405	829	315	B
WA1T	399,129	571	233	B
K1NH	176,418	363	162	B
KG1V	117,117	273	143	B
AE1T	69,192	248	93	B
AE1D	61,380	186	110	B
W6FC	33,936	112	101	B
W1DAD	5,928	52	38	B
K1DG	5,674,431	4033	469	C
WC1M	4,357,500	3500	415	C
KR1G	4,293,600	3578	400	C
KC1F	3,698,400	3082	400	C
NR1DX	2,885,376	2312	416	C
AA1QD	260,910	390	223	C
KB1PZ	21,780	121	60	C 20
K1BV	85,200	400	71	C 10
W1END	45,426	226	67	B 10

Rhode Island

K1VSJ	1,224,009	1329	307	B
KS1J	3,363,555	3055	367	C

Vermont

W1ZK	938,808	1003	312	B
W1ZS	548,130	755	242	B
K1IB	329,346	513	214	B
W1ECH	66,600	200	111	B
K1LI	2,754,153	2397	383	C
W1CX	261,873	477	183	C
AA1SU	16,065	153	35	B 80
W1SA	30,525	185	55	C 10

Western Massachusetts

W1KT	293,706	441	222	B
K5ZD (W4PA,op)	6,187,104	4464	462	C
AE1B	125,874	567	74	B 10

2

Eastern New York

W2QYA	22,656	118	64	A
WE2F	1,350,888	1462	308	B
NA2M	301,050	450	223	B
W2ENY	255,192	434	196	B
W2BEW	156,480	326	160	B
W2XL	2,543,163	2429	349	C
W2ZU	1,153,266	1403	274	C
N1JP	1,082,628	986	366	C
K2SX	230,400	400	192	C
WF2B	14,040	78	60	C
K2UF	91,392	448	68	B 40
KC4TXR	13,764	124	37	C 20
WX2N	28,728	152	63	B 15

NYC-Long Island

WA2VZQ	517,104	798	216	B
WB2TPS	225,750	350	215	B
N2UN	216,480	451	160	B
N2GC	2,065,608	1752	393	C
W2HLI	688,884	826	278	C
WB2ELW (KC2F,op)	166,440	380	146	C
AB2GG	10,296	66	52	C
WB2AMU	37,200	200	62	B 40
W3EH	4,212	54	26	C 40
K2MFY	185,436	606	102	B 10

Northern New Jersey

K2DM	1,248,918	1397	298	A
W2JEK	46,662	154	101	A
NA2U	2,220,582	2158	343	B
W2CVW	523,647	701	249	B
N2CG	238,548	412	193	B
N2LK	199,056	377	176	B
K2SZ	142,206	274	173	B
WA2VQF	114,681	301	127	B
WA2LXE	96,768	252	128	B
KF2EW	58,320	162	120	B
KX2S	39,780	195	68	B
N2LT	4,414,302	3414	431	C
W2EN	2,417,697	2283	353	C
NA2AA	550,710	633	290	C
W2UDT	257,400	429	200	C
WA2VYA	200,046	433	154	C
K2WJ	76,080	317	80	C 40
K2JT	14,760	123	40	A 40
WA2ASQ	26,082	126	69	B 20
AE2JL	47,250	225	70	B 15

Northern New York

WZ2T	73,689	203	121	A
NS2P	214,272	384	186	B
K3KYR	590,940	735	268	C
W2IB	225,522	402	187	C
N2JNZ	24,327	153	53	A 10
N2YMY	27	3	3	B 10

Southern New Jersey

WA2VQV	400,014	626	213	B	
W2NZH	205,146	393	174	B	
W5KI	103,737	229	151	B	
K2MK	22,977	111	69	B	
AD3Y	20,661	97	71	B	
WA2IAU	8,268	52	53	B	
N2MR	1,236,312	1338	308	C	
W2IRS	52,200	145	120	C	
WW2Y	63,318	346	61	C	160
K2VT	4,320	60	24	C	20
N2OO	88,893	357	83	C	15
K2UR	76,080	317	80	C	10

Western New York

W2TZ	2,201,796	2146	342	B	
W2TX	947,958	1166	271	B	
KM2L	821,526	1018	269	B	
WA2EYA	457,968	658	232	B	
WA2YSJ	398,898	498	267	B	
K1PY	290,646	482	201	B	
WA2ABN	101,394	262	129	B	
NY2A	85,902	278	103	B	
N2CK	78,546	247	106	B	
W2DXE	30,888	117	88	B	
KV2X	3,627	39	31	B	
K2UA	5,248,800	4050	432	C	
K2NV	2,302,146	2114	363	C	
N2CU	1,364,160	1421	320	C	
K2FU	1,169,622	1086	359	C	
NA2X	252,648	348	242	C	
W2FUI	127,896	292	146	C	
WB2AIV	8,820	60	49	C	
KA2MGE	6,519	53	41	C	
K2AXX	27,048	161	56	C	160
W2VO	19,080	120	53	C	160
WB2DVU	93,132	398	78	B	40
N2UM	2,580	43	20	B	40
N2MF	645,414	1778	121	C	15
W2FU	460,701	1359	113	C	15
K2CS	27,435	155	59	B	10

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Delaware

N9GG	29,520	120	82	A	

Eastern Pennsylvania

K3PH	2,079,702	2027	342	B	
WF3M	288,045	555	173	B	
N3NZ	188,100	380	165	B	
W3BEN	140,160	292	160	B	
NU3Z	105,336	266	132	B	
W3KM	21,909	109	67	B	
W3SSS	4,410	42	35	B	
AA3TT	1,328,244	1532	289	C	
N3KR	883,134	978	301	C	
K3OO	824,352	992	277	C	
WB2FFY	806,436	1179	228	C	
W3BYX	785,070	915	286	C	
N3RJ	620,958	838	247	C	
K3CP	558,360	564	330	C	
W3BG	535,509	597	299	C	
K4JLD	455,424	593	256	C	
W3RJ	289,680	680	142	C	
K3JG	265,200	400	221	C	
K3VA	262,056	488	179	C	
K3QIA	257,652	421	204	C	
W3KV	243,432	441	184	C	
K3JJG	9,288	72	43	C	160
K3SWZ	8,772	68	43	C	160
K3SV	63,717	317	67	C	80
K3ZX	5,856	61	32	C	80
W8IJ	12	2	2	C	40
NE3I	14,319	111	43	B	10
K3NL	2,925	39	25	B	10

Maryland-DC

K3AJ	391,068	639	204	A	
WD3P	57,630	170	113	A	
N1WR	1,515,348	1559	324	B	
W3IUU	543,228	812	223	B	
W3CP	496,248	667	248	B	
KE3VV	474,030	687	230	B	
W3DAD	381,306	617	206	B	
W3UT	309,672	506	204	B	
N3UN	140,400	312	150	B	
K3TW	112,398	262	143	B	
K3GHH	102,960	260	132	B	
WN3C	78,408	216	121	B	
W3FQE	60,885	205	99	B	
W3DOS (K3TW,op)					
	42,861	157	91	B	
K3LO	22,869	99	77	B	
NS3T	1,380	23	20	B	
K3ZO	4,447,266	3538	419	C	
K2PLF	2,419,308	2052	393	C	
K3ZZ	1,557,672	1583	328	C	
W3HVQ	1,072,374	974	367	C	
N3UM	879,504	1004	292	C	
W3AZ	705,681	881	267	C	
W3GN	427,491	639	223	C	
N3OA	348,783	551	211	C	
K3SX	190,302	322	197	C	
AE3M	10,413	89	39	B	20
KF3CV	2,376	33	24	B	20
WR3L	271,185	895	101	C	10

Western Pennsylvania

K3WWP	332,400	554	200	A	
N3FR	1,138,509	1341	283	B	
N3GJ	686,322	838	273	B	
WA3SES	432,915	665	217	B	
AA3LX	416,556	522	266	B	
AD8J	243,756	444	183	B	
WA3EQJ	113,094	309	122	B	
NB4J	74,214	186	133	B	
WN3VAW	67,344	184	122	B	
AA3ML	61,884	191	108	B	
K3FH	28,476	113	84	B	
W3GH	771,342	899	286	C	
WB3EPE	45,594	149	102	C	
K3UOC	103,356	396	87	B	20
K3JHT	7,035	67	35	C	10

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Alabama

W4NTI	231,660	429	180	B	
N4YQ	14,673	67	73	B	
K4AGT	47,196	171	92	C	
K4NVJ	13,662	99	46	B	15
K4WI	294,570	1091	90	C	10

Georgia

KE4R	212,532	398	178	A	
K4OGG	1,789,824	1888	316	B	
W4KYW	18,471	131	47	B	
N4NX	88,494	343	86	C	
W4RHG	45,276	154	98	C	
K4TEA	22,176	132	56	C	160
K9AY	266,724	956	93	C	40
W4WA	234,234	858	91	B	15
K6EID	92,352	416	74	C	10

Kentucky

K4BAM	184,632	392	157	B	
AA2GS	114,576	248	154	B	
K4WW	60,264	186	108	B	
AG4CZ	46,620	148	105	B	
N4JRG	6,450	50	43	B	
K4IU	305,592	476	214	C	
WB4ZDU	237,582	402	197	C	
N4QS	30,600	200	51	C	40
KT4ZX (KG4BIG,op)					
	78,189	389	67	B	15

North Carolina

N4IJ	315,744	572	184	A	
K4JO	14,976	78	64	A	
K4EYE	6,450	50	43	A	
N4YDU	1,628,991	1547	351	B	
WJ9B	1,307,952	1488	293	B	
W4IDX	826,140	980	281	B	
N4UOH	55,278	222	83	B	
K4QPL	53,700	179	100	B	
K4TP	17,922	103	58	B	
AE4EC	14,904	72	69	B	
N4UH	339,900	515	220	C	
N4QVM	133,293	283	157	C	
W4LM	19,392	101	64	C	
KZ2I	46,134	233	66	C	80
NW6S	230,112	799	96	C	15
W4ZV	587,148	1732	113	C	10

Northern Florida

NF4A	777,777	1001	259	B	
W4YA	254,412	444	191	B	
WB4IHI	156,465	305	171	B	
KN4Y	123,078	281	146	B	
N4EK	95,589	247	129	B	
NN4DF	21,000	100	70	B	
K4RFK	1,650	25	22	B	
W7QF	379,002	559	226	C	
W4VQ	8,322	73	38	C	160
NO4S	106,524	538	66	C	40
N4PN	494,892	1398	118	C	15

South Carolina

W4HGW	289,542	451	214	B	
AF4OX	212,952	467	152	B	
K4DLJ	1,446,192	1452	332	C	
W3VT	964,800	1072	300	C	
N2FY	19,431	127	51	C	80
K0COP/4	6,633	67	33	B	10
W4JKC	3,402	42	27	A	10

Southern Florida

K4ZT	40,392	136	99	B	
WT5L	19,497	97	67	B	
W4UM	3,264	34	32	B	
W4OV	203,616	336	202	C	
AF4RK	101,304	252	134	C	
W4GD	8,448	64	44	C	160
N4PL	27,720	168	55	C	80
W6HJ	21,870	135	54	C	15
N4GM	72,900	270	90	B	10

Tennessee

WO4O	1,633,329	1569	347	B	
NA4K	1,488,972	1486	334	B	
W4NZ	1,336,530	1495	298	B	
K4BEV	482,202	623	258	B	
N4UW	338,580	540	209	B	
W4TYU	127,842	286	149	B	
N4HL	100,500	268	125	B	
W4RKV	100,464	299	112	B	
W4AUI	93,366	234	133	B	
W4NI	69,849	199	117	B	
WD4OHD	43,146	153	94	B	
W4DAN	23,634	101	78	B	
W4YGE	9,612	89	36	B	
K0EJ	2,652,090	2422	365	C	
N4IR	779,868	996	261	C	
N4KN (@W4CAT)					
	752,094	987	254	C	
AA3VA	285,948	564	169	C	
W4OGG	15,582	98	53	C	
N4ZZ	438,192	1432	102	C	15

Virginia

N4UY	72,384	208	116	A	
K4FPF	694,416	782	296	B	
K4UVT	656,019	801	273	B	
K4ORD	307,146	497	206	B	
K1KO	205,869	421	163	B	
N4PD	130,092	293	148	B	
N1KC	114,543	267	143	B	
N4JED	62,532	193	108	B	
K4ITV	40,866	139	98	B	
AD4TJ	35,088	136	86	B	
N4OT	33,561	113	99	B	
KA0RVV	33,000	125	88	B	
WB4DNL	26,145	105	83	B	
K4SM	21,024	96	73	B	
W4SD	19,392	101	64	B	
N8GM	15,936	83	64	B	
K3MZ	8,700	58	50	B	
W4YE	842,310	955	294	C	
N4MM	669,780	732	305	C	
W2YE	417,690	595	234	C	
AA4KD	223,494	386	193	C	
K4RDU	207,192	356	194	C	
K4FOY	192,780	378	170	C	
N3JT	154,176	352	146	C	
W4IF	153,450	330	155	C	
W4VC	147,312	341	144	C	
K6ETM/4	144,342	297	162	C	
W6IHG	57,750	154	125	C	
N3JB	33,075	147	75	C	
W4ZYT	5,400	50	36	C	
W4HM	28,380	172	55	B	80
KZ1A	15,288	104	49	C	40
K4OAQ	390,735	1371	95	C	15
WB3BEL	57,816	264	73	A	10

West Central Florida

K4XS (N2NL,op)					
	4,236,012	3378	418	B	
N4IG	1,379,460	1385	332	B	
WD4AHZ	1,371,120	1576	290	B	
K9BG	1,105,650	1134	325	B	
W1CSM/4	118,629	269	147	B	
WA2NDP	48	4	4	B	
K1TO	1,108,890	1369	270	C	
K4LQ	837,516	983	284	C	
N6GLI/4	27,084	148	61	C	20
N4AO	407,838	1346	101	C	10

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Arkansas

KJ5TF	15,600	80	65	A	
WA5SOG	21,708	108	67	C	

Louisiana

K5KLA	1,026,912	1126	304	B	
KM5YL	139,728	284	164	B	
W5WMU	354,570	1115	106	C	20

Mississippi

W5UE	445,284	798	186	B	
AC5SU	103,368	236	146	B	
WA5OYU	2,484	36	23	C	

New Mexico

K5OI	24,360	116	70	A	
W5AN	12,852	68	63	B	
N6ZZ	2,460,924	2082	394	C	
KD5JAA	29,952	156	64	C	
W5JRP	28,380	172	55	B	20
N7DF	324,174	1114	97	C	10
W6PU	317,088	1101	96	C	10

North Texas

WA8ZBT	189,243	387	163	A	
W0VX/5	146,700	326	150	A	
W5RYA	31,122	114	91	A	
K5WO	964,218	1186	271	B	
KY5N	481,422	779	206	B	
KT5Q	261,129	451	193	B	
WK5K	166,320	330	168	B	
N5CHA	136,782	306	149	B	
W5EIJ	112,266	243	154	B	
W5KAU	92,820	238	130	B	
N1CC	22,500	100	75	B	
N5RG	1,703,469	1627	349	C	
N5PO	948,321	1023	309	C	
N8SM	37,248	194	64	C	80
N4JIU	672	16	14	A	40
K5RX	480,492	1483	108	C	10
KB5KYO	30,927	169	61	A	10

Oklahoma

K5YAA	1,888,416	1896	332	C	
W5TM (W5AO,op)					
	348,552	1128	103	C	40
K0CIE	14,805	105	47	B	40

South Texas

KG5U	631,890	826	255	A	
N5AW	1,885,509	1641	383	B	
K8EP (@W5SB)					
	1,005,804	1206	278	B	
NO5W	155,241	367	141	B	
K5HDU	132,759	297	149	B	
K5GM	50,184	164	102	B	
WX5I	41,067	169	81	B	
KD5MJJ	24,840	115	72	B	
W5BBR	9,900	66	50	B	
W5AJ	9,699	61	53	B	
KD5GKP	9,672	62	52	B	
KM5TY	6,642	54	41	B	
K5GN (@W5KU)					
	4,551,876	3402	446	C	
N3BB	3,375,840	2705	416	C	
KA5KLU	166,080	320	173	C	
W5PF	135,456	272	166	C	
W5XD	36,024	152	79	C	
KM5WR	15,561	91	57	C	
NX5M	3,276	39	28	C	160
W5EB	11,376	79	48	B	20

West Texas

NZ5M	11,352	86	44	B	15

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East Bay

W1AH/6	296,925	535	185	B	
K6LDX	60,102	189	106	B	
KE6QR	2,997	37	27	B	
W6CUS	491,466	811	202	C	
KG6HM	6,633	67	33	B	10

Los Angeles

AI6Z	187,875	375	167	B	
N6GL	130,065	299	145	B	
WO6M	110,370	283	130	B	
KG6ERO	84,096	219	128	B	
K6CEO	43,569	141	103	B	
KC6X	27,492	116	79	B	
K6NT	22,848	112	68	B	
WA6BOB	15,228	94	54	B	
N6AA	968,085	1065	303	C	
K0DI/6	824,499	1053	261	C	
N6TW	417,294	582	239	C	
N6IC	126,900	300	141	C	
K6SE	39,249	147	89	C	
KH6DX/M	11,766	74	53	C	
KU6T	8,925	85	35	B	40
N6ED	252,546	859	98	C	15
NK6A	21,024	146	48	B	10

Orange

W6GA	30,600	150	68	A	
AA6PW	336,798	693	162	B	
W6SA	215,985	385	187	B	
WA6BFW	55,332	212	87	B	
WA6OGO	52,650	195	90	B	
W8KIE	22,935	139	55	B	
K6HRT	53,535	215	83	C	
W6DCC	83,394	339	82	C	10

Santa Barbara

W6UM	641,088	742	288	B	
WA6FGV	227,568	431	176	B	
W6VM	55,650	175	106	B	
W6TK	454,896	702	216	C	
W6OUL	13,968	97	48	C	

Santa Clara Valley

K6XX	409,437	679	201	A	
K6III	195,288	412	158	A	
W6IO	92,565	255	121	A	
N6NF	614,754	861	238	B	
N6EM	295,815	533	185	B	
W6ISO	61,200	170	120	B	
W6PRI	22,050	150	49	B	
K6GT	408,654	622	219	C	
N6DQ	54,609	167	109	C	
K6MO	66	11	2	B	160
K8PO	259,722	921	94	C	40
W6ISQ	1,701	27	21	C	15
KG6CEH	11,988	111	36	B	10

San Diego

W6QU (W8QZA,op)					
	230,832	458	168	A	
W6JVA	102,729	283	121	A	
AA6EE	83,664	249	112	B	
K7JJ/6	522,405	741	235	C	
W6MVW	457,146	654	233	C	
K6NA	309,474	521	198	C	
N7CW	284,232	911	104	C	15
W6YA	384,780	1166	110	C	10
WN6K	123,075	547	75	B	10

San Francisco

W6JTI	596,484	789	252	A	
K6UM	256,014	431	198	B	
AD6G	50,508	183	92	B	
WB6IYS	23,430	110	71	B	
W6WB	48,867	179	91	C	
KQ6NN	26,325	135	65	C	

San Joaquin Valley

W6UDX	118,320	272	145	C	
KI6PG	360	12	10	B	80
KA6BIM	236,592	744	106	C	10
NT6K	92,016	432	71	C	10

Sacramento Valley

KU6J	431,844	679	212	B	
K6LRN	147,744	304	162	B	
W6RFF	102,729	283	121	B	
W6EU	188,529	319	197	C	
K1ES	12,012	91	44	B	20
K6RN	55,596	226	82	C	15
W6RKC	14,076	102	46	B	15
K6UO	32,955	169	65	B	10
WR6WR	7,560	70	36	A	10

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Arizona

N7IR	728,448	896	271	A	
NQ7X	67,275	195	115	A	
W7ZMD	4,680	60	26	A	
WN7J	575,508	796	241	B	
N3AIU	302,082	506	199	B	
N7MAL	226,728	402	188	B	
KX7J	100,875	269	125	B	
W2HTX	30,861	127	81	B	
W8LYT	5,202	51	34	B	
N7RT	2,751,960	2414	380	C	
KC7V	1,782,102	1967	302	C	
W7YS	551,928	793	232	C	
N7JXS	97,920	255	128	C	
N7UJJ	32,880	137	80	C	
K2DI	4,332	38	38	C	
KJ7WY	2,691	39	23	C	80
W8AEF	468	12	13	C	80
W7AVY	10,458	83	42	C	40
K6LL/7	450,528	1444	104	C	15

Eastern Washington

WS7V	158,046	371	142	B	
W7GB	126,000	300	140	B	
WA7LT	104,832	416	84	B	15
W7LGG	38,400	200	64	C	10

Idaho

W1HUE	113,022	273	138	A	
WO7Y	836,430	1138	245	B	
W7QDM	196,539	343	191	B	
W7UQ (KL9A,op)					
	188,838	538	117	B	
W7ZRC	122,304	448	91	B	
N7UVH	112,815	345	109	B	
N7ZN	51,336	184	93	B	
K0IP	38,844	156	83	B	
KG7H	756,972	978	258	C	

Montana

KE7NO	187,920	348	180	B	
KK7UV	104,013	273	127	B	
N7CZ	25,560	142	60	B	
KS7T	447,630	694	215	C	
KC7UP	230,955	445	173	C	
K7BG	282,069	1011	93	C	10
K7ABV	139,440	560	83	B	10

Nevada

K6CNE	10,206	81	42	A	

Oregon

N7OU	336,960	585	192	A	
W7YAQ	1,072,290	1153	310	B	
W7GG	2,212,326	2319	318	C	
K7MI	2,207,838	2033	362	C	
W2VJN	2,192,157	2013	363	C	
K4XU	2,152,722	2123	338	C	
KI7Y	664,335	855	259	C	
K0JJ	237,795	415	191	C	

Utah

KD7BOD	15,624	93	56	A	
W7CT	1,166,922	1446	269	B	
KE7NS	639,282	982	217	B	
W7HS	407,160	580	234	B	
KJ7G	78,486	254	103	B	
N7LYV	60,738	191	106	B	
N7IF	44,616	169	88	B	
K7JIZ	16,692	107	52	B	
W7UT	122,400	480	85	C	40
KO7X	150,855	565	89	C	20
K6EIL	9,945	65	51	C	20

Western Washington

W7IJ	487,599	749	217	B	
AB7RW	462,636	724	213	B	
W7QN	271,395	489	185	B	
KD7GTI	222,318	537	138	B	
AG7T	163,017	307	177	B	
W7EAI	59,274	178	111	B	
W7GTO	26,784	144	62	B	
KD7GIM	180	12	5	B	
W7VJ	1,091,412	1491	244	C	
N6HR	1,035,741	1147	301	C	
K7ZA	429,024	656	218	C	
W7IIT	281,436	499	188	C	
KB7N	196,992	384	171	C	
N7ETC	97,314	331	98	C	
W7QC	93,942	307	102	C	
N9KAH	13,338	78	57	C	
W7TSQ	297	11	9	B	40

Wyoming

AA0MZ	122,988	277	148	B	

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Michigan

AB8DF	27,900	124	75	A	
K8IR	830,004	964	287	B	
K8GT	684,744	824	277	B	
N8KV	177,384	389	152	B	
KB8PGW	174,000	400	145	B	
K8KU	153,582	358	143	B	
WB8MIW	153,180	345	148	B	
W8WVU	67,800	200	113	B	
N8NX	46,332	156	99	B	
W8XC	20,124	86	78	B	
N8VEN	17,544	86	68	B	
K8GL	3,565,890	2810	423	C	
K8JM	525,150	778	225	C	
W8TWA	101,745	255	133	C	
KC8MPQ	1,449	21	23	C	
W8TOP (W8UVZ,op)					
	36,456	196	62	C	160
N8EA	22,518	139	54	C	160
K8MD	24,750	150	55	C	80
K8VT	15,510	110	47	C	80
K8LV (@K8LX)					
	365,715	1161	105	C	40
W8UD	184,527	707	87	C	15
WA8OLD	33,480	180	62	B	15
WB8RFB	12,384	96	43	B	10

Ohio

N8AA	2,553,387	2081	409	B	
KV8Q	806,478	967	278	B	
WB8PLP (WA8RCN,op)					
	532,800	800	222	B	
W8VE	384,282	577	222	B	
NC8V	334,572	569	196	B	
W8PN	310,080	544	190	B	
W8IDM	279,051	487	191	B	
N8PW	273,312	416	219	B	
W8GOC	201,690	405	166	B	
K8LY	151,188	293	172	B	
KF8UN	127,296	408	104	B	
KG8DH	124,683	299	139	B	
N8XP	111,600	240	155	B	
W8DHG	70,125	187	125	B	
AF8C	48,348	158	102	B	
W8AN	26,784	124	72	B	
K8MR	9,165	65	47	B	
KN8AW	5,031	43	39	B	
K8AL	1,158,696	1254	308	C	
N9AG	144,126	306	157	C	
W8DN	10,413	89	39	C	80
K8MK	66,096	306	72	C	40
K8NMG	21,534	97	74	B	20
W8KH	720	16	15	B	10

West Virginia

K5IID	1,298,076	1378	314	B	
W8OP	283,416	482	196	B	
N4ZR	3,086,622	2882	357	C	
K2UOP	682,122	763	298	C	
N8II	38,076	167	76	C	
K7SKP	25,704	136	63	C	
K8KFJ	14,628	106	46	C	40
K8OWL	19,140	116	55	C	10

9

Illinois

N9JF	924,300	1027	300	B	
W9IL	913,500	1050	290	B	
K9MMS	686,085	863	265	B	
W3HDH	366,612	548	223	B	
K9RR	223,440	380	196	B	
K9XE	132,240	304	145	B	
W9SZ	107,304	263	136	B	
N9LYE	95,676	238	134	B	
AA9NF	74,664	204	122	B	
K9KM	68,016	208	109	B	
K9PPW	65,403	169	129	B	
N9BOR	54,282	166	109	B	
KA9S	36,432	138	88	B	
W9VQ	22,680	105	72	B	
W9LYA	20,805	95	73	B	
W9LNQ	18,240	80	76	B	
N9DT	3,996	36	37	B	
WA9LKZ	663	17	13	B	
K9NR	1,447,386	1619	298	C	
K9UQN	464,508	748	207	C	
W9OA	360,192	536	224	C	
N2BJ	344,088	486	236	C	
KB9UWU	65,703	181	121	C	
WA9TPQ	57,321	193	99	C	
WB9AYW	48,900	163	100	C	
KB9CRY	969	17	19	C	
K9AB	4,650	50	31	C	160

W9LYN 300 10 10 B 160
K9CS 15,651 111 47 B 80
K9CJ 55,230 263 70 C 40
KK9A 3,744 39 32 C 40
NO9Z 121,230 449 90 C 20
WB9MII 990 22 15 A 20
KE9EX 585 15 13 B 20
KA6A 293,412 998 98 C 15
W9OF 292,878 921 106 C 15
W9DY/M 16,524 102 54 B 15
K9AN 349,500 1165 100 C 10
K9QVB 245,640 890 92 B 10
KG9X 191,373 701 91 C 10
NN9K 132,720 553 80 B 10
K9WA 100,359 413 81 A 10
N9GUN 4,230 47 30 B 10

Indiana

K9DIY 21,780 110 66 A
N4TZ 2,094,048 1983 352 B
KC9FC 80,391 211 127 B
K9MI 5,760 48 40 B
W9CM 1,260 21 20 B
W9RE 4,469,220 3547 420 C
K9NW (@K9UWA)
4,146,516 3113 444 C
W9KTP 389,529 567 229 C
N9WKW 194,304 352 184 C
K9WJU (W9CG,op)
3,906 42 31 B 160

Wisconsin

N9CIQ 558,054 721 258 A
AF9J 18,480 88 70 A
W9WUU 657,126 849 258 B
AA9RR 88,128 216 136 B
W9MQN 33,075 105 105 B
W9AKS 20,703 103 67 B
N9GBB 19,530 93 70 B
K9XJ 6,426 51 42 B
N9CK 2,919,483 2439 399 C
K9MA 2,768,031 2487 371 C
W9W (WI9WI,op)
1,716,372 1946 294 C
N9AU 119,595 469 85 C 40
W9GXR 57,159 261 73 C 40
W9OP 215,049 739 97 C 15
NI9C 98,040 430 76 B 15
W9XT 332,391 1097 101 C 10

0

Colorado

N0TK 41,760 232 60 A
WV7T 29,388 124 79 A
WB0HZL 12,375 75 55 A
K0RI 742,716 897 276 B
W0ZA 110,838 377 98 B
N0IBT 43,197 187 77 B
N2IC 4,595,013 3489 439 C
KJ0G 116,748 282 138 C
K0CO 30,132 124 81 C
K0CL 61,440 256 80 B 40
K0AV 122,553 459 89 A 15
KV0Q 433,440 1376 105 C 10
W0TM 318,111 991 107 C 10

Iowa

NU0V 27,489 119 77 A
W0PWE 4,416 46 32 A
K0CF 527,850 690 255 B
NE0P 457,203 593 257 B
AA0AI 253,464 472 179 B
N0AAA 84,912 232 122 B
AD0H 49,335 143 115 B
WB0B 19,140 110 58 B
KC0BOM 36 3 4 B
W0EJ 1,653,750 1750 315 C
K0SRL 10,500 100 35 B 40
KE0FT 45,360 315 48 B 10

Kansas

K0BJ 450,216 676 222 B
W0NXS 317,262 506 209 B
KB0WPY 41,877 141 99 B
W0UY 299,574 561 178 C

Minnesota

N0UR 735,300 950 258 A
NA0N 1,204,182 1509 266 B
W0ZQ 531,960 715 248 B
KE0UI 499,230 774 215 B
AC0W 183,600 360 170 B
KN0V 175,059 367 159 B
WB0GGM 118,320 272 145 B
K0KGS 110,700 246 150 B
WA2MNO 95,667 223 143 B
K0SQ 68,442 187 122 B
WG0M 64,128 167 128 B
N0BM 33,516 133 84 B
WA0MHJ 5,508 51 36 B
K0IR 1,927,056 2113 304 C
W0OR 329,802 526 209 C
K0KG 28,770 137 70 C
K0IHG 34,974 174 67 B 20

Missouri

K0TPY 213,180 380 187 B
KS0M 157,314 314 167 B
W0SLW 104,958 238 147 B
K2HT 53,424 168 106 B
W0YZZ 13,416 86 52 B
KA0P 12,000 80 50 B
K0OU 1,005,720 1160 289 C
K0CA 554,016 796 232 C
K4VX (W9BGL,op)
300,483 1077 93 C 40
WA0OTV 3,402 42 27 C 15

North Dakota

WB0O 395,112 652 202 C
KI0E 31,275 139 75 C

Nebraska

K0IL 202,122 394 171 B
AB0FX 71,760 208 115 B
WN0L 38,415 197 65 B
K0XU 108 6 6 B 20

Maritime-Newfoundland

VO1MP 1,532,520 1419 360 B
VE1OP 1,425,138 1661 286 C
VO1WET 663 17 13 B 15
VE9ST 431,844 1484 97 C 10

New Brunswick

VE1KB 8,610 82 35 B 10

Nova Scotia

VE1EP 4,224 44 32 B
VE1AYY 31,620 170 62 B 20

Quebec

VE2AWR 864,612 1022 282 B
VE2FFE 30,600 120 85 B
VE2AYU 1,299,870 1515 286 C
VA2AN 38,106 219 58 C 40
VE2XAA 10,605 101 35 B 40
VE2/NT2W 7,182 63 38 C 20
VE2OWK 30,609 179 57 C 15

Ontario

VE3WZ 70,446 199 118 A
VE3XL 55,500 185 100 A
VE3KQN 47,520 160 99 A
VE3KP 1,384,086 1474 313 B
VE3ZPD 1,356,360 1270 356 B
VA3UA (@VE3MIS)
1,261,611 1599 263 B
VA3UZ 943,635 1045 301 B
VA3TEE 417,600 600 232 B
VA3NR 405,375 575 235 B
VA3ZW 115,080 280 137 B
VA3IX 30,996 126 82 B
VE3EJ 4,510,152 3386 444 C
VE3XN 530,076 652 271 C
VE3BR 7,740 60 43 C
VE3OSZ 8,979 73 41 B 160
VE3IAY 26,052 167 52 B 80
VE3PN 17,934 122 49 C 80
VA3TTT 175,098 758 77 C 40
VA3TTN 123,714 474 87 C 20
VE3MQW 143,706 557 86 B 15
VE3UKR 10,440 87 40 B 15
VE3STT 99,456 448 74 C 10
VE3ZT 76,446 411 62 B 10
VA3RJ 37,575 167 75 C 10
VE3TG 9,936 92 36 A 10

Manitoba

VE4COZ 32,775 115 95 B
VE4MG 34,776 184 63 C
VE4IM 118,200 394 100 B 20
VE4MF 43,935 145 101 B 15

Saskatchewan

VE5SF 730,380 1036 235 B
VE5UF 124,476 506 82 B 10

Alberta

VE6TN 272,130 470 193 B
VE6JY (VE6WQ,op)
184,230 690 89 C 40
VE6BF (@VE6JY)
302,100 1060 95 C 10

British Columbia

VA7NT 3,648 38 32 A
VE7SZ (VA7RR,op)
1,993,164 2038 326 B
VE7XF 762,888 956 266 B
VA7DX 466,470 730 213 B
VE7NH 387,351 579 223 B
VE7XB 257,094 529 162 B
VE7QO 188,307 427 147 B
VE7VR 23,985 123 65 B
VE7SL 1,488 31 16 B 160
VE7UF 12,342 121 34 C 80
VE7/W7DRA 9,546 86 37 B 40
VE7AV 109,446 493 74 C 20
VA7LC 10,080 80 42 C 20
VE7VF 61,320 292 70 B 10
VE7IN 43,524 279 52 B 10
VE7NNN 11,544 104 37 B 10
VE7NS 10,272 107 32 B 10

Northwest Territories

VY1DX 151,875 405 125 C

Single Operator Assisted

1

KI1G 7,646,040 4755 536 C
K1AM 4,335,120 3345 432 C
N6RFM 2,036,745 1605 423 C
W1CU 2,007,600 1673 400 C
N4XR 1,885,725 1479 425 C
AA1V 1,654,740 1268 435 C
N8RA 1,614,516 1621 332 C
K1GU 1,398,285 1351 345 B
W1QK 1,339,620 1345 332 C
K1VV 1,306,992 1168 373 C
W1RZF 1,130,880 1178 320 C
NQ1K 972,954 849 382 C
K1TS 863,148 1006 286 B
W1BIH 860,679 753 381 C
N1DG 852,600 812 350 C
W1JCC 803,745 795 337 C
K1NU 735,537 719 341 C
KS1L 702,297 703 333 C
W1UK 642,876 676 317 C
K1RV 624,912 752 277 C
K1JN 597,240 711 280 C
K1KU 282,240 384 245 C
W3SM 217,743 401 181 B
K1TW 157,905 319 165 B
K1HI 68,115 239 95 C
WV1M 50,868 157 108 C
N1MD 33,396 121 92 C
N1MM 32,760 130 84 C
K1ST 22,791 107 71 C
KE1KD 10,725 65 55 C

2

K2NG 5,869,986 3457 566 C
W2GD (@N2NT)
4,282,740 2884 495 C
N1EU 3,885,000 2500 518 C
K2NJ 3,299,562 2494 441 C
K2ONP 2,840,376 2233 424 C
W1GD 2,802,114 2118 441 C
W2YC 2,795,880 2026 460 C
W6XR 2,566,200 1880 455 C
NO2R 2,478,564 1707 484 C
N2MG 1,988,112 1708 388 C
WK2G 1,909,824 1624 392 B
W2GDJ 1,728,489 1553 371 C
KF2O 1,455,066 1059 458 C
N2TK 1,444,617 1063 453 C
N2CY 1,392,363 1251 371 C
W2LK 985,920 1040 316 C
K2XF 921,402 906 339 C
NY6DX 741,342 929 266 C
N2CQ 653,226 721 302 C
K2SB 627,300 697 300 C
KD2P 595,680 680 292 C
N2FF 580,851 639 303 C
K2BX 560,640 640 292 C
N2NI 533,358 747 238 B
WB2WPM 494,208 572 288 C
W2GR 462,231 667 231 B
K2MP 457,164 612 249 C
W2ZQ 408,765 595 229 C
W2NO 348,549 521 223 C
K2EP 339,264 496 228 C
N2WK 318,528 448 237 B
W2LE 316,728 498 212 C
W2EZ 230,412 422 182 C
W2RD 188,415 265 237 C
W2GO 148,986 279 178 B
W2KA 148,824 312 159 C
AB2E 120,690 270 149 B
KQ2O 69,336 321 72 C
NA2NA 41,616 136 102 B
WI2W 41,184 132 104 B
K2WB 33,300 111 100 C

3

K3WW 7,055,904 4388 536 C
AA3B 4,124,064 2888 476 C
N3RR 3,982,230 2709 490 C
KQ3F 3,644,520 2761 440 C
N3AD 3,579,453 2577 463 C
W3FV 2,272,860 1830 414 C
W3OV 1,422,432 1347 352 C
WE3C 1,333,989 1149 387 C
K3II 1,322,400 1102 400 C
W3GM (K3ND,op)
1,318,122 1118 393 C
WA3KPP 1,295,892 1278 338 B
W3EKT 1,213,674 994 407 C
WT3W 1,095,633 1023 357 C
KB3MM 1,076,406 1037 346 B
WT3P 1,071,144 1044 342 C
N3AM 1,067,526 954 373 C
K3NZ 1,061,196 926 382 C
W3GK 947,520 987 320 C
W3UJ 912,336 916 332 B
N3ZA 767,970 742 345 C
N3MV 610,566 638 319 C
W3UL 484,848 624 259 C
WB4ZHO 315,228 482 218 B
N3AS 239,202 411 194 C
W3IZ 211,578 358 197 C
KU3X 133,560 318 140 B
K3CT 71,205 235 101 C
K3TG 64,071 189 113 B
NZ3O 46,728 132 118 C
KB3FEE 28,812 98 98 B
K3PP 10,620 60 59 C

4

K3KO 1,876,626 1522 411 C
N4ZJ 1,852,500 1625 380 C
W3IO 1,185,336 1212 326 C
N4VV 952,644 1031 308 C
N4DL 848,718 1014 279 B
N8PR 409,632 502 272 C
W3YY 386,082 482 267 C
N6MW 241,116 283 284 B
WA2MBP 156,600 300 174 B
N3EK 53,235 169 105 B

5

K5NA 1,491,375 1025 485 C
N5JR 1,162,560 1384 280 C
K5MC 750,162 742 337 C
K5LP 406,368 498 272 C
N1PC 143,010 227 210 B

6

W6OAT 1,573,242 1331 394 C
N6JV 1,101,870 1155 318 C
N6WS 742,653 817 303 B
K6TA 655,011 843 259 C
NF6R 161,553 343 157 C
NU6I 157,815 315 167 C
K6EP 21,012 103 68 B
K6ASK 16,254 86 63 C
N6HY 8,775 75 39 C
K6BIR 4,788 42 38 B

7

W7/DL3OI (@W7ZQ)
3,000,459 2387 419 C
AA7A 2,182,680 1720 423 C
N7FO (KB3EHU,op)
1,683,870 1517 370 C
W7ZR 1,041,651 1131 307 B
W7OM 1,016,436 1193 284 C
WA7UTM 437,943 577 253 C
K7ZO 109,326 266 137 C

8

KU8E 592,920 648 305 C
AA8TC 499,065 485 343 C
WZ8A 351,288 492 238 C
K8CH 84,630 182 155 B
N8TR 35,970 110 109 C
K8KSN 35,550 158 75 B

9

N9XX 985,149 963 341 B
K9WX 229,320 392 195 B
K9PG 201,000 335 200 B
W9TN 135,432 297 152 B
AA9PB 133,518 289 154 C
KB9KTC 89,100 220 135 C
W9YO 79,365 185 143 B
WE9A 48,048 143 112 C
AD4OS 9,984 64 52 B
KG9N 9,165 65 47 B

0

N0AT 1,772,550 1515 390 C
WA0SXV 297,483 323 307 C
K0UK 261,630 513 170 B
K0BX 162,864 348 156 C
KI0F 41,712 176 79 C
K0XD 21,630 103 70 B

VE

VE3NA (@VA3RU)
2,735,658 2166 421 C
VE6LB 125,235 253 165 C
VE6JO 15,708 154 34 C

Multioperator Single Transmitter

1

AA1ON (+W1RH)
3,654,720 2592 470 C
WT1T (@K1TWF) (WO1N, K1TWF, N1TT, W1ES,ops)
3,547,800 2700 438 C
N1RR (+WM1K,KM1P)
2,535,504 2092 404 C
N1AU (+WC1D)
1,274,544 1272 334 C
W1SRG (AG1C, N1GR, NK1L,ops)
526,269 607 289 C
W1NR (+W1BK)
508,950 585 290 C
W1WFZ (+K1FTA)
398,763 547 243 C
W1FM (+N1SOH)
335,400 559 200 C
KK1L (+K1KD)
276,330 610 151 C
W1AW (N4QX, N7NG, K1STO, N1ND,ops)
165,393 391 141 C

2

AA2FB (+K2QMF)
4,539,381 3199 473 C
N2XI (@W2RE) (N1NY, N2IW, N2IX, K2XR, W2RE,ops)
4,445,172 3126 474 C
K2UG (KY2J, NA2N, WA2JQK,ops)
3,255,525 2385 455 C
K2YEH (+K2CDJ)
403,245 515 261 B
N2BIM (+WB2BHC)
318,240 510 208 C

3

W3BGN (+K2TW)
6,331,332 3967 532 C
NE3F (+KS3F, K3ATO)
3,057,600 2240 455 C
N3BNA (+N2WKS)
1,117,248 1058 352 C
W3LJ (+K3NCO)
168,336 334 168 C
WY3T (+N3JRX)
155,775 335 155 C

4

W4AN (+K4BAI, K5OT)
6,766,200 4296 525 C
W4MR (@AA4NC) (K4MA, AA4NC,op)
4,627,620 3282 470 C
K4NNN (K4QJ, N4KM, W1CW, W1YL,ops)
4,109,268 3092 443 C
WS4Y (+K2BG, K4WA)
989,520 1085 304 C
W4AUB (+N4AU, K4IZN)
438,816 653 224 C

6

W6YX (W6LD, N7MH, ops)
2,063,250 1750 393 C
K6ZM (K6WG, KD6RMN,ops)
1,871,064 1999 312 C
W1HIJ (+N6HC)
886,032 1172 252 C

7

WT6G (+KE7X, W7LR)
1,891,032 1672 377 C
AD7DX (AD7L, W7IX,ops)
134,250 358 125 B

9

WN9O (+W9IU)
2,653,236 2052 431 C

0

K0JE (+K0JA)
165,966 278 199 B
W0BR (+KA3NAM, N0SZE, KC0IBO)
33,276 118 94 B

VE3HG (+VE3HKC, VE3GGF, VE3RZ)
1,331,520 1168 380 B
VE6AO (VE6CIZ, VE6JAZ, VE6KC, VE6KZ, VE6EX, VE6JO, VE6KG, VE6RTL,ops)
893,412 996 299 C

Multioperator Two Transmitters

K1AR (@K1EA) (+K1EA, K5ZD, NT1N, AG9A, W1NR)
13,198,560 7096 620 C
N2RM (+K2WI, N2AA, N2NC, N2NT, W2RQ, WM2H)
12,636,672 6928 608 C
N3RS (+K3WU, N2SR, N3ED, N3RD, W2UP, W8FJ)
11,525,958 6414 599 C
K1KI (+K1CC, KM1P, W1RM, K2KQ, W2WB)
11,139,120 6480 573 C
K4JA (+K9JY, K9GY, KE9I, W4JVN, WE9V)
10,879,335 6285 577 C
K8AZ (+K8BL,K8MR,K8NZ,N8TR, W8BIN,W8CAR,W8GN,W8KIC, WB8K,WT8C)
9,406,083 5491 571 C
K1ZR (@W1GQ) (+N1SNB, W1GQ, K2TE) 9,403,584 5762 544 C
NY4A (@N4AF) (K2AV, N4AF, W2CS,ops)
8,799,570 5382 545 C
W8AV (+K4LT, AF8A, K8AJS, K8KM, K8MN, K8MR, K8ND, KI8IZ, KU8E, W8RZ, W8WTS)
8,060,310 4815 558 C
KB1H (+NB1U, K1EBY, N1XS, AA1CE, KB1DFB, N7NG, K1GX)
6,589,425 4265 515 C
NR4M (+K7SV, K4GMH, K4EC, K1SE, WA4JUK, K4EU)
5,950,377 3959 501 B
N5TW (+K5PI, AF5Z, W5TD, KE5C, N5IW, WS4G, K4FB, WQ5G)
5,370,708 3761 476 C
W6AX (@W6GO) (N6IG, K6RC, N6IYS, KG6ECI,ops)
5,295,528 3724 474 C
N0IJ (+N0KK, AF9T, WJ0M)
4,341,777 3209 451 C
W8ZA (+ops)
3,885,222 2738 473 C
WQ8RP (AC8W, K8DD, K8WMW, WD8S, WX3M,ops)
2,372,220 1910 414 A
K6SG (+K6NO)
1,978,344 1917 344 C
K3DI (+K2YWE, VE3GLO)
1,902,594 1643 386 C
N7WA (+JR1NKN, N7BV)
1,509,651 1683 299 C
WX3B (+N3SB)
210,384 487 144 C
K5KG (+K5RC)
136,779 359 127 C

Multioperator Unlimited Transmitters

W3LPL (+K1HTV, W2GG, ND3A, K3KU, AI3M, K3LP, K3MM, N3OC, KE3Q, K3RA, K3RV, KD4D)
17,260,200 8600 669 C
KC1XX (+K1GQ,K1TR,K1XX,W1FV, KM3T,N4CW,K6AW,N6HB)
17,089,380 8631 660 C
K3LR (+KD9SV, K9ZO, K9VV, N9RV, K8DX, K3UA, N0AX, N3RA, W9WI, ND8L, K8CX)
16,099,245 8193 655 C
K1XM (@W1KM (+W1KM, W1FJ, NB1B)
14,492,028 7804 619 C
K9NS (AA9D, KB3AFT, K9DX, K9GS,,K9HMB, K9NO, K9PW, K9PPY, K9RO, K9RS, KS9W, N9CO)
14,032,956 7378 634 C
W4MYA (+K4GAU, K4WMS, KC8FS, N3SB, W4HJ, WA4PGM, WA4QDM, WA8WV, WX3B, WK4Y)
11,748,948 6571 596 C
K1TTT (+K1MK, W1TO, NT2X, NU1P, W1MA, N1NK, K1WD, OK1DIX/ N1GA, W1VE)
11,522,904 6577 584 C
K1RX (+KF1V, K1EPJ, WA1S)
10,851,372 6258 578 C
W3PP (+AA1K, N6ZO, K3FT, NW3Y, WB4FDT,NX3A,N3KW ,KW3Z, N3PT)
10,704,504 6184 577 C
K0RF (+W0UA,N4VI,N9NC,W1XE, W0RTT,N2WW,SM7IWN,N0HF,logger)
9,642,276 5532 581 C
W4KZ (@NQ4I) (+W7FB,W4DD,N3XX, KS4Q,WI4R,K4PK, K4PI)
9,379,164 5623 556 C
K3NM (+W3CF, AA2WN, K2WK, LU9AY, WX3K)
7,506,375 4625 541 C
W0AIH (+WV3B, AA0ZZ, K0PC, KS0T, N0XB, WR0D, KK0AD, KT0R, K0TG)
7,345,632 4501 544 C
K5GO (+K0RWL, K0VBU, K5LG, KJ5WX, KM5G, N0EHW, N5DX, N5OE, W0JOE, W5RZ, K5ALU)
6,831,240 4379 520 C
N0NI (+N0YY, K0KD, K0RX, WO0V, W0FLS)
6,604,158 4258 517 C
N6RO (+WA6O, N6BV, K3EST, W1SRD, WC6H, W6UT, N6ZS, N6DW)
6,104,538 4302 473 C
K3ANS (+WF3H, W3ZL, K3YD, K3MD)
5,601,408 3712 503 C
KV1W (+W1ZT, K1MBO, AI3E)
4,196,022 3034 461 C
N4RV (+ops)
2,138,721 1769 403 C
W3AP (+ops)
1,520,790 1630 311 C
K0RAY (+WA0IYY, N0PKX)
333,300 505 220 C

DX

Single Operator

Africa

Morocco

CN8YR 88,788 302 98 B

Angola

D2CR (RK3BR,op)
18,444 116 53 B

Canary Islands

EA8CN 1,828,827 2233 273 B
EA8/DJ1OJ 761,928 1198 212 B
EA8NN 143,418 902 53 C
EA8ASJ 86,337 543 53 B 20

Reunion

FR5FD 323,172 764 141 B

Egypt

SU9ZZ	1,030,608	1684	204	B	

Mali

TZ6DX	797,382	1429	186	C	

South Africa

ZS1NF	65,562	223	98	B	
ZS0E	113,022	299	126	C	
ZS4TX	109,998	679	54	C	40
ZS5RON	17,010	135	42	B	10

Asia

Vietnam

3W2LWS (WA1LWS,op)	63,675	283	75	B	

Azerbaijan

4K9W	17,160	104	55	C	

Israel

4Z5AX	37,440	260	48	B	10

Cyprus

C4A	657,216	978	224	C	

Kuwait

9K9C (OK1TYM,op)	22,134	119	62	C	

Oman

A45XR	55,818	443	42	C	10

Taiwan

BV7FF	127,200	400	106	C	

Kyrgyzstan

EX2A	75,750	250	101	C	
EX2X	89,433	523	57	C	20
EX2M	40,752	283	48	B	15

Tajikistan

EY8MM	810	18	15	C	

South Korea

HL1UOG	108,819	321	113	B	
HL2AMO	3,096	43	24	B	

Thailand

E21EIC	129,000	430	100	B	
HS4BPQ	9,009	77	39	B	

Saudi Arabia

HZ1HZ	229,680	580	132	C	

Japan

JR4DAH	214,755	515	139	A	
JH1XUZ	40,824	189	72	A	
JA5CDL	17,802	138	43	A	
JP6VCH	3,900	65	20	A	
JA1KEG	3,393	39	29	A	
JA5IDV	585	15	13	A	
JF3WNO	120	8	5	A	
JH7DNO	941,280	1480	212	B	
JR4PMX/1	756,204	1189	212	B	
JQ1UXN	686,637	1211	189	B	
JE2HVC	346,086	663	174	B	
JE1REU	345,648	758	152	B	
JA1YFG	328,440	644	170	B	
JS1OYN	318,330	655	162	B	
JF2QNM	293,985	705	139	B	
JR7ZIT (JQ1UKK,op)	233,172	612	127	B	
JA5JCC	211,182	577	122	B	
JE4MHL	173,355	455	127	B	
JA1XRH	136,884	374	122	B	
JE9VOI	133,056	396	112	B	
JH6OPP	132,252	428	103	B	
JA2VZL	108,237	331	109	B	
JA3YPL (JJ3TBB,op)	100,800	320	105	B	
JA5ATN	72,600	275	88	B	
JA1XUY	67,122	226	99	B	
JG3LGD	66,528	224	99	B	
JH7CJM	66,120	232	95	B	
JA1CP	64,032	232	92	B	
JA7ARW	54,810	203	90	B	
JL7AIA	53,922	209	86	B	
JH7IMX	49,440	206	80	B	
JA6SRB/4	49,128	184	89	B	
JE3UHV	38,844	166	78	B	
JA4BAA	36,186	163	74	B	
JR7HOD/1	36,120	172	70	B	
7N1BHO	33,252	163	68	B	
JE1HJV	32,193	147	73	B	
JA2BQX	32,175	165	65	B	
JA2MZ	26,082	138	63	B	
JA1BCP	25,437	139	61	B	
JA2UJ	24,192	126	64	B	
JR4CAU	24,120	201	40	B	
JA7DNO	24,003	127	63	B	
JM2RUV	23,532	148	53	B	
JN1MSO	21,615	131	55	B	
JR3NDM	21,033	123	57	B	
JJ1NZA	20,748	182	38	B	
JA6QDU	20,625	125	55	B	
JA1KJW	19,992	119	56	B	
JK1VSL	18,954	117	54	B	
JH1MTR	18,810	114	55	B	
JA7CPW	18,144	112	54	B	
JA1HG	17,808	112	53	B	
JA1AZS	17,400	100	58	B	
JA9RO	15,288	104	49	B	
JH1PXY	14,112	98	48	B	
JK8NLB	13,608	84	54	B	
JN7OJA	13,230	90	49	B	
JH0NVX/1	8,100	90	30	B	
JJ1GWF	7,128	72	33	B	
JA1XPU	6,528	68	32	B	
JA3BQC	4,872	56	29	B	
JA9KUG	3,366	51	22	B	
JH0IXE	2,772	42	22	B	
JH4JUK	1,458	27	18	B	
JH0OQL	1,020	20	17	B	
JH5FXP	1,825,392	2237	272	C	
JH4UYB	1,780,416	2248	264	C	
JG1ILF	1,541,475	2015	255	C	
JA8RWU	1,512,381	2041	247	C	
JR1AIB (JE1CKA,op)	658,512	1076	204	C	
JA2AXB	340,704	728	156	C	
JO3JYE	163,398	482	113	C	
JN2AMD	160,362	453	118	C	
JA1HP	138,375	369	125	C	
JA2QVP	130,995	355	123	C	
JA3ARM	123,879	347	119	C	
JI7NUF	120,945	733	55	C	
JA1JKG	93,240	444	70	C	
JA1BNW	73,920	224	110	C	
JA5IP	67,410	210	107	C	
JN3SAC	37,146	151	82	C	
JL3JTD	34,710	130	89	C	
7J1ABD	32,964	164	67	C	
JE2WWB	28,704	208	46	C	
JF2FIU	26,532	134	66	C	
JR3WXA	20,160	120	56	C	
JA2VQF	19,890	102	65	C	
JE4QGF	17,010	126	45	C	
JA1HHU	12,558	91	46	C	
JA8TEZ	858	26	11	C	
JA0QNJ	7,272	101	24	C	160
JR7VHZ	2,226	53	14	C	160
JE1SPY	741	19	13	B	160
JA2ZJW (JH1CMI,op)	28,080	208	45	C	80
JH1AEP	14,874	134	37	C	80
JH7XGN	73,299	461	53	C	40
JH1RFM	28,380	215	44	C	40
JA6BGA	4,131	51	27	C	40
JR4ISF/3	2,646	42	21	B	40
JR4CZM	2,025	45	15	B	40
JE5XIC	1,386	33	14	B	40
JA0GZ	264	11	8	B	40
JA3WFQ	198	11	6	B	40
JA0DWY	52,245	387	45	C	20
JR1LQK	2,496	52	16	C	20
JH1GVY/1	126	7	6	B	20
7K4XNN	129,870	666	65	B	15
JF2ION	103,827	653	53	C	15
JR9NVB	57,600	384	50	B	15
JA5APU	41,814	303	46	B	15
JG0OXL	37,950	275	46	B	15
JA1EM	15,504	136	38	B	15
JL1UTS	14,706	129	38	B	15
7M4PJX	9,870	94	35	B	15
7K2GMJ	8,400	100	28	B	15
7N1LPG	7,776	96	27	B	15
JR1KSK	5,208	62	28	B	15
JA1XEM	3,654	58	21	C	15
JH8DHV	2,142	42	17	B	15
JA9XAT	810	30	9	B	15
JA6XTA/1	570	19	10	B	15
7M1KNG	540	20	9	B	15
JH3AIU	139,104	828	56	C	10
JF1SQC	130,326	749	58	B	10
JI1RXQ	109,890	666	55	B	10
JA9CWJ	96,513	607	53	C	10
JH8SLS	92,220	580	53	C	10
JF3BFS	86,736	556	52	B	10
JG2TKH	57,408	368	52	C	10
JG1GGF	45,261	321	47	B	10
JJ1GQH	36,519	259	47	B	10
JA1NLX	36,432	264	46	B	10
JA1PS	27,930	190	49	B	10
JI1HFJ	26,508	188	47	B	10
JA6UBK	22,806	181	42	C	10
JR4GPA	18,960	158	40	B	10
JA1BUI	17,136	136	42	B	10
JQ3UDL	14,763	133	37	B	10
JA3PYC	12,312	114	36	B	10
JJ6DGP	11,322	111	34	B	10
JR3CVO	9,900	100	33	B	10
JS1MJE	5,940	55	36	B	10
JF7GDF	5,106	74	23	B	10
JI1BBN	3,450	50	23	B	10
JR2TRC	3,450	50	23	B	10
JE2HCJ	2,337	41	19	B	10
JA1KI	1,860	31	20	B	10
JG1TVK	1,260	35	12	B	10
JA3HPD	756	18	14	B	10
JA1AAT	567	21	9	B	10
JA7AXP	252	12	7	B	10

Mongolia

JT1CO	311,112	696	149	B	

Jordan

JY9NX	214,236	541	132	C	

Lebanon

OD5/OK1MU	100,521	657	51	C	40

Asiatic Russia

RA9SO	43,740	180	81	A	
UA0FDX	23,232	121	64	A	
RV9COI	1,197	21	19	A	
RU0LL	498,873	929	179	B	
RK9CZO (RX9CAZ,op)	176,400	525	112	B	
RA0FN	134,568	356	126	B	
UA0DC	73,062	246	99	B	
RA9OW	60,720	220	92	B	
UA9CR	53,040	221	80	B	
UA9AX	45,900	180	85	B	
UA9OP	43,005	235	61	B	
UA0QO	34,839	147	79	B	
RZ0CQ	23,040	128	60	B	
RX9WN	10,701	87	41	B	
RA9FFB	8,208	72	38	B	
UA9CDV	677,346	1429	158	C	
RX9TX	437,580	935	156	C	
RX9SX	411,180	890	154	C	
UA9KM	372,552	817	152	C	
UA9ZZ	343,827	759	151	C	
UA9MA	159,750	426	125	C	
UA0LS	151,638	398	127	C	
UA0ANW	149,283	513	97	C	
UA9YE	111,078	363	102	C	
RW9QA	98,172	324	101	C	
RW0QJ	44,400	185	80	C	
RA0AM	33,912	157	72	C	
UA9OS	14,616	87	56	C	
UA0JDD	8,364	68	41	C	
RU0AT	7,686	61	42	C	
UA9YAB	1,512	28	18	C	
UA9OF	10,200	100	34	C	40
UA9MR	7,104	74	32	B	40
RZ0IWA	3,450	50	23	C	40
RW9WA	2,268	36	21	C	40
RZ9UA	190,152	1112	57	C	20
RK9KWB	101,640	605	56	C	20
UA9LAC	85,212	526	54	C	20
UA9BS	72,504	456	53	C	20
RU0BB	60,555	367	55	B	20
UA9OA	44,982	306	49	B	20
RW9TA	36,300	242	50	C	20
UA9FM	34,560	240	48	C	20
UA0AGI	11,400	100	38	C	20
RA9WR	37,395	277	45	C	15
RA9HDM	29,835	221	45	B	15
RA9JP	28,482	202	47	C	15
UA9WQK	25,584	208	41	B	15
RA9FF	16,092	149	36	B	15
RA0JY	10,152	94	36	B	15
UA0SDX	6,300	75	28	B	15
RS0F	42,336	294	48	C	10
UA0ZS	19,680	164	40	B	10
RA0FF	15,498	126	41	B	10
RX9LW	5,700	100	19	C	10
RV9WB	3,657	53	23	B	10
RW0LZ	1,872	26	24	B	10

Kazakhstan

UN7PJO	10,965	85	43	B	
UP6P	363,432	797	152	C	
UP4L	279,480	685	136	C	
UN7QX	278,622	673	138	C	
UN1F	101,430	345	98	C	
UN7EX	15,246	121	42	B	20
UN4PD	11,340	105	36	B	20
UN8FM	3,024	42	24	B	20
UN4PG	12,078	122	33	B	15

Hong Kong

VR2BG	511,020	1020	167	C	

Macao

XX9TDX	131,892	379	116	B	

Europe

Croatia

9A/S53XM	39,600	176	75	B	
9A2RD	114,318	657	58	C	
9A3PA	104,976	648	54	C	
9A5Y (9A3NM,op)	80,511	571	47	C	
9A7CQ (9A1CCJ,op)	66,300	425	52	C	
9A2AJ	13,224	152	29	B	160
9A6A	77,895	577	45	C	80
9A3IQ	144,072	828	58	C	40
9A4W	70,992	493	48	C	40
9A4BT (9A7A,op)	46,230	335	46	B	40
9A7R	164,256	944	58	C	20
9A3ND	5,040	70	24	B	20
9A3GW	228,114	1311	58	C	15
9A2VR	121,296	722	56	C	15
9A2KD	57,987	379	51	C	15
9A9R	98,820	610	54	C	10
9A3MA	41,904	291	48	C	10

Portugal

CT1BNW	22,572	132	57	B	
CT1AOZ	81,408	512	53	B	20
CT1BQH	112,104	692	54	B	15

Fed. Rep. of Germany

DJ3XK	117,972	339	116	A	
DL1DTD	65,007	233	93	A	
DL3KVR	63,948	292	73	A	
DM3XI	31,434	169	62	A	
DL4GBR	14,742	91	54	A	
DL7ANR	658,980	1046	210	B	
DL5KUD	330,330	605	182	B	
DL1WA	307,638	633	162	B	
DL3ZAI	285,120	576	165	B	
DJ7XA	283,926	599	158	B	
DK7FP	281,313	621	151	B	
DL9XY	246,450	530	155	B	
DL5SVB	235,350	523	150	B	
DJ5GG	173,010	395	146	B	
DL8OBD	169,290	495	114	B	
DK1QO	153,846	407	126	B	
DL1TH	151,317	391	129	B	
DL3XD	126,546	322	131	B	
DJ8EF	122,298	374	109	B	
DJ9FG	117,660	370	106	B	
DK5ZX	116,883	351	111	B	
DL1DQY	104,601	293	119	B	
DL7UGO	102,384	316	108	B	
DL9NEI	101,442	319	106	B	
DK5JM	98,568	296	111	B	
DM3PKK	95,844	326	98	B	
DJ2IA	71,505	227	105	B	
DL5NA	67,968	236	96	B	
DL8UVG	65,520	240	91	B	
DL5CL	58,320	216	90	B	
DK3AX	54,096	196	92	B	
DL8ZAJ	49,680	184	90	B	
DL1DWT	47,142	194	81	B	
DL1LSZ	46,284	203	76	B	
DL2ARG	44,160	160	92	B	
DL8DXL	44,082	186	79	B	
DL1ARD	39,366	162	81	B	
DL7UCX	30,024	139	72	B	
DL7AXM	28,566	138	69	B	
DL4JYT	20,016	139	48	B	
DL5MY	17,640	105	56	B	
DL2RYL	14,742	91	54	B	
DL3JRA	9,360	78	40	B	
DJ1VQ	5,883	53	37	B	
DL5ANS	3,915	45	29	B	
DF5RF	507	13	13	B	
DL5AWI	2,284,200	2538	300	C	
DL1ASA	1,071,546	1646	217	C	
DL2DX	712,332	1263	188	C	
DL1JF	619,236	1002	206	C	
DK3LT	397,764	762	174	C	
DL2JRM	348,480	726	160	C	
DL7VZF	282,555	585	161	C	
DL6AG	195,762	553	118	C	
DK3YD	162,000	400	135	C	
DF4XX	122,250	326	125	C	
DL4ME	71,577	241	99	C	
DL5FU	21,411	117	61	C	
DL1JFM	21,240	120	59	C	
DL7CX	9,996	119	28	C	160
DJ0MDR	65,145	505	43	C	80
DJ5BV	64,170	465	46	C	80
DK7JQ	8,352	96	29	C	80
DL2RUG	6,720	80	28	B	80
DL3GA	143,136	852	56	C	40
DL6RAI	121,968	726	56	C	40
DJ2YE	7,392	88	28	B	40
DL8UAT	20,664	168	41	B	20
DH0DX	156,426	899	58	C	15
DL7VGN	42,042	286	49	B	15
DL4AAE	37,812	274	46	B	15
DK2GZ	37,650	251	50	C	15
DL9GFB	9,312	97	32	C	15
DK5QN	155,382	893	58	C	10
DK3KD	133,722	782	57	C	10
DK3DM	120,897	707	57	C	10
DL2OBF	113,400	700	54	C	10
DF9ZP	58,653	343	57	C	10
DL4JU	55,350	369	50	B	10
DF6LQ	53,664	344	52	B	10
DL5ME	26,574	206	43	C	10
DF2PN	1,530	34	15	B	10

Spain

EA7AAW	68,115	239	95	A	
ED7AJR	531,000	1000	177	B	
EA5AVC	435,480	760	191	B	
EA7AKJ	308,610	635	162	B	
EA3GIP	135,378	327	138	B	
EA4AAK	131,364	356	123	B	
EA4DAT	61,857	237	87	B	
EC3AHT	38,979	183	71	B	
EA4OA	33,726	146	77	B	
EA1FBJ	21,312	111	64	B	
EA1ND	17,100	114	50	B	
EA5EOH	16,632	99	56	B	
EA3AXM	15,312	88	58	B	
EA1BID	13,617	89	51	B	
EA1WX	12,384	86	48	B	
EA2CR	12,054	82	49	B	
EA1CS	11,700	78	50	B	
EA5FV	2,341,527	3037	257	C	
EA3AR	1,030,833	1569	219	C	
EA4BQ	223,020	531	140	C	
EA1FD	153,648	388	132	C	
EA5BY	52,668	266	66	C	
EA7GSU	42,957	333	43	C	80
EA5FID	60,894	398	51	B	40
EA3ALV	18,954	162	39	B	40
EA4BWR	22,017	179	41	B	20
EA3KU	138,681	811	57	B	10
EA7CA	2,100	50	14	B	10
EC7AMD	765	17	15	A	10

Balearic Islands

EA6GP	61,206	202	101	C	

Ireland

EI8IC	883,668	1396	211	B	
EI4DW	716,556	1132	211	B	
EI8GP	139,776	832	56	B	15
EI5DI	154,392	919	56	B	10

Moldova

ER1CW	201,801	491	137	B	
ER0ND (UT7ND,op)	174,552	1039	56	C	20

Estonia

ES6PZ	272,253	601	151	C	
ES4RD	102,795	623	55	C	20
ES1XT	17,325	165	35	B	15
ES6CO	23,616	192	41	C	10

Belarus

EW1EA	99,534	313	106	B	
EW1NY	40,356	228	59	B	
EW6AL	18,285	115	53	B	
EW1CQ	14,994	102	49	B	
EU7ZZ	154,671	473	109	C	
EU6EU	3	1	1	B	160
EW1WZ	45,396	388	39	C	80
EU1AZ	8,136	113	24	C	80
EU1MM	7,644	98	26	B	20
EU1DX	145,656	867	56	C	15
EW6GB	26,136	198	44	C	15
EU1SA	61,200	408	50	C	10
EU1UN	30,597	217	47	C	10
EW6DX	12,480	130	32	B	10

France

F6FTB	84,744	264	107	A	
F5ADH	21,672	129	56	A	
F5ICC	513,906	883	194	B	
F8PDR	415,584	888	156	B	
F5JBR	414,765	709	195	B	
F5RAB	268,800	512	175	B	
F5LJY	185,148	444	139	B	
F5AKL	149,376	389	128	B	
F5RBG	147,498	403	122	B	
F5TVG	139,887	297	157	B	
F6EEQ	101,964	293	116	B	
F5NQL	79,500	250	106	B	
F6IIE	64,872	212	102	B	
F6CXJ	42,987	161	89	B	
F5POJ	36,186	163	74	B	
F5IQJ	23,985	123	65	B	
F5NLX	9,180	102	30	B	
F2FX	759	23	11	B	
F6HKA	1,014,768	1458	232	C	
F8BPN	898,896	1228	244	C	
F6CWA	486,777	769	211	C	
F5MFL	94,530	274	115	C	
F5MZN	126,225	765	55	C	80
F5OIH	32,292	276	39	C	80
F6ETI/P	93,756	601	52	C	40
F6FJE	8,613	87	33	B	40
F6FVY (@F6BEE)	239,304	1352	59	C	20
F5IN	216,360	1202	60	C	15
F5JY	18,135	155	39	B	15
F6KBI	210,672	1232	57	C	10

England

G3KKP	455,535	795	191	B	
M0BIN	227,700	506	150	B	
G3KNU	226,008	516	146	B	
G6QQ	140,868	364	129	B	
G3HZL	99,180	285	116	B	
G3RSD	88,818	262	113	B	
G4ZME	63,210	215	98	B	
G3VQO	60,060	220	91	B	
G3ECS	55,836	188	99	B	
G4EDR	17,496	108	54	B	
G3JJG	16,758	98	57	B	
G0MRH	6,720	56	40	B	
M6T (G4PIQ,op)	3,250,350	3495	310	C	
G0IVZ	3,205,950	3350	319	C	
M0C (G0CKP,op)	2,416,128	2816	286	C	
G3MXJ	1,542,240	1904	270	C	
G0WKW	1,002,162	1498	223	C	
G2QT	697,245	989	235	C	
G3NKS	269,775	545	165	C	
G4BJM	253,287	477	177	C	
G3TMA	196,125	523	125	C	
G0UKX	122,244	334	122	C	
G3UFY	87,300	300	97	C	
G3WPH	39,600	330	40	B	80
G3JKY	5,250	70	25	B	40
G4BUO	216,978	1247	58	C	15
G5G	152,772	878	58	C	15
G3TXF	264,708	1548	57	C	10
G3WVG	208,962	1222	57	C	10
G4IIY	38,880	270	48	B	10
M4T (G0VQR,op)	25,542	198	43	B	10

Northern Ireland

GI0GDF	110,745	321	115	B	
GI4KSH	129,528	514	84	C	

Jersey

GJ2A (K2WR,op)	1,374,975	2037	225	C	

Scotland

GM3NHQ	193,185	477	135	B	
MM0BQI	61,740	210	98	B	
GM3ZAS	57,420	220	87	B	
GM3CFS	59,823	391	51	B	15
GM3POI	297,018	1707	58	C	10

Guernsey

MU0FAL	119,316	326	122	B	

Wales

GW0KZW	12,276	93	44	A	
GW3NJW	1,002,744	1466	228	B	
GW3SYL	231,660	468	165	B	
GW3WWN	11,259	139	27	B	10

Hungary

HA8TP	330,150	710	155	B	
HA8IC	29,646	183	54	B	
HA5BSW	26,136	264	33	B	
HA8JV	2,012,850	2485	270	C	
HA8FM	195,408	1104	59	C	
HA7XQ	163,020	494	110	C	
HA8YU (HA8KUJ,op)	29,520	205	48	C	
HA8DL	72	6	4	B	80
HA8IB	125,856	736	57	C	40
HA0LM	102,984	613	56	C	40
HA6OL	72,000	480	50	C	40
HA0MO	107,892	666	54	C	20
HA8FK	100,440	620	54	B	20
HA8EN	34,968	248	47	B	20
HA5OAA	192	8	8	B	20
HA8LQG	5,208	62	28	B	15
HA8MT	78,000	520	50	C	10
HG8Z	70,110	410	57	C	10
HA5PT	54,000	360	50	B	10
HA0GK	9,579	103	31	A	10
HA8UH	5,880	70	28	C	10
HA3MB	756	18	14	B	10

Switzerland

HB9BMY	229,740	547	140	A	
HB9CZF	190,128	466	136	A	
HB9DAX	84,000	280	100	A	
HB9AYZ	25,986	142	61	A	
HB9QA	17,766	94	63	A	
HB9ARF	387,600	760	170	B	
HB9DOT	114,276	356	107	B	
HB9DCM	35,955	235	51	B	10

Italy

I3BBK	276,120	590	156	A	
IU2R	75,600	252	100	A	
IV3TAN	2,088	29	24	A	
IK2AIT	154,836	374	138	B	
IZ1DFI	131,625	375	117	B	
IK2RJK	124,362	329	126	B	
IC8POF	117,000	325	120	B	
I6FDJ	89,100	297	100	B	
IK2WYI	74,820	290	86	B	
IT9AJP	63,936	222	96	B	
IK4WMH	61,677	231	89	B	
IR9A	54,600	200	91	B	
IK0YUT	53,580	190	94	B	
IK4NPC	50,076	214	78	B	
IN3FHE	33,687	197	57	B	
IK2NCF	27,324	138	66	B	
IK0PRG	24,738	133	62	B	
IR2G	19,635	119	55	B	
IZ0BXZ	19,440	108	60	B	
IK1ZVK	12,771	99	43	B	
IK3SCB	11,613	79	49	B	
IK4AUY	9,471	77	41	B	
IV3KSE	8,775	65	45	B	
IK2REA	1,512	24	21	B	
IR4T (IK4UPB,op)	2,788,812	3068	303	C	
IK2AHB	1,106,496	1632	226	C	
II1H	459,792	824	186	C	
IU4T (IK4MTF,op)	457,758	882	173	C	
I0ZUT	373,248	768	162	C	
IK2WXV	305,550	679	150	C	
IY4W	171,171	1001	57	C	
IZ0AIS	38,592	192	67	C	
IK2DED	18,981	171	37	C	160
I1NVU	32,745	295	37	B	80
IK6SNQ	22,950	225	34	C	80
IQ2C	174,249	1019	57	C	40
I3MGN	5,208	62	28	B	20

IT9BLB	181,482	1043	58	C	15
IR4D	153,642	883	58	C	10
IQ3X	100,650	610	55	C	10
II2K	100,548	588	57	C	10
IK1QBT	81,345	493	55	C	10
IO7C (I7PXV,op)	43,428	308	47	B	10

Sardinia

IS0OMH	483,912	858	188	B	
IS0HQJ	448,533	817	183	B	
IS0IGV	122,760	310	132	B	
IS0UWX	29,580	170	58	B	
IS0SEA	3,444	41	28	B	
IS0SDX	11,712	122	32	B	40

Norway

LA9HFA	816,816	1309	208	B	
LA3BO	102,384	316	108	B	
LA8OM	79,968	272	98	B	
LA7TO	54,780	220	83	B	
LA1PHA	51,030	189	90	B	
LA9AU	3,456	36	32	B	
LA7MFA	1,295,190	1845	234	C	
LA2HFA	244,764	523	156	C	
LA9GY (LA2T,op)	792	22	12	C	
LA5UF	78,000	520	50	B	15
LA6PB	25,200	200	42	B	10

Luxembourg

LX1JH	102,465	297	115	B	
LX1NO	511,056	1014	168	C	

Lithuania

LY5A	865,926	1318	219	A	
LY9A (LY3BA,op)	443,385	835	177	A	
LY2LA	749,235	1255	199	B	
LY2BM	416,670	817	170	B	
LY2MW	275,040	573	160	B	
LY1DS	120,450	365	110	B	
LY2IJ	71,010	263	90	B	
LY2BBI	8,400	80	35	B	
LY2VAD (LY1FZ,op)	829,260	1355	204	C	
LY2GV	726,750	1275	190	C	
LY5W	623,904	1072	194	C	
LY3BH	31,356	134	78	C	
LY1CX	75,330	465	54	C	40
LY2OX	113,568	676	56	C	15
LY3KS	34,362	249	46	B	15
LY2FF	3,600	60	20	B	15
LY2MM	6,486	94	23	C	10

Bulgaria

LZ1UQ	404,721	699	193	A	
LZ2RS	163,308	439	124	A	
LZ2RF	213,585	491	145	B	
LZ9R	206,550	510	135	B	
LZ4UU	78,474	319	82	B	
LZ2UF	61,710	242	85	B	
LZ1NJ	57,510	213	90	B	
LZ1QH	31,737	149	71	B	
LZ1NG	90,750	550	55	C	
LZ2JE	18,288	127	48	C	
LZ3AB	3	1	1	C	160
LZ3PZ	1,554	37	14	B	80
LZ9W (LZ4AX,op)	130,845	793	55	C	40
LZ2FM	5,175	69	25	B	40
LZ4ZP	117,432	699	56	C	20
LZ2GTR	17,427	157	37	C	20
LZ2UZ	10,323	111	31	B	20
LZ2PB	38,880	270	48	B	15
LZ2PP	63,648	408	52	C	10
LZ2GS	7,392	88	28	B	10

Austria

OE75CWL	372,444	757	164	C	
OE3JOS	315,129	629	167	C	
OE/K1IR	103,800	346	100	C	
OE8SKQ	157,644	906	58	C	15

Aland Islands

OH0PM	2,292,660	2710	282	C	

Finland

OH2YL	33,858	171	66	A	
OH1BOI	182,754	426	143	B	
OH3IR	164,076	452	121	B	
OH2HEN	70,686	231	102	B	
OH3VX	31,524	148	71	B	
OH3KAV	23,058	126	61	B	
OH7NJ	10,890	110	33	B	
OH2HMB	5,376	64	28	B	
OH2U (OH2LUR,op)	2,425,152	2972	272	C	
OH1F (OH1MDR,op)	2,236,956	2846	262	C	
OH3JF	250,125	575	145	C	
OH3JR	232,128	496	156	C	
OH2FS	212,112	491	144	C	
OH6XY	209,088	484	144	C	
OH5NE	142,803	387	123	C	
OH1EB	132,969	349	127	C	
OH2VZ	105,225	305	115	C	
OH8T	18,819	153	41	C	
OH6YF	3,510	65	18	C	80
OH8L (OH8LQ,op)	270,918	1557	58	C	20
OH6NIO	147,504	878	56	C	15
OH8A (OH8WW,op)	146,610	905	54	C	15
OH6Y (OH6YF,op)	77,910	530	49	C	10
OH2BSQ	28,380	220	43	B	10
OH2XF	23,355	173	45	B	10
OH3KOK	13,755	131	35	B	10

Czech Republic

OK1AIJ	36,750	175	70	A	
OK1FKD	31,395	161	65	A	
OK2BND	26,838	142	63	A	
OK1FNJ	907,200	1400	216	B	
OK1HX	785,166	1223	214	B	
OK2EC	499,590	854	195	B	
OK8DCE (DL2HWI,op)	498,945	899	185	B	
OK1FLM	432,864	864	167	B	
OK2MBP	430,251	829	173	B	
OK1SI	392,940	740	177	B	
OK2TBC	365,769	713	171	B	
OK2SGY	353,439	681	173	B	
OK1ZP	336,651	697	161	B	
OK1OX	328,536	676	162	B	
OK1AYY	290,955	595	163	B	
OK2SJ	278,928	596	156	B	
OK1DCF	255,174	599	142	B	
OK2LW	253,827	553	153	B	
OK2PTZ	227,970	510	149	B	
OK1DVK	211,479	449	157	B	
OK1DKO	208,407	547	127	B	
OK2ZJ	172,380	442	130	B	
OK1EV	150,552	408	123	B	
OK2PBG	142,392	349	136	B	
OK1AOT	130,626	369	118	B	
OK1AOU	120,879	333	121	B	
OK2VP	107,640	312	115	B	
OK1DXD	99,756	326	102	B	
OK2BJ	98,604	249	132	B	
OK2AJ	90,480	290	104	B	
OK2BWC	79,380	270	98	B	
OK1DOL	76,518	234	109	B	
OK1WWJ	76,320	318	80	B	
OK1FHI	74,787	257	97	B	
OK1HGM	45,816	166	92	B	
OK2CQR	45,018	183	82	B	
OK2CSU	30,624	176	58	B	
OK1JDJ	16,830	110	51	B	
OK1SRD	11,388	73	52	B	
OK2SWD	5,814	57	34	B	
OK1RF	3,132,576	3504	298	C	
OK2FD	1,598,796	1996	267	C	
OK1ARN	395,769	737	179	C	
OK2ABU	308,256	608	169	C	
OK1DRU	292,740	595	164	C	
OK2ZW	174,216	476	122	C	
OK1DOS	73,233	237	103	C	
OK1TN	28,614	251	38	C	160
OK1AEZ	18,870	185	34	C	160
OK1TP	7,176	104	23	C	160
OK1FC	41,652	356	39	C	80
OK1DSZ	20,064	209	32	B	80
OK2EQ	11,919	137	29	C	80
OK1FOG	9,720	120	27	B	80
OK1DRQ	175,914	1011	58	C	40
OK1FPG	40,635	301	45	C	40
OK2HZ	20,124	172	39	B	40
OK2VYG	16,974	123	46	B	40
OK2BDF	9,792	102	32	B	40
OK2BGK	74,358	486	51	B	20
OK2BWB	6,873	79	29	B	20
OK1WMV	1,482	38	13	B	20
OK2GG	92,259	603	51	C	15
OK1VD	87,129	461	63	B	15
OK2ZV	86,139	563	51	B	15
OK2WTM	81,249	511	53	B	15
OK2NN	80,454	506	53	C	15
OK1QM	71,136	456	52	B	15
OK1FPS	70,512	452	52	B	15
OK2SG	29,808	207	48	B	15
OK2BHE	8,265	95	29	B	15
OK1MMN	7,290	81	30	B	15
OK2RZ	165,144	983	56	C	10
OK1CW	131,670	798	55	C	10
OK1AU	95,592	569	56	C	10
OK2PDT	90,312	568	53	C	10
OK1GI	67,080	430	52	B	10
OK1ACF	56,784	338	56	B	10
OK1AOV	48,894	281	58	C	10
OK1XC	47,892	307	52	B	10
OK1AES	47,580	305	52	B	10
OK2BJT	38,448	267	48	C	10
OK1GS	37,536	272	46	B	10
OK2PKY	29,700	220	45	B	10
OK2KQM (OK2INW,op)	27,135	201	45	B	10
OK2BHL	819	21	13	B	10

Slovakia

OM4XA	31,959	201	53	A	
OM6T (OM5AW,op)	1,018,218	1522	223	B	
OM3OM	711,645	1135	209	B	
OM7RC	455,301	803	189	B	
OM7AG	288,300	620	155	B	
OM7CA	287,868	644	149	B	
OM7JG	214,704	497	144	B	
OM1AF	180,360	501	120	B	
OM5KM	165,132	396	139	B	
OM8MM	156,114	413	126	B	
OM3PQ	152,622	417	122	B	
OM8FF	151,659	411	123	B	
OM7VF	105,300	325	108	B	
OM8HG (OM3KGQ,op)	101,286	331	102	B	
OM3CDZ	88,788	302	98	B	
OM0CR	57,798	247	78	B	
OM3NA	1,909,440	2496	255	C	
OM2KI	149,952	568	88	C	
OM3RM	144,072	828	58	C	
OM0WR	24,465	233	35	C	160
OM2XW	7,425	99	25	C	160
OM5RJ	12,420	138	30	C	80
OM5M (OM2RA,op)	164,976	982	56	C	40
OM2IB	164,844	964	57	C	20
OM2TB	5,100	85	20	B	20
OM2AW	4,290	65	22	B	20
OM3KZA	552	184	1	B	20
OM5NL	64,566	422	51	B	15
OM0TT	43,500	290	50	B	15
OM0CW	7,068	76	31	B	15
OM3CDN	2,400	40	20	B	15
OM2DX	182,799	1069	57	C	10
OM8AG	50,901	361	47	C	10
OM2LEE	27,720	220	42	B	10
OM7YC	26,961	209	43	B	10
OM3BA	21,720	181	40	B	10

Belgium

ON6NL	193,764	482	134	A	
ON7CC	171,804	412	139	A	
ON6AA	393,030	794	165	B	
ON4CAS	390,399	727	179	B	
ON4XG	356,301	649	183	B	
OT1H	129,276	756	57	B	
ON5WL	63,345	205	103	B	
ON4CHK	42,720	160	89	B	
ON5JD	29,970	135	74	B	
ON6LO	29,394	138	71	B	
ON4AKL	486,783	1089	149	C	
ON4BR	2,064	43	16	C	160
OT1T (ON4UN,op)	132,012	772	57	C	80
ON6TJ	27,477	213	43	B	10

Denmark

OZ8SW	313,389	657	159	B	
OZ5WQ	235,161	493	159	B	
OZ3ZW	180,429	439	137	B	
OZ5UR	112,125	325	115	B	
OZ4FF	85,284	276	103	B	
OZ7AEI	20,001	113	59	B	
OZ1LO	2,400,804	2722	294	C	
OZ0X (OZ1AA,op)	2,172,528	2568	282	C	
OZ5MJ	35,280	140	84	C	

Netherlands

PA3HEQ	81,600	272	100	A	
PA0ADT	73,440	288	85	A	
PA1AT	2,520	30	28	A	
PA3AAV	295,350	550	179	B	
PA0JED	172,050	370	155	B	
PA3ELD	126,096	296	142	B	
PA0OOS	124,470	461	90	B	
PA3AYF	116,070	365	106	B	
PA0RRS	100,464	322	104	B	
PA5FN	92,448	288	107	B	
PA5WT	82,800	300	92	B	
PA7FM	70,272	244	96	B	
PA3EZC	18,330	130	47	B	
PA3BFH	268,884	582	154	C	
PA5TT	27,336	136	67	C	
PA3ACC	972	27	12	C	40
PA3GRH	13,365	135	33	B	20
PA3AEX	13,209	119	37	B	20
PI4TUE	189,126	1106	57	C	15
PA3CAL	12,915	123	35	B	15
PA3EMN	34,980	265	44	B	10
PA0MIR	32,535	241	45	B	10
PA3GPX	16,530	145	38	B	10

Slovenia

S54X	90,792	291	104	A	
S51TA	1,447,446	2002	241	B	
S56A	610,071	973	209	B	
S57J	589,050	1122	175	B	
S52LW	203,472	471	144	B	
S53AU	45,864	156	98	B	
S50R	178,698	1027	58	C	
S53F	81,588	523	52	C	
S50U	29,070	255	38	C	160
S57M	20,790	198	35	C	160
S50A	102,789	729	47	C	80
S57DX	200,796	1154	58	C	40
S53M (S53ZO,op)	194,400	1080	60	C	40
S57Q	165,126	949	58	C	40
S50S (S52ZW,op)	84,906	534	53	B	40
S58A	208,791	1221	57	C	15
S52GP	112,752	696	54	C	15
S50C (S53MM,op)	169,455	1027	55	C	10
S50K	154,224	918	56	C	10
S52ZW	124,146	726	57	C	10
S52QM	119,358	698	57	C	10
S52OP	369	123	1	A	10

Sweden

SM3C (SM5CCT,op)	366,750	750	163	A	
SM7DBN	42,588	182	78	A	
SN8A (SP8AQA,op)	42,210	201	70	A	
SM7CZC	12,480	65	64	A	
SM2LIY	407,835	795	171	B	
7S3A (SM3CER,op)	404,796	854	158	B	
SM7EH	213,585	491	145	B	
SM7BJW	213,504	512	139	B	
SM7CIL	168,672	502	112	B	
SM4SX	129,744	408	106	B	
SM0BDS	124,509	343	121	B	
SM3EAE	85,995	273	105	B	
8S0W (SM0NJO,op)	27,306	123	74	B	
8S6A (SM6DPF,op)	20,010	115	58	B	
SM2UJW (SL2ZA,op)	4,500	50	30	B	
SK6HD (SM6FKF,op)	245,322	531	154	C	
SM6WQB	216,972	492	147	C	
SM3R	108,117	293	123	C	
SM3AF	21,384	108	66	C	
SM6FUD	13,200	110	40	C	
SM5BEU	2,610	30	29	C	
SM4Z (SM4CAN,op)	28,158	247	38	C	160
SM5AJV	5,460	70	26	B	80
SM7EHU	2,538	47	18	C	80
SM7N (SM7NDX,op)	116,325	705	55	C	40
SM5GNS (SM0GNS,op)	52,938	346	51	B	40
SM0WRA	9,801	99	33	B	40
8S5X (SM5HJZ,op)	142,884	882	54	B	20
SK0X	60,588	374	54	B	20
SN8M (SP8MI,op)	3,300	55	20	B	20
8S5A (SM5AJV,op)	171,564	986	58	C	15
SL0W (SM0AJU,op)	110,544	658	56	C	15
SK0UX (SM0GRD,op)	60,123	409	49	B	15
SM6BSK	58,194	366	53	B	15
7S2E (SM2DMU,op)	153,384	913	56	C	10
SM5INC	96,564	619	52	C	10
SM0W	68,952	442	52	B	10

Poland

SP3VT	647,184	1112	194	B	
SP3MGP	535,602	1003	178	B	
SP7YRS	109,386	354	103	B	
SP2AYC	89,400	298	100	B	
SP6SYF	67,158	246	91	B	
SP6BEN	65,565	235	93	B	
SP4CQU	64,512	224	96	B	
SP4GHL	54,735	205	89	B	
SP2KAC (SP2AEU,op)	33,642	178	63	B	
SQ3GNA	6,327	57	37	B	
SP7GIQ	3,196,050	3575	298	C	
SP2FAX	2,905,164	3196	303	C	
SP8NR	810,081	1233	219	C	
SP4Z	556,500	875	212	C	
SP5ATO	321,141	641	167	C	
SP2FGO	286,560	597	160	C	
SP2HPM	72,675	255	95	C	
SN2E	1,683	33	17	B	160
SP9W	150	10	5	B	160
SP6LV	27	3	3	B	160
SP8BRQ	78,192	543	48	C	80
SP5GH	13,857	149	31	C	80
SP7JKW	9,072	112	27	B	80
SP5ANX	3,534	62	19	B	80
SP8BAB	39,837	271	49	B	20
SP4DEU	28,485	211	45	B	20
SP3KRE(SQ3HTX,op)	17,688	134	44	B	20
SP7FGA	8,910	99	30	B	20
SP2JGK	6,006	77	26	C	20
SP6EWB/9	12	2	2	B	20
SN3A (DJ0IF,op)	203,019	1147	59	C	15
SP9XCN	91,107	573	53	B	15
SP2AVE	54,162	354	51	C	15
SP4JWD	40,044	284	47	B	15
SP3FPF	19,530	155	42	B	15
SP7ENU	14,097	127	37	B	15
SP6AZT	78,792	469	56	C	10
SP3GTS	59,976	408	49	B	10
SQ9HYM	27,720	210	44	B	10
SP3AZO	12,768	112	38	B	10
SP4AVG	11,583	117	33	B	10
SP5CGN	10,080	96	35	B	10
SP3LWP	9,207	99	31	B	10
SP1BLE	6,723	83	27	B	10
SP3AOT	4,743	51	31	B	10

Greece

SV/OK1YM	71,799	263	91	C	
SV2AVP	5,538	71	26	B	80

Bosnia-Herzegovina

T95C	181,368	458	132	C	
T90U (T95MOJ,op)	16,530	145	38	C	40

Iceland

TF3GB	833,856	1376	202	B	

Kaliningrad

RA2FW	234,342	554	141	B	
UA2CZ	205,578	486	141	C	

European Russia

RA4LW	38,115	165	77	A	
RZ6HX	27,135	135	67	A	
UA4ARL	16,815	95	59	A	
RZ3BY	554,526	978	189	B	
RZ4FA	481,689	897	179	B	
UA4FER	393,600	800	164	B	
UA1ANA	279,972	606	154	B	
RN6CF	239,292	578	138	B	
RV3QX	218,700	540	135	B	
UA3AGW	199,263	523	127	B	
RA4AR	175,287	491	119	B	
UA1ZZ	159,804	386	138	B	
UA3SAQ	135,000	375	120	B	
RV3DAK	129,375	375	115	B	
UA4RF	118,944	354	112	B	
RK1NA	101,088	312	108	B	
R3/K3NA	100,683	339	99	B	
UA3AMZ	94,620	332	95	B	
RN1AO	85,500	300	95	B	
UA1TBK	83,220	292	95	B	
UA4SS	71,280	264	90	B	
RN3BK	58,968	234	84	B	
RW6CW	58,140	228	85	B	
UA3LPF	46,413	191	81	B	
RA6AR	40,053	169	79	B	
RV3YR	37,074	167	74	B	
RA3AF	36,729	159	77	B	
RA1AR	35,568	152	78	B	
UA4LFC	33,150	170	65	B	
UA1OMO	30,504	164	62	B	
RX3DQU	29,760	155	64	B	
UA4YG	28,710	145	66	B	
RU3WR	27,342	147	62	B	
RX3AEX	19,800	110	60	B	
RA4UAT	8,460	60	47	B	
UA4CIF	7,344	68	36	B	
RW3DA	3,219	37	29	B	
RU6FA	3,168	44	24	B	
RA4APB	1,008	112	3	B	
UA4AGO	513	57	3	B	
RA3VY	60	5	4	B	
RW1ZA	1,804,140	2570	234	C	
RZ1AWO	1,123,542	1687	222	C	
RK4FF	616,032	1116	184	C	
RD4M (UA4LU,op)	496,944	986	168	C	
UA6LV	453,348	771	196	C	
RM3C	418,824	831	168	C	
UA6LTI	348,840	680	171	C	
UA3TU	307,188	636	161	C	
UA4HTT	300,300	700	143	C	
RV1CC	215,232	472	152	C	
RN4WA	124,920	347	120	C	
UA1AQF	77,472	269	96	C	
RK3DH	76,533	263	97	C	
RZ3RC	69,678	294	79	C	
UA4FEN	59,598	231	86	C	
RU3DX	43,575	175	83	C	
RN6AL	37,260	207	60	C	
RA3MB	30,030	130	77	C	
UA6LP	25,152	131	64	C	
RV3UK	22,113	117	63	C	
RA3BB	7,752	68	38	C	
RA4AI	5,487	59	31	C	
RN6BN	2,907	57	17	C	160
RA6AX	16,926	182	31	C	80
UT3UA	10,962	126	29	C	80
UA3AP	4,599	73	21	B	80
UA4PWW (RW4PL,op)	43,218	294	49	C	40
RK3BA	9,576	114	28	B	40
UA3RF	9,486	102	31	C	40
UA6NZ	5,688	79	24	B	40
RA3WDK	5,616	78	24	C	40
RV6LSS	4,290	65	22	B	40
UA1OAM	975	25	13	B	40
RW6FO	660	20	11	A	40
RA1ACJ	267,270	1510	59	C	20
RM4W (RW4WR,op)	217,683	1273	57	C	20
RW4LC	71,424	384	62	C	20
RZ3BW	36,576	254	48	C	20
UA1CEC	31,626	251	42	B	20
RA1OAK	27,792	193	48	B	20
RW3WM	23,892	181	44	B	20
UA1ONG	13,908	122	38	B	20
RA3XA	8,742	94	31	B	20
RA1OK	6,771	61	37	B	20
UA3XAO	693	21	11	B	20
UA3DPX	109,725	665	55	C	15
RA6LW	64,239	437	49	C	15
RW3GB	61,887	421	49	B	15
RA3XO	44,400	296	50	C	15
RA4FW	32,379	251	43	B	15
RX3QAK	27,852	211	44	C	15
UA3XEG	18,603	159	39	C	15
RA3AJ	85,068	556	51	C	10
RK6AXS	72,981	459	53	C	10
R73A	59,250	395	50	C	10
RZ3DX	21,318	187	38	C	10
RA3WA	18,696	164	38	B	10
UA3AVR	3,588	52	23	B	10
UA4LBQ	810	135	2	B	10

Ukraine

UX4UA	283,038	586	161	A	
UT5JDS	314,916	652	161	B	
US0KW	235,290	506	155	B	
UY5TE	164,580	422	130	B	
UT2UB	137,856	359	128	B	
UR3CMA	41,205	205	67	B	
UT5UOC	24,495	115	71	B	
UT7UW	6,018	59	34	B	
EO6F (UX0FF,op)	1,711,944	2301	248	C	
UX7IA	556,884	998	186	C	
UX5UO	513,375	925	185	C	
UY5ZZ	266,910	574	155	C	
UY5ZI	194,337	453	143	C	
UV5QI	148,428	372	133	C	
UT5JAP	115,440	260	148	C	
UX3MW	79,200	275	96	C	
UR5ECW	66,144	416	53	C	
UT8LO	65,760	274	80	C	
UU4JN	10,584	84	42	C	
UT8IM	1,248	32	13	B	160
UT7QF	324	12	9	C	160
UT5UIA	31,122	266	39	C	80
UT3UZ	29,160	270	36	C	80
UY8IF	9,648	134	24	B	80
UV5I (UR6IM,op)	152,019	889	57	C	40
UY3QW	119,130	722	55	C	40
UR5FJF	72,192	512	47	B	40
UT1FA	61,152	392	52	C	40
UY0ZG	45,570	310	49	C	40
UR6QS	16,137	163	33	C	40
UT4PZ	11,832	116	34	B	40
UY1M	5,865	85	23	C	40
UT5UGR	3,762	57	22	C	40
US1PM	24,066	191	42	B	20
UY5YA	6,831	69	33	C	20
UY5LQ	6,699	77	29	C	20
UT2IY	132,927	751	59	C	15
UR5FEO	123,366	709	58	C	15
UW5U (UY2UA,op)	97,776	582	56	C	15
UV5U	46,305	315	49	C	15
UY2UZ	26,640	222	40	C	15
UR5FCM	11,067	119	31	B	15
UU7JS	5,508	68	27	C	15
UT0H	5,148	66	26	B	15
UR7VA	59,550	397	50	C	10
US6EX	30,996	252	41	B	10
UT5PW	29,040	220	44	C	10
UT9FJ	25,026	194	43	A	10
UT2IW	13,965	133	35	C	10
UR0MZ	12,138	119	34	C	10
US3QW	9,180	102	30	C	10
UX2FXX	216	9	8	B	10

Latvia

YL0A (YL2KA,op)	548,826	943	194	B	
YL2FD	87,552	304	96	B	
YL2NK	74,568	239	104	B	
YL2SM	1,260,792	1796	234	C	
YL2LY	500,598	822	203	C	
YL2GD	352,980	636	185	C	
YL7A	222,705	505	147	C	
YL2PP	8,742	94	31	B	40
YL2BJ	5,460	70	26	B	10

Romania

YO4AAC	31,959	159	67	A	
YO2ADQ	9,006	79	38	A	
YO3APJ	1,169,250	1559	250	B	
YO3FWC	474,183	893	177	B	
YO4ZF	55,800	200	93	B	
YO4RHK	26,010	170	51	B	
YO6ADW	13,923	91	51	B	
YO4NF	130,326	749	58	C	20
YO4BBH	5,520	80	23	B	20
YO3KPA	129,864	773	56	C	15
YO9FJW	86,139	563	51	C	10
YO8WW	40,866	278	49	C	10
YO6BHN	38,514	262	49	B	10
YO5DAS	15,651	141	37	A	10
YO8DHD	13,716	127	36	B	10

Yugoslavia
YT1VP 160,728 362 148 A
YU1LM 107,856 336 107 A
YT7TY 104,412 308 113 A
YT1W (4N1SM,op) 550,746 987 186 B
YU7AM 190,350 450 141 B
YU7RN 178,500 425 140 B
YU7DP 153,648 388 132 B
YU1PJ 109,440 320 114 B
YU7WJ 37,011 169 73 B
YU1AAT 11,520 96 40 B
YU7KW 211,536 452 156 C
YZ1U 124,254 767 54 C
4N1A 79,488 576 46 C
YT0T 69,576 446 52 C
4N8/LZ1BJ 21,114 138 51 C
YU7FN 10,206 81 42 C
4N7ZZ 11,424 119 32 C 160
YU1RA 3 1 1 B 160
YU1KR 58,080 440 44 C 80
YU7YU (@YT6A) 48,891 379 43 C 80
YT7A 194,346 1098 59 C 40
4N1SM (YT1BB,op) 161,124 926 58 C 40
YZ1W 126,723 797 53 C 40
YZ1EW 52,128 362 48 B 40
YZ9A 200,070 1170 57 C 20
YU1ZZ 197,163 1153 57 C 20
YU1TT 91,575 555 55 C 20
YU1AAV 24,318 193 42 B 20
YT0A 157,920 940 56 C 15
YU7CF 82,044 516 53 C 15
YU7KWX 81,015 491 55 B 15
4N1N (4N1JA,op) 64,428 413 52 B 15
YZ1V 57,876 371 52 B 10
YU2000A 54,750 365 50 C 10
YU1QW 42,687 279 51 B 10
YU7KM 39,474 306 43 B 10
YU7SF 36,801 261 47 B 10
YT6T 25,800 215 40 C 10
YU7LS 11,844 94 42 B 10

Macedonia
Z31MM 780,489 1233 211 B
Z32AF (Z39Z,op) 72,177 491 49 C 40
Z31JA 12,006 138 29 C 40
Z33F 4,158 63 22 B 20
Z37A 87,132 548 53 B 15

North America

Barbados
8P5A (W2SC,op) 5,057,937 5063 333 C
8P9NX 1,346,526 1878 239 C

Bahamas
C6AKW (K3TEJ,op) 3,597,660 3634 330 C
C6A/K7RE 120,042 741 54 B 80
C6AKQ (N4BP,op) 228,114 1311 58 C 40

Cuba
CO8LY 165,660 1004 55 B 15

Martinique
FM5GU 2,579,400 2866 300 C

Saint Martin
FS/ND5S 334,935 827 135 B

Dominican Republic
HI3LFE 124,413 367 113 B
HI3Y 5,934 86 23 B 160

Panama
HP1AC 108,888 349 104 A
HO3A 169,719 407 139 B

Honduras
HR6/N4MO 284,400 1580 60 B 10

Grenada
J38A (K4LTA,op) 2,330,730 2679 290 B

Alaska
KL7AC 468,639 1021 153 A
KL7RA 286,230 1645 58 C 15

Puerto Rico
KP3W 17,928 166 36 C 160
NP3X (WP3A,op) 54,924 398 46 C 80
NP4FW 10,608 104 34 A 20
WP3A 136,620 828 55 C 10

St. Maarten Saba St. Eustatius
PJ7/ND5S 213,843 599 119 B

Costa Rica
TI4G 208,974 1201 58 C 20
TI3TLS 217,710 1230 59 C 15

Antigua & Barbuda
V26G (KB2QWO,op) 3,703,320 3810 324 B

Belize
V31YN 85,083 359 79 C

St. Kitts & Nevis
V47X (WT9U,op) 2,641,248 3057 288 B
V47KP (W2OX,op) 2,759,676 3046 302 C

Anguilla
VP2E (N5AU,op) 3,700,443 4453 277 C

Turks & Caicos Islands
VP5GA (N2GA,op) 3,677,208 3737 328 B
VP5U (AJ6V,op) 3,887,811 4167 311 C

Mexico
XE1ZOI 110,550 275 134 B

Cayman Islands
ZF2NT 4,837,392 4799 336 C
ZF1A (W5ASP,op) 328,512 1856 59 C 10

Oceania

Philippines
DU7/N7ET 19,323 113 57 A
DU3NXE 49,980 196 85 C
DU1EV 90 6 5 B 40

Mariana Islands
WH0V 44,550 297 50 C 40
WH0ABA 18,696 164 38 C 15
KH0/JI1EFP 2,109 37 19 B 15
KH0/JQ1NGT 89,388 573 52 C 10

Guam
KH2D 2,760 40 23 B 20

Hawaii
KH6/W6PH 2,092,224 2564 272 B
KH6/N2KJM 90,720 288 105 B
KH7Z (KH6ND @KH7R) 4,112,829 4167 329 C
KH6TO 3,372,390 3535 318 C
WH7/N6ND 123,312 734 56 C 15

Wake Island
KH9/C6AGS 987,471 1503 219 C
KH9/AC4G 515,070 885 194 C

East Kiribati
T32RD (OK1RI,op) 356,301 2013 59 C 15

Palau
T88SM 18 3 2 B 10

Marshall Islands
V73ZZ (K7ZZ,op) 1,461,393 2287 213 B

Australia
VK4EMM 1,611,120 2192 245 B
VK2AYD 33,534 243 46 B
VK2APK 103,950 630 55 C 40
VK4TT 49,248 342 48 B 10

Indonesia
YB0ECT 70,794 437 54 B 20

New Zealand
ZL1CMY 67,800 226 100 A
ZL2BR 125,064 386 108 B
ZL1AIH 75,888 496 51 B 10

South America

Chile
CE4U 52,104 334 52 C 20

Uruguay
CX9AU 669,204 1282 174 B

Ecuador
HC2/UA4WAE 1,414,476 1871 252 B

Argentina
LU5FZ 50,838 229 74 A
LR7A (LU7AWP,op) 533,052 1139 156 B
LU1EWL 501,735 1079 155 B
LU5FF 33,210 246 45 B
LU6UO 174,933 1023 57 C
LW8EXF 7,224 56 43 C
LU7DW 1,122 22 17 C 20
LU5OM 36 4 3 B 20
LW1EXU 169,743 959 59 B 10

Peru
OA7/NB3I 190,704 548 116 B

Aruba
P40R (K4UEE,op) 3,298,464 3524 312 B
P49V (AI6V,op) 4,158,000 4200 330 C

Brazil
PY2YU 1,281,744 1978 216 B
PY2LDS 34,560 160 72 B
PY4ZO 20,928 109 64 B
PY7OJ 9,384 68 46 B
PY2FUS 330 11 10 C
PY2NY 117,315 711 55 C 40
PY7IQ 108,597 683 53 B 20
PU2NYV 49,491 351 47 B 15
PY2AER 32,379 251 43 B 15
PY3AU 17,673 137 43 C 15
PY3FBI 11,025 105 35 B 15
PY4NF 108 6 6 B 15
PY1NX 68,400 456 50 B 10
PY4FQ 40,800 272 50 B 10
PY3ARM 7,776 81 32 B 10
PS7ZZ 12 2 2 B 10

Venezuela
YV1OB 405,603 723 187 B
YV7QP 142,350 325 146 B

Single Operator Assisted

Asia
RT9T (RW9SW,op) 313,728 688 152 C
7L4IOU 190,350 423 150 B
JA1YNE 163,314 422 129 C
JA9XBW 131,019 367 119 B
7N2UTO 36,666 194 63 B
JA1SJV 1,980 30 22 C

Europe
OH0Z (OH1MM,op) 3,078,030 3478 295 C
DK3GI 2,597,340 2965 292 C
YL8M 1,979,601 2509 263 C
OK1DG 1,209,318 1606 251 C
G3LZQ 1,163,280 1480 262 C
ON7NQ 910,314 1473 206 B
IK0YVV 837,567 1389 201 C
IK3UNA 711,585 1255 189 B
DL6KVA 641,229 1013 211 C
PA5KT 598,230 867 230 C
DF5ZV 503,118 847 198 C
DJ9MH 486,000 750 216 C
OK1AXB 381,654 699 182 C
EA5BM 309,960 630 164 C
SM0CCE 304,107 607 167 C
OK2ZC 282,720 620 152 C
DL2ZAV 277,713 523 177 B
GW0GEI 260,568 564 154 C
DJ9RR 235,104 496 158 C
OH9W 233,454 533 146 C
EW2AA 222,900 743 100 C
F6OIE 147,441 413 119 B
OK1KT 100,464 299 112 C
YO9HP 85,722 314 91 C
DK2ZO 71,877 247 97 B
DJ2QV 34,185 215 53 C
DF1HF 30,600 136 75 C
G0MTN 27,945 135 69 B

South America
PY2EX 495,759 913 181 C

Multioperator Single Transmitter

Asia
JA1YQH (JI7GBI,JI7LZL,JR0EFE,ops) 419,475 799 175 B
RZ9SWP (RX9TN,RA9STT,RA9STH, ops) 268,932 614 146 C
JA3YUA (JA3KLI,AA7KO,AH0Q, JE3AKU,ops) 4,290 55 26 C

Europe
TM5C (@F6CTT) (F6ARC,F5MUX,ops) 3,935,274 4358 301 C
EI7M (EI4BZ,EI6BT,ops) 3,203,742 3401 314 C
OM7M (OK2BFN,OM3PA,OM3PC, OM5RM,OM5RW,OM5ZW,ops) 2,882,520 3140 306 C
SK3W (@SK3GW) (SM3SGP,SM5FUG, SM5IMO,SM0OEK,ops) 2,645,253 2949 299 C
OE2S (OE2LCM,OE2VEL, OE2WPO,ops) 2,608,320 3040 286 C
ED1RRL (EA1DAV,EA1CA,ops) 2,503,116 2838 294 C
HB9FAP 2,328,480 2772 280 C
OL5Q (OK1HRA,OK1FFU,ops) 2,293,812 2853 268 C
HG5A 1,826,550 2255 270 C
SP8YMM (+SP8ARY,SP8GQU, SP8GWI,SP8HZZ,SP8LBK,SQ8BGJ) 1,493,856 2128 234 C
YL7C 966,735 1485 217 C
EA4DRV 963,996 1474 218 C
4N7N (YU7WW,YU7QL,YT7KM,ops) 866,112 1388 208 C
RU3FM 625,860 1098 190 C
HA9SU (+HA9BVK) 529,395 1217 145 C
IO2L 441,864 969 152 C
LA2O 406,896 784 173 C
OK2KDS (OK2VWB,OK2HIJ, OK2TCW,ops) 304,290 630 161 B
SP9KRT (SP9ZW,SP9ADU, SP9EMI,SP9-1753,ops) 249,324 526 158 B
DJ5CL 248,832 576 144 C
SP5GDY 248,820 572 145 C
4N1FG (4N1FG,YU1FG,ops) 216,999 513 141 B
YO2DFA 173,448 438 132 C
HA6KZS 142,434 386 123 C
F5TNI 132,069 331 133 C
UR4PWC (US-P-361,US-P-363, US-P-296,ops) 75,750 250 101 B
RZ4PXJ (RW4PY, RA4PQC,ops) 67,320 255 88 C
F5RZJ 64,719 459 47 C
9A3CY 55,680 232 80 C
RK3QWM (RA3OU,UA3QCB,ops) 43,326 174 83 C
UR4LWY 41,322 194 71 C
SP9KJU (SP9MDY,SQ9HHV,ops) 40,053 169 79 B
OL5KRT (+OK2KRT) 11,985 85 47 C
ON4KVA 5,100 50 34 B

North America
XA5T (XE2FU,XE2ABN,XE2KB,N5LNU, N5XTP,KD5DLO,N1LN,N5TU,K1OJ, K5NZ,ops) 4,793,748 4813 332 C
T48K (CO8ZZ,CO8DM,CO8JY, CO9KAA,ops) 3,183,624 3468 306 B

Oceania
9M6V (W6AQ,K6IPV,ops) 237,945 547 145 B

South America
HC8N (N5KO,K5KA,W6RGG, K7PN,ops) 5,486,022 5347 342 C
PJ2T (W0CG,W9EFL,KP2L,W9VA, WA9S,N8BJQ,ops) 4,670,250 4790 325 C
LU1DZ 1,758,276 2652 221 C
LU8DW (+LW9DAH) 929,682 1781 174 C
PP2CW (PP2BT,PP2FN,PP2JT, PP2KJA,PP2MR,PP2RON,ops) 73,953 249 99 C

Multioperator Two Transmitters

Africa
D68C (W3EF,G4TSH,G3XTT,G3VMW, UT8LL,DL7AKC,M0DXR,ops) 3,610,764 4491 268 C

Asia
RF9C (RZ9CO,RA9CKQ,RA9CMO, UA9CIR,ops) 875,448 1512 193 C

Europe
HG6N 3,734,388 4234 294 C
LY7Z (LY2CY,LY2TA,ops) 2,892,960 3444 280 C
DL0DX 2,354,898 2951 266 C
UT7L (UR4LRG,US4LGW,UX0LL, UY5LW,ops) 1,284,456 1964 218 C
UU5A (UU1JA,UU2JQ,UU3JM, UU4JDX,UU4JMG,UU0JM,UU0JX,ops) 1,092,807 1537 237 C
YZ7A 383,520 940 136 C

North America
WP2Z (K6LA,K8CC,K9TM,ops) 6,714,192 6506 344 C
C6AKP (N4RP,W4SAA,ops) 2,174,232 2482 292 C

South America
PY3MHZ (PY3ABT, PY3AFS, PY3BZA, PY3CQ, PY3DX, PY3FOX, PY3KK, PY3KN, PY3MM) 1,220,445 2199 185 C

Multioperator Unlimited Transmitters

Africa
VQ9IO (VQ9VK,VQ9SS,VQ9PO, VQ9JT,ops) 1,031,352 1754 196 C

Asia
JA3YBK 3,052,245 3545 287 C
JA7YAA (JE7HLZ,JH0NZN,JH0ORW, JG7PSJ,7M1JAS,JO7DJT,ops) 2,185,698 2659 274 C

Europe
MD/DL5AXX (+DL4LQM,DL4WG, DL5LYM,DL8WAA) 6,055,086 6043 334 C
RU1A (RU1AA, RW1AC, RV1AW, RN1AM, RX1AA, UA1ARX, RA1AIP, ops) 5,024,400 5300 316 C
RW2F (UA2FB,UA2FF,UA2FM,UA2FZ, RA2FA,RN2FA,RV2FW,ops) 4,961,376 5136 322 C
EA4ML (EA4AHD, EA4ET, EA4TX, UY7CW, EB4AKI, EB4EPJ,ops) 4,047,120 4380 308 C
9A7A (LA5IIA, 9A3TR, 9A3OS, 9A4RX, 9A6DM, 9A8A, 9A7V, 9A4PA,ops) 3,933,000 4370 300 C
HG0HQ (HA1VQ, HA1WD, HA1YA, HA1ZN, HA1ZZ, HA3KW, HA3MY, HA3UU, HA5LV, HA5M) 3,850,092 4194 306 C
OZ5W (+OZ1FTU, OZ1KRF) 3,444,975 3765 305 C
LY7A 2,893,320 3384 285 C
HA1KSA 2,808,582 3262 287 C
OL7W 2,278,305 2955 257 C

Checklogs
7S5C, CT1FOK, DF2OSB, DK4MX, DK7AN, DL5CD, DL5DWW, DL6KWN, DL6KWU, DL7VRG, DL8DZV, DL0MPI, EA1AEH, EA7MT, EU6AA, F5JU, F6IEU, GM4SID, HA0HH, HG8W, IN3NOR, IS0IEK JM1NHZ, JR7HAN, K7MM, LA2QM, LA4OGA, LY1BW, LZ1ABC, LZ1AQ, LZ1AU, N0KJI, OK2BOV, OK2BYH, OK2PCN, OM4DN, OM8DD, PA3AQL, PY2APQ, PY2TNT, RA3SL, RA4NF, RU3AA, RU3DG, RU3FF, RU4LM, RV3ACA, RW6BN, RW0WR, RX3DRU, RX3DTN, SM3AGO, SM5ARL, SM5BFR, SM5ENX, SM5FUG, SP1EGN, SP3CUG, SP4IGV, SP6CES, SP7HB, SP7XK, SQ4GXO, TA3BN, UA1AAV, UA3AKI, UA3AMY, UA4AO, UA9FEG, UA0FGN, UA0ZC, US9QA, UT3NA, UT4EK, UT5UBJ, UU0JC, VE3BUC, YO5OAW

QST

CONTEST CORRAL

(continued from page 103)

ward this extra multiplier. IL stations multiply QSO total by sum of states, IL counties, VE provinces plus a maximum of five DXCC entities. Count additional DX for points, but not multipliers. Others multiply QSO points by the number of IL counties worked. All stations may take one bonus multiplier for each eight QSOs with the same IL county. Awards. Send entries by Nov 19 to RAMS, c/o John Matz, KB9II, 7079 West Ave, Hanover Park, IL 60103. **www.megsinet.com/~jematz/rams.html**.

24-26

YLRL YL Anniversary Contest, phone, 1400Z Oct 24 to 0200Z Oct 26. See Oct 10-12 listing.

27-28

CQ WW DX Contest, phone, sponsored by CQ Magazine, 0000Z Oct 27 to 2400Z Oct 28 (CW is 0000Z Nov 24 to 2400Z Nov 25). Exchange RS(T) and CQ zone. Classes: Single operator all band/single band/assisted, high power/low power (<100 W)/QRP (<5 W); multi single, multi multi. Multi-singles have a 10 minute rule. All classes may only have one transmitted signal per band. Work stations once per band. Team and club competition. North American stations score 2 pts/QSO w/ stations in different countries on the same continent and 3 pts/QSO w/stations on different continents; stations in the same country may be worked for zone credit, but no points. Multipliers are CQ Zones and countries (DXCC + WAE). Final score is QSO points × multipliers. Awards. Send logs by Dec 1 (Jan 15 for CW) to CQ Magazine, 25 Newbridge Rd, Hicksville, NY 11801. **ssb@cqww.com**; **cw@cqww.com**; **cqww.com/cqww/**.

Ten-Ten International Net Fall CW QSO Party, sponsored by Ten-Ten International, from 0000Z Oct 27 to 2400Z Oct 28. Single op only, CW on 10 meters only. Categories: Individual, QRP, Club. Contacts must be in CW subband. Exchange call, name, state/country and 10-10 number (if member). Score 1 pt/QSO w/nonmembers and 2 pts/QSO w/members. Final score is QSO pts × prefixes. Awards. Send logs by Nov 13 to Peg Porterfield, KC5BKT, Bauxite Chapter, 4426 Congo Rd, Benton, AR 72015; **listserv.lehigh.edu/lists/tenten-l/rules.html**.

QST

2001 ARRL November Sweepstakes Rules

1. Object: For stations in the United States and Canada (including territories and possessions) to exchange QSO information with as many other US and Canadian stations as possible on 160, 80, 40, 20, 15 and 10 meter bands.

2. Date and Contest Period:

2.1. CW: First full weekend in November (**November 3-5, 2001**).

2.2. Phone: Third full weekend in November (**November 17-19, 2001**).

2.3. Contest Period: Begins 2100 UTC Saturday, ends 0300 UTC Monday.

2.4. Operate no more than 24 of the 30 hours.

2.4.1. Off periods may not be less than 30 minutes in length.

2.4.2. Times off and on must be clearly noted in paper logs. **Do not indicate off times in electronic log files. The log checking software calculates it.**

2.4.3. Listening time counts as operating time.

3. Entry Categories:

3.1. Single Operator:

3.1.1. QRP.

3.1.2. Low Power.

3.1.3. High Power.

3.1.4. Unlimited—Packet assisted

3.2. Multioperator

3.2.1. Multi-Single only

3.2.1.1. Only 1 transmitted signal is permitted at any time.

3.2.1.2. There is no limitation on the number of band changes.

3.2.1.3. Packet use is permissible.

3.3. School Club

3.3.1. There are three divisions to this category.

3.3.1.1. College and University

3.3.1.2. Technical School

3.3.1.3. Secondary and other School

3.3.2. School clubs compete as their own category.

3.3.3. Only currently enrolled regular students and faculty/staff of the institution are eligible to operate a school club entry. Alumni may "Elmer" but may not operate the station during the competition.

3.3.4. There is no distinction between Single and Multi operator stations or power levels in this category.

3.3.5. School clubs must operate from established stations located on the campus. No portable operation from a nearby contest station is allowed. A club may operate from a member's station only if no on-campus station exists.

3.3.6. Certificates will be awarded to the top scoring entry in each division of this category in each ARRL/RAC section and division.

4. Exchange: The required exchange consists of:

4.1. A consecutive serial number;

4.2. Precedence;

4.2.1. "Q" for Single Op QRP (5 W output or less);

4.2.2. "A" for Single Op Low Power (up to 150 W output);

4.2.3. "B" for Single Op High Power (greater than 150 W output);

4.2.4. "U" for Single Op Unlimited;

4.2.5. "M" for Multi-Op;

4.2.6. "S" for School Club;

4.3. Your Callsign;

4.4. Check (the last two digits of the year you were first licensed);

4.5. ARRL/RAC Section

Example: WA4QQN would respond to W1AW's call by sending: W1AW 123 B WA4QQN 71 NC which indicates QSO number 123, B for Single Op High Power, WA4QQN, first licensed in 1971, and in the North Carolina section.

4.6. With the exception of the serial number, which changes from QSO to QSO, the exchange sent must remain consistent during the entire contest.

5. Scoring: QSO points: Count two points for each complete two-way QSO.

5.1. Multiplier: Each ARRL Section and RAC Section plus VE8/VY1/VY0, with a maximum number of 80.

5.1.1. KP3 and KP4 are in the Puerto Rico Section.

5.1.2. KV4/KP2 and KG4 stations are in the Virgin Islands Section.

5.1.3. KH6 and other US possessions in the Pacific count as the Pacific Section.

5.2. Final score: Multiply QSO points (two per QSO) by the number of ARRL/RAC sections (plus VE8/VY1/VY0).

6. Miscellaneous:

6.1. Work each station only once, regardless of the frequency band.

6.2. Only one transmitted signal at any time is permitted.

7. Awards: Certificates will be awarded to the top operator CW and Phone scores in each category ("A", "B", "Q", "U", "S" and "M") in each ARRL/RAC section and division. Division winners in each category are also eligible for a Sweepstakes Plaque. If the plaque is not sponsored, the winner may purchase it from the ARRL.

8. Submission:

8.1 Deadline for submission of CW entries is Wednesday December 5, 2001. Deadline for submission of Phone entries is Wednesday December 19, 2001. Entries emailed or postmarked after the deadline may be designated checklogs.

8.1.1. The CW and Phone mode are considered separate contests and must be submitted in separate envelopes or emails sent to the appropriate address.

8.1.2. Entries must be made on current ARRL entry forms or on a reasonable facsimile. Current forms may be downloaded in .pdf or ASCII format from **www.arrl.org/contest/forms**

8.2. Email entries for CW should be sent to SSCW@arrl.org and Phone to SSPhone@arrl.org

8.3. Any entry that has been created using a computer for logging must be submitted in the Cabrillo log file format.

8.3.1. The file must be in ASCII text format. Files from word processing, spreadsheet programs or "bin" type logging program files are not acceptable.

8.3.2 Any electronic file that is not submitted in required format will not be eligible for competition and awards.

8.3.3 Failure to submit a required ASCII file may result in the entry being designated a checklog and ineligible for competition.

8.3.4. A paper printout for a log that has been generated by a computer in lieu of the actual data file is not an acceptable substitute.

8.3.5. Paper logs that are entered into a logging program or computer after the contest are considered electronic logs and must include the required electronic file in the submission.

8.4. Handwritten paper logs are acceptable entries. Any handwritten paper log over 500 QSOs in length must include the required dupe sheet.

8.5. Logs sent via the regular mail service should be addressed to: November SS CW or November SS Phone, ARRL, 225 Main St, Newington, CT 06111.

9. Other information.

9.1. See "General Rules for All ARRL Contests" and "General Rules for ARRL Contests on Bands Below 30 MHz (HF)" available in the November issue of *QST* or from **www.arrl.org/contests**.

9.2. All contest queries should be directed to **contests@arrl.org** or by telephone to 860-594-0232. All contest rules and entry forms may be downloaded from the Contest Branch Web Page at: **www.arrl.org/contests**.

Participation Pins

The ARRL is again pleased to continue its PINS (Participation In November Sweepstakes) program for 2001. Anyone who completes 100 contacts on CW or Phone during Sweepstakes is eligible to purchase one of these attractive Participation Pins. Each pin includes the year and mode and have become a popular tradition in the November Sweepstakes event. **Pins cost $6**, including postage and handling and will be shipped after all entries have been processed and logs verified.

To order your pins, attach a note to the front of your summary sheet indicating the number of pins ordered along with your check. If you enter electronically, send a copy of your summary sheet with a note and your check attached to **Sweepstakes PINS, ARRL Contest Branch, 225 Main St, Newington, CT 06111**.

Current ARRL/RAC Sections

There are now 80 multipliers in the ARRL November Sweepstakes. These are the 71 ARRL Sections in the United States (which can be found listed on page 12 of *QST* each month) and 9 sections in Canada. A complete list of ARRL/RAC sections may be found at: **www.arrl.org/contests/sections.abv.html**.

Clean Sweep Mugs

Commemorate working your "clean sweep" by purchasing your 2001 November Sweepstakes mug. To earn your mug, work all 80 ARRL/RAC sections during the CW or Phone November Sweepstakes. The price for the keepsake mug is *$11.95* each (including postage and handling). To order, attach a note to the top of your summary sheet indicating how many mugs you are ordering and your check. If you submit electronically, send a photocopy of your summary sheet indicating how many mugs you are ordering along with your check and send to **Clean Sweep Mugs, ARRL Contest Branch, 225 Main St, Newington, CT 06111**. Your mug will be shipped after all entries have been processed and the contest results are finalized.

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—One of the hottest "new" operating activities as of late is working QRP. Recent developments in radio design have allowed these lower power transceivers to be made in very small packages. The "mode" has also re-introduced many amateurs to the joy of building. This has been further egged on by the availability of several well-received kits to construct QRP transceivers. Another aspect is that because of the small package sizes, it has driven many to explore the many methods of portable and mobile operations that are now possible. Everything from a high rise hotel room to the back seat of a bicycle. It has opened the eyes of many that with a little ingenuity, you can pretty much operate from anywhere and have a lot of fun with it. Traffic(July) DTN QNI 180 QTC 15 in 22 sess. DEPN QNI 34 QTC 0 in 4 sess. K3JL 40 N3HMQ 5. 73 Randall.

EASTERN PENNSYLVANIA: SM, Eric D. Olena, WB3FPL – SEC: Michael O. Miguelez, N3IRN. ACC: Steve Maslin, N3ORH. OOC Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Robert Josuweit, WA3PZO, Dave Heller, K3TX, George Law, N3KYZ, Harry Thomas, W3KOD. By now the summer heat has abated and autumn is well on the way. In the middle of the winter season how many of us will long for summer to return. I know that I will miss the summer simply due to the Hamfests. With a number of Hamfests yet to attend this year I am already looking back and remembering the great opportunities to visit with so many people and enjoy some of the different aspects of our hobby. If you are among those who enjoy the company and comradeship that Hamfests provide then you should make sure that you are active in the activities of your local Amateur Radio Club. In August, I found myself faced with a difficult situation. There were two Hamfests in E. Pa. on the same date. Of course, they were at opposite ends of the Section and it was impossible for me to attend both. My apology to the folks in York County. I chose to attend the Hamfest in Matamoras instead of the one in Shrewsbury. Dennis Silage, K3DS, volunteered to represent Amateur Radio as a speaker at the August 15 Chapter Meeting of the Cable Telecommunications Engineers. The organization's topic of discussion was "Reverse Path – Operations and Issues, 5 MHz to 42 MHz." Since Amateur Radio frequencies fall within that range the Engineers asked if someone would represent Amateur Radio. I am both pleased and honored that K3DS accepted the invitation. Since the writing of this article precedes the meeting there are no details available. K3DS will pass along any important information at a later time. An important event that is still in the planning stage at this moment is the WCAU Channel 10 sponsored Techfest. This event is scheduled for October 19 and 20 and will be at the Philadelphia Convention Center. Hope to see you there. For those who will not be able to attend, I will provide some of the details concerning our display in a future article. Enough cannot be said for Paul Sokoloff, WA3GFZ's, efforts to get the Techfest project available to the E. Pa. Section. Without Paul there would not be an Amateur Radio space available. Part of the display probably will include K3DS's 10 GHz digital data communications system. Tfc: K2BCL 350, W3IPX 264, N3YSI 247, N3EFW 157, W3HK 117, W3NNL 54, N3SW 54, KB3CEZ 40, W3JKX 33, W3TWV 24, N8JSO 23, K3TX 15, KB3BBR 14, KB3DCT 13, KA3LVP 12, N3AS 11, K3ARR 9, N3IRN 6,N3AO 5, KB3DDL 4, KB3CVO 4, KB3CKD 4, W3BNR 3, N3HR, 1, Net Reports: EPAEPTN 142, EPA 140, PTTN 46, SEPPTN 27, PFN 20, D3ARES 13, LCARES 8, CATN 6, MARCTN 4.

MARYLAND/DC: SM, Tom Abernethy, W3TOM, 301-292-6263-w3tom@arrl.org—ASM/RACES: Al Nollmeyer, W3YVQ (*w3yvq@arrl.net*). BM: Al Brown, KZ3AB 301-490-3188 (*kz3ab@arrl.net*). SEC: Mike Carr, WA1QAA (*bamcc@erols.com*) 410-799-0403. STM: Bruce Fleming, N3EGF, 301-863-6582 (*megaswoop@aol.com*) MDC Section Web Homepage *http://www.qsl.net/w3tom/.* Congratulations to the Anne Arundel Radio Club on 50 years of ARRL affiliation! October 6 is the MDC Section-wide Simulated Emergency Test (SET). Contact your local EC (or the SEC if you need EC contact information) and get involved in this year's exercise. CALV EC N3QHC reports formation of the CALV ARES nets meeting every Sunday at 2000 hours on 146.985 (PL 156.7). N1WR was the NCS for the first net. CARR AEC KE3FL reports 26 members and 3 sessions of the CARET. CHAR EC/SM W3TOM reports in place of COMEX exercise for July, 15 ARES/RACES team members gathered in front of CHAR EOC for hamburgers and hotdogs while constructing five dipole antennas. HOWA EC K3EF reports KC2AEI, W1TRT, K3UOD, W3GJN, N3RER, W3CCI, KF3O, N3UMG, WA3WZX, WA1QAA, N3ZPL, N3OY, N3LDC, N3UMF, W8AAS, KB3EKC, KC3EV, KB3CYL, and K3EF provided communications for this year's Columbia Triathlon. APRS was used in the LEAD and SAG wagons while monitored in the Police Communications van. One injury occurred and was reported via Amateur Radio. KENT EC WA6LHQ reports WA6LHQ/3, N3TF, N3SUV, KB3ENU, WA3UJE, N3WGC, KA3NXL, N3PBT provided communications for the MS 150 Bike Tour. PRGE EC WI3N reports two drills were conducted. The June 6 RACES Hurricane Drill tabletop with WI3N, KB3EFS, K3HDM, and KB3DVC exchanging traffic with MEMA. June 12 PRGE ARES/RACES members participated in the monthly COMEX drill using 2M and 440. 73, Tom. With the Nets: Net/NM/QND/QTC/QNI: MSN/KC3Y/31/29/259, MEPN/N3WKE/no report/, MDD/WJ3K/60/140/533, MDD Top Brass AA3SB/174 K3JL/163 AA3GV/130, BTN/AA3LN/31/47/332. Tfc: KK3F 4908, AA3SB 107, AA3GV 81, W3CB 60, KC3Y 52, N3DE 51, N3WK 44, W3YVQ 42, N3WKE 33, K3CSX 30, N3ZKP 15, N3KGM 12, WA1QAA 6, WA3GYW 4, KE3FL/0, PSHR: KK3F 228, AA3SB 165, W3YVQ 138, N3WKE 133, W3CB 127, N3WK 115, KC3Y 100, WA1QAA 97, AA3GV 87, N3ZKP 83, K3CSX 82, KE3FL 74.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC — http://www.northnet.org/nnyham. Email: kf2gc@arrl.org. ASMs: KD2AJ, WZ2T, WB2KLD, N2ZMS, WA2RLW. ACC: WB2BAU. BM: KA2JXI. OOC: N2MX. PIC: N2SZK. SEC: WN2F. STM: N2ZGN. TC: N2JKG. Our Section is very active with Public Service during these summer months and summer 2001 was no exception as we have logged many hundreds of man hours providing communications for the Tinman triathlon in Tupper Lake, the Ironman USA in Lake Placid and various canoe races on the Saranac Lake. These events usually last most of the day which means many hams work extra hours dedicated to providing reliable communications between authorities and medical ambulance related information to various control points. It takes many clubs to pull this off and I am proud of the all the hams and our NNY Section's clubs that get involved, and make doing these public service events possible. Over 42 amateurs did Health and Welfare traffic during the Ironman 2001. I want to thank those amateurs who traveled from Canada, NJ and New England and elsewhere just to help out. This was the best one so far. The education and training gained by working communications along with ambulance & medical personnel is a great experience. The first NNYARA Hamfest 2001 is scheduled for October 13, in Lake Placid, NY. Website: www.geocities.com/nnyara.

SOUTHERN NEW JERSEY: SM, Jean Priestley, KA2YKN (@K2AA) e-mail ka2ykn@voicenet.com. ASM: W2BE K2WB W2OB N2OO N2YAJ N2XYZ. SEC: KC2GID. STM: K2UL. ACC: KB2ADL. SGL: W2CAM .OOC: K2PSC. TC: W2EKB. TS: W2PAU, WB2MNF, AA2BN, KD4HZW, WB3IJB, WA2NBL, N2QNX, N2XFM. Volunteer appreciation BarBQ is over but not forgotten. Hotdogs, salads, roast pig (apple too) and time to meet other volunteers. The Homeport Alliance knows how to say "THANK YOU." The phrase "build it and they will come" sums it up. Pardon the pun but there was a SEA of volunteers. You can be a volunteer with MARS. The Navy-Marine Corps MARS Motto: "Proudly Serving Those Who Serve". Interested? visit these Web sites Navy-Marine Corps www.navymars.org http://www.asc.army.mil/mars http://www.asc.army.mil/ mars Air Force MARS http://public.afca.scott.af.mil/public/mars1.htm. You can also contact Doug Hall at 609-448-6822. Traffic rpt: WA2YL 214, K2UL 120, AA2SV 74,WA2CUW 61, WB2UVB 52, K2UL-4 47,KB2RTZ 44, N2VQA 28, N2WFN 12, W2AZ 7, KA2YKN 5, KA2CQX 4, KB2VSR KB2YBM KC2ETU 1 point each.

WESTERN NEW YORK: SM, Scott Bauer, W2LC— Congratulations to 13 year old James Clark, KC2GKB, who passed his Extra exam at the ARRL WNY Section Convention, the Greater Buffalo Hamfest and Exposition, hosted by the Lancaster Amateur Radio Club. I had the pleasure of meeting James, KC2GKB, and shaking his hand. Keith, WA2FKV, ran the W2"RUF" and Ready Code Copying Contest. W2LC, that's me, successfully copied 25 WPM. I was bit tired so I didn't try 30 WPM, I'll save that for next time. Anyway that's my story; I was tired, really! I bought a few nice enclosures, for future gizmos, experimenting and homebrew radio toys. LARC's Buffalo Hamfest was a fun one, you should have been there! Thanks to Luke N2GDU (convention chairman), LARC President Bob K2VGZ, Karl N2NJH (outdoor demo's), and Hal N7HR (test sessions) and all of the other LARC members for hosting a fine event! More on the hamfest next month. Congrats to Pat, NW2I, and Al, WA2RKP, on becoming Hams of the Year for the Pioneer Radio Operators Society. Pat is instrumental with the PROS' VE program and is a VE liaison. 12 years of coordinating and administering exams, great job Pat! Al is active in various public service events, including bike and foot races. Al also warms up the club room prior to meetings, and you know how cold it gets in WNY! Steve, N2TKX, is the new President of the Liverpool ARC. See you in the CQWW DX contest. July Net Summaries:

Net	NM	Sess	QNI	QSP
BRVSN	N2OYQ	31	155	2
EBN	WB2IJZ	22	289	0
NYPHONE	N2LTC	31	212	265
NYS/E	WB2QIX	31	326	189
NYS/M	KA2GJV	31	214	147
NYSPTEN	WB3CUF	31	357	41
OCTEN/E	KA2ZNZ	31	1336	197
OMEN	N2UC	1	15	1
WDN/E	N2JRS	31	469	79
WDN/M	KA2IWK	9	119	9

Net	NM	Sess	QNI	QSP
CNYTN	WA2PUU	31	435	64
ESS	WI2G	31	425	62
NYPON	N2YJZ	31	417	116
NYS/L	W2YGW	31	297	217
NYSCN	W2MTA	5	22	1
OARC	N2KPR	4	42	5
OCTEN/L	KA2ZNZ	31	623	199
TIGARDS	W2MTA	5	35	4
WDN/L	W2GUT	31	501	93
WDN/M	June 9	108	12	

Traffic (July 2001), * indicates PSHR, #indicates BPL: N2LTC#* 788, W2MTA* 427, KA2ZNZ* 422, KA2GJV* 337, NN2H* 296, WI2G* 179, WB2IJH* 168, KB2KOJ* 163, WB2QIX* 120, W2FR* 106, W2LC* 92, KC2EOT* 86, W2GUT* 76, KG2D* 69, W2PII* 68, KA2IWK* 66, KA2DBD* 54, N2CCN* 41, N2KPR* 36, KB2ETO* 23, K2DN* 20, AF2K* 15, KA2BCE* 15, WA2GUP* 15, KB2WII* 7, W2RH 5, KG2HA* 1. Digital; Stn Rx/Tx: KA2GJV 16/0, N2LTC 187/160.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE—ASM: N3MYZ. SEC: N3SRJ. ASM-ARES: WB3KGT. ASM-Packet: KE3ED. OOC: W3ZPI. PIC: W3CG. STM: N3WAV. TC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. DEC-OES: K3TB. On Saturday, September 29, we will be conducting a section club president's conference. This will take place at the Tree of Life Wellness Center in Ellwood City, Pa. The conference will be conducted to help the club officers compare ideas and programs to further activities in the many clubs we have in our section. On Sunday the 30th, we will have an emergency coordinators conference at the same location. Planning for this year's S.E.T. and other programs will be covered. A presentation about the Certification and Continuing Education program will also be conducted. This will include plans for possibly having some local emergency communications classes at various locations in the section. I am looking forward to having many individuals take part in these two conferences. Just two weeks later is the Pennsylvania QSO Party. This is one of the most enjoyable operating events we have in Western and Eastern Pennsylvania. The contest takes place on Saturday and Sunday, October 13 and 14. For details and rules visit the contest Web site at http://www.qsl.net/narc/paqso.htm. I would like to encourage everyone to take part in this event and for the clubs to make it a group activity. All too often we find that there are no stations operating from a particular county. I ask that each of the counties within the Western Pa. Section put forth an effort to have activity on the various bands. Don't forget to also monitor the simplex frequencies on VHF and UHF to provide some contacts, particularly for the many mobile and rover stations that pass through the areas. Good luck and hope to hear you on the air. 73 de John Rodgers, N3MSE, WPA-SM, n3mse@arrl.org.

CENTRAL DIVISION

INDIANA: SM, Peggy Coulter, W9JUJ—SEC: K9ZBM. ASEC: WA9ZCE. STM: W9FU. OOC: AA9WD. SGL: K9JZZ. PIC: KB9LEI. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Key 7/7, Rollin J. Robb, K9LMJ, Vincennes. He will be missed. It is with great regret I accept the resignation of my ASM, Chuck Crist, W9IH. He has been most helpful this past year. I will miss him. He feels it is time to accept other challenges and move on to other programs. On the other hand, I'm pleased to announce an appointment of my OOC, John Merkley, AA9WD. Thank you John. It may be too late when you see this, I'm not sure, but nominations are being accepted until Oct 1st for the IN Amateur of the Year award to be awarded at the IN State Convention at the Fort Wayne Hamfest Nov 17/18. Anyone can send in a nomination for this award given by the IRCC. Your nominee maybe someone who has excelled as an Elmer, organizer or one of those unsung heros who never gets enough credit for keeping amateur radio alive in your community. Send your nominee to Jack Parker, w8ish@arrl.net. Congratulations to the Key and Mike Club and Tippecanoe ARA Inc. for 50 yrs as an ARRL Affiliated Club. This hot wx we have been having has taken a toll on news. Not much this month. Hope more next month. Please send me your news. NM's ITN/WA9JWL,QIN/K9PUI/ KJ9J, ICN/K8LEN, VHF/WA9JWL.

Continued on page 124.

Steve Ewald, WV1X ♦ Public Service Specialist

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
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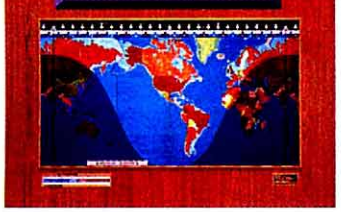

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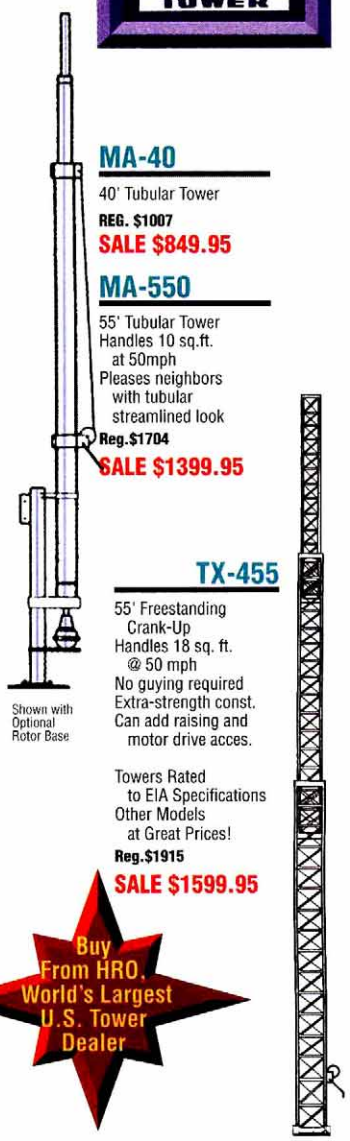

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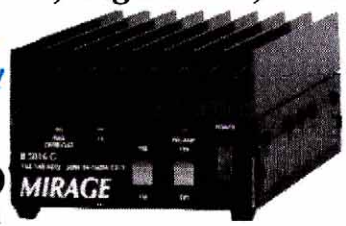

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Suggested Retail

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

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

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

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

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

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

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

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

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

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

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

More 160 Watt, 2 Meter Amplifiers . . .

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

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

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

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

100 Watts for 2 Meter HTs

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

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

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

- *100 Watts out with all handhelds up to 8 Watts*
- *All modes: FM, SSB, CW*
- *Great for ICOM IC-706*
- *15 dB low noise GaAsFET preamp*
- *Reverse polarity protection*
- *SWR Protection*
- *FREE mobile bracket*
- *Auto T/R Switch*
- *FREE handheld BNC to B-310-G patch cable*
- *Ultra-compact 4³/₄x1³/₄x7³/₄ inches, 2½ pounds*
- *One year MIRAGE warranty*

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

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

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

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

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

MIRAGE RUGGED!

35 Watts, FM only . . . $69.95

B-34, $69.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1³/₄x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

Power Curve -- typical BD-35 output power

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

- *45 Watts on 2 Meters/35 Watts on 440 MHz*
- *Auto Band Selection*
- *Auto T/R Switch*
- *Full Duplex Operation*
- *5x1³/₄x5 inches*
- *FREE mobile bracket*
- *"On Air" LEDs*
- *Single Connector for dual band radios and antennas*
- *Reverse polarity protection*
- *Works with all FM handhelds to 7 Watts*
- *One year MIRAGE warranty*

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

6 Meter Amplifier

FCC Type Accepted

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

70 cm Amplifiers (420-450 MHz)

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

Amateur TV Amps

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

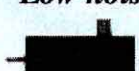
Remote Control Head for Amps

RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1³/₄x3³/₄x2½ inches.

Repeater Amps

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

Low noise GaAsFET preamps



KP-1

KP-2

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

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

Frequency (MHz)	In Shack $139	Mast Mount $195
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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)

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Commercial Amps ($199 to $395)

FCC Type Accepted

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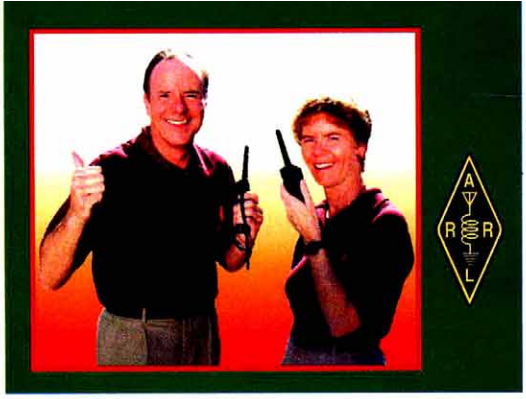

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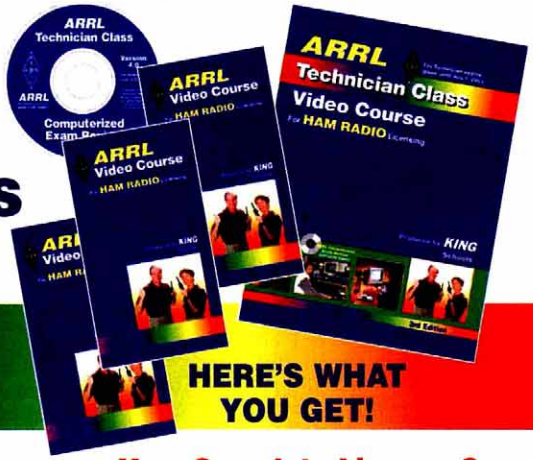

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QST 10/2001

Net	Freq	Time/Daily/UTC	QNI	QTC	QTR	Sess
ITN	3910	1330/2130/2300	2220	191	1589	83
QIN	3656	1430/0000	120	41	564	50
ICN	3705	2315	10	8	112	11
Hoosier VHF nets(8 nets)			424	12	704	34

D9RN in 62 sessions QTC 305 IN participation 98 % by WB9QPA, N9KNJ, KB9NPU, K9GBR, W9UEM, WA9JWL, NT9G, KB9XA, KB9YQP and KB9CQC.9RN in 62 sessions QTC 192 IN represented by KO9D, K9PUI, WB9OFG, KJ9J, N9HZ, WB9UYU,and W9FC. Tfc: W9FC 243, KJ9J 181, WA9JWL 102, K9GBR 75, N9KNJ 47, W9JUJ 40, K9PUI 39, WD9HII 36, W9FU 33, KB9NPU 32, KA9EIV 27, W9UEM 27, WB9OFG 17, K9RPZ 14, WB9QPA 14, W9EHY 12, K9DIY 8, K8LEN 8, AB9AA 7, N9HZ 6, AB9A 5, K9ZBM 5, WB9NCE 3, K9CUN 3, N9AJM 2.

WISCONSIN: SM, Don Michalski, W9IXG—BWN 3985 0600 W9RCW. BEN 3985 1200 KE9VU. WSBN 3985 1730 K9FHI. WNN 3723 1800 KB9ROB . WSSN 3645 1830 N9BDL. WIN-E 3662 1900 WB9ICH. WIN-L 3662 2200 W9UW. With deep regret, I inform you of the passing of Rev. Cletus Abts, KA9ICP. He was a member of the Wisconsin Rapids ARC. Jack Douville, WB9GTX, 80, passed away. Jack was a member of Sheboygan County ARC. Robert Shady, 75, KB9XR, and Carl Kerstetter, W9NVM, and Maurice Soldner, K9LGL, are Silent Keys. Our thanks to the NorWesCo ARES/RACES team who spearheaded the efforts of a total of 65 amateurs, all under the leadership of Wes Jones, N9PHS, EC/DEC, for their efforts in the Burnett/Washburn county tornado disaster. These amateurs spent 15 days in the relief effort. We greatly appreciate their hard work! For health reasons, I accepted Jim Romelfanger's, K9ZZ, resignation as the Wisconsin section PIC and OBS. Jim has given many years of service to the section for which we are extremely grateful. We give him our best wishes. The Greater Milwaukee DX Association, GMDXA, has elected new officers for the 2001 and 2002 year. The new President is Wayne Long, K9YNF, the new V.P. is Bill Ribish, W9LR, and the new secretary-treasurer is Ken Boston, W9GA. Many of our new Technician class amateurs are looking for help in learning Morse Code. If you have some free time, please volunteer to assist them. Consider it a small step taken to help preserve CW! 73! Tfc: K9JPS 708, W9IHW 586, W9RCW 551, W9YPY 502, N9TVT 439, K9GU 431, N9VE 326, W9CBE 160, N9BDL 107, K9LGU 92, K9FHI 79, N9CK 66, N9KHD 56, KE9VU 55, AG9G 49, WA7UVX 45, W9YCV 44, W9UW 41, KB9ROB 38, W9BHL 32, K9HDF 30, KA9BHK 22, WB9ICH 20, KG9B 17, AA9BB 14, N9JIY 6, W9RSX 3.

DAKOTA DIVISION

MINNESOTA: SM, Randy Wendel, KMØD—The hamfest sponsored by Brainerd ARC this past July 21 was a success. The club reports they are planning another one July 20, 2002. Radio City was a major vendor among 36 vendor tables at the event and over 250 attendees helped make the fest more of a success than the club had anticipated. The St. Cloud ARC also held its 54th hamfest Aug 12 and it was a great day for their event also. 54 yrs of hamfesting is a long time! Be sure to mark your calendars for Hamfest MN on Oct 27. You can also register online for tickets and/or tables at http://www.hamfestmn.org. For additional info, email Mandy at kg0ay@pclink.com. The annual ARES SET is coming in October. ARES members should contact their county ARES EC for SET participation info. We sure had a heat wave in July into August. My family and I enjoyed a great vacation in mid-August in Wisconsin. I lived in Wisconsin Rapids for a year back in 1986. It was great to see some old familiar faces and places again. I was Net Manager for the Wisconsin Section Side Band Net for a brief stint before I moved back to MN. Take a look at the online Badger State Smoke Signals Web site at http://www.bsss.org. 73 de KMØD.

Net	Freq	Time	QNI/QTC/Sess	Mgr
MSPN/E	3860	5:30 P	682/116/31	WØWVO
MSPN/N	3860	12 P	427/91/31	WAØTFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	237/88/31	KØWPK
MSN/2	3605	9:50 P	111/27/29	KØPIZ
PAW	3925	9A-5P	2020/79/71	KAØIZA

SAR: KBØOHI, WØLAW, WAØTFC, KØPIZ, KBØAII, W3FAF, WØHPD, KØPSH, KØWPK, KAØIZA, KBØAIJ, WDØGUF, KN9U, KCØHAW, NØJP, WAØYSL, KØIKO.

NORTH DAKOTA: SM, Kent Olson, KAØLDG — Please send in your requests for League affiliated hamfests early. It's best to send them in at least three months prior to your event to ensure it gets processed. Send them to Jay Bellows, KØQB, or me and I will forward it to him. It's about the last chance to get your antennas in order before winter arrives. Remember, safety first when doing this as some unfortunate hams have been injured or worse while working on antennas. Also, as winter approaches, make sure your backup power sources are up to snuff. You never know when you might need them. Along with that, make sure your equipment is also in good shape. Consider taking one of the Emergency Communications Courses that the ARRL offers. So far, I have taken the first course, and am looking forward to taking the second one. It is very well structured course. Section Web site at: http://home.earthlink.net/~qtipf16/. July Tfc: HF NM KEØXT reports Goose River Net, 5/39/1; WX Net 24/767/12; Data Net 29/613/24. NØRDJ 5.

SOUTH DAKOTA: SM, Roland Cory, WØYMB—Lake Area Club at Watertown 621 contacts for Field Day for a 24.2 percent increase over last year. This included a contact with a station in Portugal and one with Kuri Island in the Pacific. The special event station for the Laura Ingalls Wilder Pageant at DeSmet was temporarily off the air when a thunderstorm hit Saturday night at 10:45 PM. Otherwise, it went well with success on 75, 40 and 6 meters. Pierre ARC plans were to have special-event station set up for the WWII monument dedication on Sept 15 in Pierre. Their 2-meter net is held on Wed evening at 9 PM on 145.30. Black Hills clubs furnished communications for the Rushmore Endurance Race. 55 runners started for one of four distances – 15 miles, 50 k- 50 miles and 100 miles. Nine runners finished the 100-mile race. Sixteen members of the Black Hills ARC and the Northern Hills ARC

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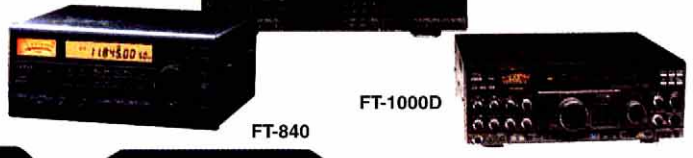

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and the Hot Springs ARC assisted with the communications over the two days of the event. July traffic reported was 320.

DELTA DIVISION

ARKANSAS: SM, Bob Ideker, WB5VUH—On Saturday, October 6, Arkansas will be conducting its annual Arkansas QSO Party. It's a one-day event, and your help is needed to be successful. Don Banta, W5RL, is leading this project and has written a simple, step-by-step guide on how to participate. If you don't already have a copy, then write, or call or call Don for more details. His addr. is 3407 Diana St., Springdale, 72764 or w5rl@arrl.net. This will be a lot of fun and I am requesting your help and support of this activity. You only need to operate a couple of hours (your chose of when and what frequencies) and can be done by yourself or in a club setting similar to FD. It starts at 0900 on Sat. and ends at midnight on Sat. night. All modes of communications can be used. We really need your help to be successful so start planning for the event NOW. I would like to hear from you regarding your indication to be active. If ANY information is needed, you will be mailed (or emailed back) immediately with whatever you request. Let's make this activity a big success by participating and getting the AR section on-the-air for this once a year event. Traffic for July includes over 2900 checking into our HF nets with 106 pieces of traffic & SARs include K5BOC 64, K7ZQR 40, KC5TMU 28, KA5MGL 12, KO5E 10, W9YCE 10, W5HDN 7, AD5AM 3, & KB5ILY 1.

LOUISIANA: SM, Mickey Cox, K5MC — ACC: KM5YL. OOC: WB5CXJ. PIC: K5IQ. SEC: AC5TM. SGL: KD5KNZ. LCW NM: W4DLZ. LTN NM: WB5ZED. Joel, W5OPR, and Keith, KL7JIU, have been appointed ECs for Orleans Parish and Livingston Parish, respectively. Carolyn, KM5YL, in addition to serving as our ACC, is now also an ORS. Congratulations to all! The LA QSO Party is close at hand. This year's contest will coincide with the TX QSO Party, which hopefully will increase the number of participants as compared to last year. Other minor changes in the rules this year should also make the contest more enjoyable for all. Full details can be found at the Twin City Ham Club's Web site, www.tchams.org. W5TFW has been appointed by ARRL HQ as HF Awards Manager for the Baton Rouge ARC. The Jefferson ARC reports that its recent Technician class was a huge success with 11 students passing their exams! KB5RQK and N5IX recently completed level 1 of the League's on-line emergency communications course. Those that have taken the course report that it is excellent. AC5TM, in conjunction with ECs around the section, is working on plans for this year's Simulated Emergency Test in October. One major goal of this year's SET is to achieve closer ties between our local ARES groups and NTS traffic handlers. Tfc: K5IQZ 143, K5MC 71, KM5YL 29, W5PY 16, K5DPG 12, KG5GE 12. PSHR: K5IQZ 130, K5DPG 118, KM5YL 104, K5MC 98, KG5GE 90, W5PY 80. Net Reports: sessions/QNI/QTC. LTN: 31/365/88. LCW: 29/169/42.

MISSISSIPPI: SM, Malcolm Keown, W5XX—Mississippi Section Web Page at arrlmiss@org. Web Master K5IBM at k5ibm@arrl.net. STM: KJ5YY, NM: WJ5K, KB5W, N5YNY, K5XU, KM5UH, KB5IXI. Don't forget the Mississippi Section Simulated Emergency Test on September 15 starting simultaneously at 0800 on 3862 and on the 2 Meter Nets. Be Prepared! Also put the ARRL Day in the Park on your calendar. This year's picnic will be hosted by MFJ on September 29 at McKee Park in Starkville beginning at 9 AM until ??? and will feature tailgating and tours of the MFJ Plants. Food will be available. MFJ will be celebrating 30 years in the Ham Radio business. Congratulations to W0CIR, KB5RQK, W5WAF, KC5YCH, and KB5ZEA for completing the Level 1 ARRL Emergency Communications Course. MSPN Net Manager WJ5K has put the MSPN Preamble and Roster on-line. If you want to follow along with the roll call, download a copy of the roster at http://tarc.freeservers.com/mspn.html. According to the County Hunters Web Site, the most needed counties in Mississippi are Amite, Benton, Bolivar, Copiah, Grenada, Humphreys, Lafayette, Marshall, Ponotoc, Tallahatchie, Tippah, Wilkinson, and Yalobusha. Nets meet daily for most of the daylight hours on 14336 (SSB) and 14056.5 (CW). Help a county hunter out. Wonder why Issaquena is not rare? Regret to report the passing of N5TYY of Greenville. PIO Report: W5KWB. DEC/EC Reports: NN5AF, KD5CKP, KD5KXJ, N5NQ, W5OXA, KB5RQK, WA5TEF, KC5TYL, AB5WF, N5ZNT. Net Reports: sessions/QNI/QTC: MSPN 31/3066/46, MTN 31/113/45, MSN 31/1146/11, Jackson Co ARES/RACES 31/448/8, PBRA 29/185/8, WCMS ARES 13/143/2, MLEN 5/92/0, LARCEN 5/84/0, MCARA 5/60/0, JARCEN 5/100/0, Attala Co ARES 4/50/6, NW MS ARES 4/27/0, Lowndes Co ARES 4/59/0, MBHN 3/16/0, Central Miss SKYWARN 1/31/0. PSHR: WB5ZED 206, KB5W 154, K5VV 102, W5XX 100, KJ5YY 74. Traffic: WB5ZED 720 (BPL), KB5W 331, K5VV 45, KJ5YY 16, W5LEW 11, W5XX 5.

TENNESSEE: SM, O. D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. Mr. Rube, WA4FMR, became a Silent Key on July 6. All TN hams will miss Mr. Rube, but certainly the TN Phone Net has lost its weather man. At the beginning of the net the NCS would ask Mr. Rube about weather and he would always have a weather report. Our sympathy goes out to Mrs. Vi, WA4FRQ, Mr. Rube's wife. Tri-County AREC of West TN had a great time celebrating the "Iris Festival, " using the special events call sign of N4I on May 5. The Knoxville Hamfest was the best ever this year according to RACK PANELS. Plaques were presented to Bill Cross from the FCC for his participation in the event and to the ARRL for its continued support of the RACK club and its activities. RACK 2001-2002 club officers are: Sheila, KB4G-Pres; Wayne, KF4TBY- 1st VP; Jim, KG4CFB –2nd VP; Carl, KF4SJ- 3rd VP. Carol, N4LFR-Treas., HP, KA4LEO, Sec; Mike, N4KNX- Act Mgr; Willard, W4HZD-Educ Dir; David, K4PZT- Hamfest Dir; David AC4JE- Trustee & Rep Dir; Bruce, K4PCK- Past Pres. DRN-5 reports: sess 62, mess 667, TN rep 74% by KE4GYR and W4OGG. Net sess/QTC/QNI: TMPN 30/54/2347; TNCWN 19/9/157; TEMPN 26/45/714; TEPN 23/26/2039. Tfc: KE4GYR 39, WA4HKU 34, K4QQ 14, N4PU 10, WA4GLS 10, W4SYE 7, KI4V 6, WD4JJ 3, WA4GZZ 3.

GREAT LAKES DIVISION

KENTUCKY: SM, John D. Meyers, NB4K—The solid rock of Emergency Communications in Northern Kentucky known as WD4PBF became a Silent Key on July 11th. Jake will be

MFJ *Pocket size* Morse Code Reader™

Hold near your receiver -- it instantly displays CW in English!

Automatic Speed Tracking . . . Instant Replay . . . 32 Character LCD . . . High-Performance Modem . . . Computer Interface . . . Battery Saver . . .

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$79.95

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Then watch CW turn into solid text messages as they scroll across an easy-to-read LCD display.

No cables to hook-up, no computer, no interface, nothing else needed!

Use it as a backup in case you mis-copy a few characters - - it makes working high speed CW a breeze - - even if you're rusty.

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Eavesdrop on interesting Morse code QSOs from hams all over the world. It's a universal language that's understood the world over.

Automatic Speed Tracking

MFJ *AutoTrak*™ automatically locks on, tracks and displays CW speed up to 99 Words-Per-Minute.

Simply place your MFJ-461 close to your receiver speaker until the lock LED flashes in time with the CW.

Four Display Modes

1. Bottom line scrolls and fills with text, then that entire line is displayed on top line until bottom line refills -- makes reading text extra easy! Automatically displays speed in WPM.

2. Same as **1**, without speed display -- gives you maximum text display.

3. Top line scrolls, bottom line displays speed in Words-Per-Minute.

4. Both top and bottom lines scroll.

Two-line LCD display has 32 large 1/4 inch high-contrast characters.

MFJ Instant Replay

The last 140 characters can be instantly replayed. This lets you re-read or check your copy if you're copying along side the MFJ-461.

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Consistently get solid copy from MFJ's high performance *PLL* (*phase-lock loop*) modem. Digs out weak signals. Even tracks slightly drifting signals.

Of course, nothing can clean up and copy a sloppy fist, especially weak signals with lots of QRM/QRN.

Computer Interface

The MFJ-461's serial port lets you display CW text full screen on a bright computer monitor -- just use your computer serial port and terminal program.

More Features

When it's too noisy for its microphone pickup, you can connect the MFJ-461 to your receiver with a cable.

Battery saving feature puts MFJ-461 to sleep during periods of inactivity. It wakes up and decodes when it hears CW.

Uses 9 Volt battery (not included).

True Pocket Size

Fits in your shirt pocket with room to spare - smaller than a pack of cigarettes. Tiny 2¼x3¼x1 in. 5½ ounces.

No Instruction Manual needed!

Super easy-to-use! Just turn it on -- it starts copying instantly!

Accessories

MFJ-26B, $4.95. Soft leather protective pouch. Clear plastic overlay for display, push button opening, strong, pocket/belt clip secures MFJ-461.

MFJ-5161, $14.95. MFJ-461 to computer serial port cable (DB-9).

MFJ-5162, $5.95. Receiver cable connects MFJ-461 to your radio's external speaker 3.5 mm jack.

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Learn Morse code anywhere with this tiny *MFJ Pocket-sized Morse Code Tutor*™! Practice copying letters, numbers, prosigns, punctuations or any combination or words or QSOs. Follows ARRL/VEC format. Start at zero code speed and end up as a high speed *CW Pro!* LCD, built-in speaker.

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Built-in Iambic Paddle. Thumbwheel speed control. Adjustable weight. Adjustable sidetone with speaker. Iambic modes A or B. Fully automatic or semi-auto "bug" mode. Reversable paddle. Tune mode. RF-proof. Battery Saver. Tiny 2¼x3¼x1 in.

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missed, but his legacy will live on in the net he so much gave of his time, the 7th District RACES/ARES Net. October will see the National S.E.T. on Oct. 6th. Ron, KA4MAP, is discussing the scenario with state EM officials at this time. Listen on the air for further details. Many ARES teams across Ky were activated for SKYWARN the evening of July 8 as a massive storm front moved southward out of Indiana and Ohio bringing severe storms into a large portion of the state from west of Louisville eastward to W Va. Several District 9 crew assisted W. Va neighbors in the flooding.

Net	*QNI*	*QTC*	*Sess*	*Mgr*
KRN	526	22	22	N4AFP
KSN	262	20	31	KO4OL
KYN	288	49	31	K4AVX
KTN	1981	115	62	KB4VKS
KEN	104	2	5	KA4MAP
WTEPN	25	0	2	KO4OLN
KEN	58	2	5	WD8JA
WTSTMN	306	27	31	WB8GW
L1ARES	35	14	8	KE4JFS
7DARN	69	2	4	WD8JAW
K4MSU	44	3	5	K4JFD
WARN	129	12	5	K4MAP

PSHR: NB4K 173, KE4JFS 154, KO4OL 88. Tfc: K4AVX 32, KE4JFS 26, WD8JAW 23; WB4ZDU 13. NB4K 5.

MICHIGAN SM: Dick Mondro, W8FQT (w8fqt@arrl.org); ASM: Roger Edwards, WB8WJV (wb8wjv@arrl.net); ASM: John Freeman, N8ZE (n8ze@arrl.net); ASM: Lyle Willette AB8CB (ab8cb@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 (kb8rji@arrl.net) SGL: Ed Hude, WA8QJE (edhude@juno.com); TC: Dave Smith, W8YZ (w8yz@arrl.net); Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net); BM: Thomas Durfee, Jr.,WI8W (wi8w@arrl.net).Please join me in welcoming Lyle Willette, AB8CB, from Sault Ste Marie, who has graciously accepted appointment as Assistant Section Manager (ASM) for Education & Training. Lyle's experience as a professional weather forecaster and his search & rescue skills makes him a valuable resource. The month of October is upon us and two important activities will take place. The first is the Simulated Emergency Test on October 6 with the theme of "Terrorism in Michigan", an entirely new statewide scenario for this year that promises to give us an opportunity to sharpen our skills. Each district in the state will have a different mission to complete and will need to work as a team with other adjoining districts. We need all the help we can get, from NTS Traffic Handlers to ARES Emergency Communications Teams. This team effort and will be very enlightening. Please contact your Emergency Coordinator or Net Control Station to see how you can be a part of the effort. The second activity this month, October 20, 21, is JOTA (Jamboree-on-the-Air), the amateur radio event for Scouts and their families and leaders. JOTA is an annual event in which Boy and Girl Scouts and Guides from all over the world speak to each other by means of Amateur Radio. Scouting experiences are exchanged and ideas are shared via radio waves. Since 1958 when the first JOTA was held, millions of Scouts have met each other through this event. Many contacts made during JOTA have resulted in pen pals and links between Scout troops that have lasted many years. JOTA is not a contest, but it is a unique experience for scouts of all ages and can be considered an "Elmer Activity" for our youth. I urge you to help by devoting a portion of your time to this worthwhile event. Contact your radio club or Section JOTA Coordinator, Jerry Crawford, K8GER at k8ger@arrl.net to see how you can help. 73, Dick, W8FQT. Traffic reports for July 2001: K8GA 438, K8LJG 240, KB8ZYY 200, W8RTN 164, N8FPN 161, AA8PI 151, K8KV 125, N8EIZ 111, K8AE 101, WX8Y 99, W8RNQ 46, WA8DHB 37, W8RF 36, K8UPE 29, W8YIQ 24, K8ZJU 22, N8UN 22, K8AMR 21, K8YB 17, KA8DDQ 16, N8EXV 8, W8NGO 3. Deadline 5th of the month. Please support the following SECTION NETS:

Net	*QNI*	*QTC*	*Sess*	*Net Mgr.*	*Freq*	*Time*	*Day*
QMN	NO REPORT			WB8SIW	3.663	6:30&10 PM	Daily
MACS	267	67	31	W8RNQ	3.953	11 PM	Daily (1 PM Sun.)
MITN	507	272	31	N8FPN	3.952	7 PM	Daily
UPN	1021	44	36	AA8SN	3.921	5 PM	Daily (Noon Sun.)
GLETN	416	103	31	WB8ICN	3.932	8:30 PM	Daily
SEMTN	310	96	31	WI8K	145.330	10:15 PM	Daily
WSSBN	745	35	31	K8CPW	3.935	7 PM	Daily
MI-ARPSC	71	3	5	W8FQT	3.932	5 PM	Sunday (Alt. 7.232)
VHF	no report			KB8ZYY	Var.	Var.	

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12 and check out the OSJ at *www.maser.org*).—Much has been said and written about making Amateur Radio more visible to the public for recruiting new hams and for protecting our frequencies. Everyone wants a "quick fix" solution or beefing up those responsible for making this happen. Sorry, but the real answer lies with the work of Seneca Co RC who ran a radio booth during the county fair in Tiffin. They had packet, APRS, ATV on display. Ohio has 88 counties which means 878 other chances to put us on public display during county fairs. Then there are shopping malls for demonstrations during Christmas season and numerous city street events all over our state. Maybe someone signs up for ham radio classes; maybe no one does. But keeping our hobby in the public light is the best medicine for recruiting and protecting our frequencies. Do what they did in Seneca County. Just a reminder for clubs to check your Special Service Club status and affiliation status and keep it up to date. Any new officers? Any news about your club? Contact Brenda Krukowski, KB8IUP, the Ohio ACC, *kb8iup@arrl.net.* Congrats to the Bellbrook ARC and Wood Co ARC for the 25 anniversary of ARRL affiliation with the ARRL. Remember Ohio's 200th birthday is 2003. The Ohio Section plans, chaired by ASM Bob Winston, W2THU, Cleveland, were announced at the Sept 15 Ohio Section Conference. More on this later. It is time for local clubs to plan how they will celebrate the event through Ham Radio. Ohio Section Congrats to (A) Newsletter editors across Ohio for lots of Field Day pictures. It is still our universal ham

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Use sound card and rig for all digital modes!

Plug and Play! Includes software, audio cables, power plug . . . RFI-proof . . . Isolation transformers -- no hum, noise, distortion . . . Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, Meteor Scatter, others . . . Use as Voice Keyer, CW Contest Memory Keyer

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$89.95

Plug this new MFJ-1275 sound card interface between your transceiver and computer and enjoy operating all digital modes.

Everything you need is included -- software, audio cables and power plug.

The MFJ-1275 provides fully automatic operation with audio and push-to-talk control. It matches sound card audio, eliminates ground loops and provides microphone override.

Works with all transceivers with 8-pin round or modular microphone plugs.

Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, high speed CW Meteor Scatter and many others. Also use as Contest Voice Keyer and CW Contest Memory Keyer.

Digital Modes or Normal Operation

Choose digital modes or normal transceiver/computer operation with the push of a switch.

Selecting the ON digital mode, all connections are made between your rig and computer for instant digital operation.

In the BYPASS normal mode, your transceiver and computer connections are restored for their normal operation.

Audio Isolation Transformers

Audio isolation transformers and relay eliminate ground loops, audio hum, noise and distortion.

RFI-Proof

Extensive RF suppression and line isolation eliminates RF feedback problems.

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You can override any digital mode and transmit microphone audio at any time by pressing mic PTT -- great for SSTV and Contest Voice Keyer operation.

More Impressive Features

Serial port -- lets computer control your radio to override and/or interrupt digital transmissions.

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Use any Transceiver with 8-pin Mic

Internal jumpers program microphone wiring for any brand or model radio -- no soldering required. Order **MFJ-1275** for 8-pin *round* mic plug. Order **MFJ-1275M** for 8-pin *modular* mic (RJ45) plug.

Everything you need is included

MFJ-1275/MFJ-1275M includes audio cables, power plug and a CD with a collection of the most popular amateur radio software to operate PSK-31, RTTY, SSTV, PACKET, AMTOR, CW, HSCW Meteor Scatter, Contest Voice Keying and other modes. Uses 12 VDC or 110 VAC with optional adapter (**MFJ-1312B, $14.95**).

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radio activity; (B) LEARS's "Spirit of '76 and '88" newsletter for not only listing area hamfests and VE exams but area fox hunts as well; (C) Frank Pipe, K8IGW, Pickerington, for his excellent "Tactical Call Signs" article in the "COARES Bulletin" in Juen; (D) GCARA in Cincinnati holding a kit building night (this time code oscillator kits). Even had an audience watching. Ohio Oct hamfests, (7) TwoMeterGruop in Medina; (14) Ashland ARC at Ashland; (28) Massilion ARC in Canton...de K8QOE.

Net	QNI	QTC	QTR	Sess	Time	Freq	NM
BN (E)	103	39	195		1845	3.577	WD8KFN
BN (L)	158	55	266	31	2200	3.577	NY8V
OSN	142	38	470	31	1810	3.708	WB8KQJ
OSSBN	1818	479	2682	92	1030, 1615, 1845	3.9725	N8IO

Tfc: N8IO 255, WD8KFN 255, WB8KVM 152, W8STX 146, N8IXF 138, KD8HB 133, N8OD 118, W8PBX 109, N8DD 101, WA8SSI 96, N8BV 94, KA8CXG 93, K8PJ 93, N8TNV 72, KA8FCC 71, NS8C 60, WA8EYQ 57, WB8HHZ 52, KC8HJL 50, N8IBR 48, N8CW 46, K8RC 42, WB8SIQ 37, KA8VWE 35, W8RPS 34, KI8IM 28, KC8HTP 26, WB8PMG 26, KC8DWM 24, NY8V 22, N8GOB 19, N8WLE 17, KB8SBK 16, W8BO 15, K8QIP 14, AB8KB 11, KC8KYP 11, N8RRB 11, KC8PDY 6, W8RG 6, KB8SIA 6, KB8TIA 3.

HUDSON DIVISION

EASTERN NEW YORK: SM, Pete Cecere, N2YJZ— STM: Jim Peterson, K2CSS. 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. I'd like to visit your club at one of your meetings. 'Have SM will travel'. Just e-mail me at n2yjz@arrl.org. If you hear a new KC2 station pick them up and Elmer.73 de Pete N2YJZ. June-PSHR: N2YJZ 142 WB2ZCM 141 KC2DAA 138, WA2YBM 136, W2AKT 129, K2CSS 122, WB2IIV 118, KC2HUV 95, W2JHO 90. Station Traffic: N2YJZ 132, K2CSS 97, N2JBA 68, KC2DAA 58, WB2ZCM 39, WB2IIV 39, WA2YBM 18, W2JHO 18, KC2HUV 15, W2AKT 16, WA2WMJ 12, K2AV V 5, N2RTF 5, WA2BSS 4, N2FTR 2, KC2GLD 1, KL7JCQ 1. Net Reports: QNI/QTC AES 49/8. CDN 251/62. CGESN 37/4. ESS 425/124. HVN 701/236. NYPHONE 212/535. NYPON 417/234. NYS/E 326/395. NYS/M 214/321. NYS/L 297/459. NTSPTEN 357/82.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SEC: KA2D. ACC: N2MUN. PIC: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. SGL: N2GA. The semi-annual NLI Section Staff meeting is Sunday, Sept. 30, in the ARES/RACE Room at Babylon Town Hall. The meeting starts at 9:30 AM and all ARRL appointees are welcome to attend. October events: Oct. 21: HOSARC Hamfest at New York Hall of Science, Flushing Meadows Corona Park, 9 AM - 3 PM, Contact Steve WB2KDG at 718-898-5599 or www.hosarc.org. VE exam at 10 AM, call Lenny Menna, W2LJM, at 718-323-3464. Oct. 28: Great South Bay ARC Hamfest, Knights of Columbus Hall, 9AM - 2 PM, 400 Broadway, Lindenhurst, NY, see www.gsbarc.org VE session at 12 noon, contact: Phil Lewis N2MUN at 631-226-0698. Oct. 21 & 22: Annual Boy Scout Jamboree on the Air (JOTA). Oct. 20 & 21: Simulated Emergency Test - listen to all regular ARES frequencies and be prepared for this annual drill. HRU 2002: Ham Radio University 2002 is Sunday, January 20, 2002. Mark your calendars now! Contact Phil, N2MUN, for more information and the date of the next HRU planning meeting at n2mun@arrl.net or 631-226-0698. Congratulations again to Bill, WB2GTG, who again has made Brass Pounders' League. The monthly NLI Section e-happenings newsletter is being e-mailed to all ARRL members in the section who have subscribed to Division / Section bulletins. If you have not received this newsletter, go to the ARRL Web site (www.arrl.org) and update your profile. Check the box that indicates you want Division / Section bulletins. Previous newsletters are available on the NLI site. Please e-mail me with your club's information and I will get it in the newsletter! Volunteer Exam sessions, club listings, upcoming events and more are available on the NLI Web site - www.arrlhudson.org/nli. Tfc: WB2GTG 785, KB2KLH 81, AB2IZ 74, WA2YOW 70, N2AKZ 40, N2WGF 36, W2XS 16, KA2YDW 13, KA2UEC 11, N2TEE 5, KA2D 3, WA2VZK 2.

NORTHERN NEW JERSEY: SM, Bill Hudzik,W2UDT. Section appointee changes: SEC K2MPH and OOC KB2JSG have resigned their positions. Both have served the section well, especially Mike, K2MPH who became SEC just before Hurricane Flyold. Talk about baptism by fire! Our new SEC is Steve Ostrove, K2SO, who is looking for more OES and EC volunteers. The OOC is K2ZD, Mario Karcich, who has been an OO since 1984 and is actively looking to expand our OO ranks in the section. Please give them your support by volunteering for an ARRL appointment. On board also as an ASM is John Hults, K2WJ. He is part of our ham radio license plate group which consists of W2UDT, K1XV and the SNJ SGL Larry Gaspere, W2CAM. The group is working across Division and Section lines to get a new ham radio plate for NJ. We will have met with the Transportation Committee and hope to have the bill out to vote before November. By this time we hope to have a revamped NNJ web site running. Webmaster N2WZB has been working hard to give us a new look. 73, Bill W2UDT.

Net	NM	Sess	QNI	QTC	QSP
NJM	WA2OPY	31	129	78	73
NJPN	W2CC	36	188	49	36
NJSN	K2PB	31	173	12	11
NJN/E	AG2R	31	193	72	68
NJN/L	AG2R	31	171	62	59
CJTN	KB2VRO	30	183	44	33
NJVN/E	N2RPI	30	443	46	37
NJVN/L	N2OPJ	31	408	45	41

Tfc: KB2VRO 46, WA2MWT 44, N2OPJ 39, N2RPI 38, N2GJ 37, K2PB 30, W2JG 21, W2CC 19, N3RB 13, K2DBK 11, K2SO 6, K2VX 5.

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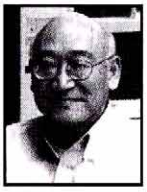

-- Martin F. Jue, K5FLU
President and Founder
MFJ Enterprises, Inc.

I know I'm not the only ham who can't understand all the speech in a QSO caused by high frequency hearing loss. I developed a solution that I want to share with my fellow hams.

I almost gave up my ham radio hobby

I have been a passionate ham radio operator for over 40 years ever since I was a teenager. I loved every minute of it. Still do, but I almost had to give it up.

As I grew older (I'm 56 now) I found myself asking "*What did you say?*" so often it got downright embarrassing. I can hear pretty good most of the time. I just can't always understand what people are saying and my left ear is weaker than my right ear.

It got to where I was having trouble carrying on QSOs. I could hear, but I just couldn't quite make out all the words.

My hearing problem almost put a stop to my lifelong hobby.

There was no way I was going to give up ham radio . . .

Research showed me what to do

I searched the literature and spoke to hearing and speech experts.

According to their research on the intelligibility of speech in hearing English words:

1. The frequencies important for speech intelligibility are the consonant sounds from 500 to 4000 Hz. They contribute 83% of word intelligibility.

Frequencies from 500 to 1000 Hz contributes 35% of word intelligibility and 35% of sound energy.

Frequencies from 1000 to 4000 Hz contributes *48% of intelligibility* but has *only 4% of sound energy!*

2. In contrast, frequencies from 125 to 500 Hz contributes 55% of sound energy but only 4% to word intelligibility.

***In** other words, nearly half the speech intelligibility is contained in 1000 to 4000 Hz frequency range with only 4% of the speech sound energy.*

On the other hand, the low frequencies 125 to 500 Hz have most of the speech energy but contribute very little to intelligibility.

How I improved my ability to hear and understand QSOs

The research showed me what to do.

First, drastically increase the speech energy above 500 Hz where 83% of intelligibility is concentrated.

Second, drastically reduce the speech energy below 500 Hz that contributes only 4% of intelligibility.

Amateur radio communications limit audio to about 300 to 2700 Hz.

I split the audio band into four overlapping octave ranges centered at 300, 600, 1200, 2400 Hz.

I could boost or cut each range by nearly 20 db to give me full control. This let me maximize speech intelligibility for most kinds of frequency loss.

My left ear is weaker than my right ear so I split the output audio into left and right channels with separate 2½ watt amplifiers. A balance control lets me equalize the perceived loudness to each ear. *Now both ears help in improving speech intelligibility!*

I couldn't believe my ears!

I built one and hooked it to my rig.

I boosted the high frequencies, cut the low frequencies, set the volume and adjusted the balanced control so I could hear each side equally loud.

I couldn't believe my ears! Speech that I could hear but barely understand before was now highly understandable. I got my ham radio back!

With this concept, you'll *understand* QSOs better and enjoy ragchewing and contesting more, even if you don't have high frequency hearing loss.

It helped me so much I wanted to share this with my fellow hams

I developed this into an accessory that any ham can use.

I made it immune to RFI, added a front panel phone jack, on/off speaker switch, two selectable transceiver inputs, a bypass switch for in/out comparison and built it into 10Wx2½Hx6D inch aluminum enclosure. Needs 12 VDC.

Other Uses

Replace your rig's audio section for superb audio. Eliminate hum, buzzes, poor frequency response, low audio power.

Works with SSB, FM, AM, CW -- any voice mode. Use any rig -- ham, marine, aircraft, CB. Use for PA systems, internet phone, radio talk shows.

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MFJ-392, $19.95. Matching high performance communication headphones.

MFJ-281, $12.95. Mylar cone speaker emphasizes 600-4000 Hz for crystal clear speech fidelity. Requires two.

MFJ-1316, $19.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, $58.80. *All-in-one MFJ-616 Accessory Pack.* Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

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MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD—SEC: NA0R. ACC: N0IJP @ KE0BX. BM: K0IIR @ W0CXX. SGL: K0KD. STM: KB0RUU. GRARC has a new secretary. Congrats Larry. New Techs are KC0LCJ, KC0LCT, KC0LCL, and KC0LCI. KA0OBC to General and Extras are N0EBN, K9EMU, KB9VWV, and WB9CPI. TSARC are at it again. They have deposited nearly $28K into their bank account in four years and only have $1.6K left, but you should see the van. If you want to know how they do it, contact Ernie, WA0AUU. CVARC are having classed for all licenses. Contact K0KTG. Started Sep 10! Hurry! FMARC and IIARC are jointly sponsoring the Radio Rodeo on Sep 23. Have you given the Novice Spectrum Study Committee your thoughts on the matter? I have, for better or worse! The Iowa Radio Sport Society has announced the Mystic Pilgrimage on Oct 13. I hear that Story County ARC and the Cyclone ARC held a joint FD and had a great time. Wade! Did you get those antennas straighten out? Looks like EIDXA are getting new badges. Hey! I received a mailing for the Summerfest addressed to "Amateur Radio Station", Chillicothe, IA. They found me! Ok, OK. It is a small town. Newsletters were received from GRARC, TSARC, CVARC, FMARC, SCARC, EIDXA, DARC, OARC. Traffic: KB0RUU 223, W0SS 153, WB0B 38, N0JL 32, KB0JUL 2. 73 es cu nxt month. de N0JL

KANSAS: SM, Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers , K0BXF. SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. PIC: Scott Slocum, KC0DYA. TC: Rick Carver, WA0KS. Welcome Richard Webb, KB0RUU, TRN Manager, reports of our Ks hams participation. By the time you read this, our state convention will be over and we must get ready for the October SET. For more on the K0S Mt. Sunflower, Ks, Expedition in Oct, see *QST* special events or "KAR" Newsletter. The Johnson Co and Jayhawk AR Clubs receiving their 50th year ARRL affiliation certificates also the Kaw Valley AR Club their 75th and the Trojan ARC their 25th. Congrats to all. Morris, KA0OLR, became a Silent Key Monday, July 30th. He was 1 of our faithful NCSs of the CSTNet. The Sand Hills ARC were featured on "Mainstreet Kansas" on KSN TV. It is good to hear HR is getting PR. June Kansas Nets: sessions/QNI/QTC, KSBN 30/873/82; KPN 22/282/53; KMWN 30/646/467; KWN 30/711/407; CSTN 26/1752/ 102; QKS 57/212/115; QKS-SS 4/9/6; SEC 26/244/12; QNS KB0AMY KC0AUH N0BTH KC0CIG WD0DDG WD0DVM AA0IQ W0PBVKB0QGX KB0WEQ KB0YQV Joseph WD0DVM SEC.TEN 171 msg 58 sessions Kansas 73% w/ AA0FO K0PY W0WWR NB0Z W0SS/Mgr. TRN QNI 475 QTC 456 Ks 95% with KB0AMY W0FE N0KJ AA0OM W0WWR BBS. AA0HJ received 12 W1AW Bulletins 322 Personal 0 NTS. Tfc: W0WWR 527, K0PY 56, KB0DTI 26, W0OYH 23, N0RZ 20, NB0Z 13, W0FCL 5. OBS-WA0DTH 12, K0RY 15.

MISSOURI: SM, Dale Bagley, K0KY— I want to express my congratulations to Missouri Section Shelby County Emergency Coordinator Thaddeus Huff who was selected to receive the Hiram Percy Maxim Memorial Award. The Hiram Percy Maxim Award recognizes the contributions of time, skill and energy of outstanding Amateurs under 21 years of age to Amateur Radio. The ARRL Foundation Inc has made a $1000 Grant for the Hermann Junior High School. The Hermann Bearcat ARC KC0JYV, is fortunate to have Diane Pankau as their teacher and Richard Lionberger, KB0WCY, the Club Trustee. October Hamfests will be held in Grandview, MO, October 20th sponsored by the Southside ARC, and the Halloween Hamfest on Oct 27th in Kirkwood, MO. These are great Hamfests and it is always great fun to get together with all those that attend. Larry Ballew, AB0HP, from Macon, MO, has been appointed as an Assistant Section Manager. Larry has been very supportive of Section Activities and will continue to be a great asset to Amateur Radio and the ARRL. Bryan Nehl, K0EMT, of California, MO, has been appointed as the EC for Moniteau County. Don Moore, KM0R, of Columbia, MO, is the new EC for Boone County. I want to thank and congratulate John Magnuson, N0EG, for the many years of service as EC of Boone County. The Callaway Amateur Radio League has purchased the ARRL Library Book Set and donated the 16 books to the Callaway County Public Library. The donation resulted from the generosity of Gene Meador, WB0HNK. The donation was given in memory of Blair Carmichael, WB0PLY, and H.B. Wade, KI0FO. Blair and H.B. were charter members of CARL. Net Sess/QNI/QTC: Audrain Co ARES 4/45/2; N0ATH rptr 5/115/0; Rolla Billbaord 31/452/ 6 NA0V; MTN 31/410/80; JCARES 4/46/0; AARCI 5/107/0; MON 54/41/40. Tfc: KE0K 21.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASM: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. Amateurs from the Omaha area participated in a mock disaster drill at Offutt AFB on August 11. This is a good example how several ARES organizations can work together. It has been quiet the last few weeks as far as the weather is concerned. Bill Montz, (W0ERT) EC for Johnson, Nemaha and Pawnee counties sent me some good tips about hot weather. Drink plenty of water (not alcohol, pop or juices) while outdoors for ARES functions or any activity where you could come dehydrated. Drink even if you aren't thirsty. Your body needs 8 quarts per day to regulate its temperature and vital functions. Net Reports: MIDNE ARES: QNI 383, QTC 4 & 31 sessions. NMPN: QNI 1521, QTC 18 & 31 sessions. Lincoln/Logan ARES: QNI 27, QTC 2 & 4 sessions. NE Storm Net: QNI 784, QTC 19 & 31 sessions. NCHN: QNI 69, QTC 2 & 11 sessions. NE 40 Meter Net: QNI 233, QTC 3 & 24 sessions. MARES: QNI 272, QTC 2 & 5 sessions. Tfc: K0PTK 96, KE0XQ 14, W0UJI 2, KA0DOC 2, WB0ART 2, WY0F 2, W0EXK 2, KA0O 2, KA0DBK 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—ASMs: KZ1Z, NK1J, N1API, K1STM. BM: KD1YV. OOC: W1GC. PIC: W1FXQ. SEC: WA1D. STM: K1HEJ. SGL: K1AH. TC: W1FAI. Don't miss the Nutmeg Hamfest and Computer Show October 7 at Mountain Side Wallingford. Noted speakers Riley Hollingsworth and Kay Craigie will be on board! John Dilks, K2TQN with his old-time radio mobile museum. For more details check out http://www.qsl.net/nutmeghamfest. Be sure and support this very fine effort-members of the Meriden ARC are working hard to make this event exciting so come on out and enjoy the fun! Let's continue to have our State Ham Fest an annual event. And don't forget The CARA Ham Fest September 16, Edmondton Town Hall, Newtown and the Tri-City Hamfest and Auction October 27 at the Senior Citizens Center Rt. 85 Waterford. The Big E is running from September 14 to September 30 so don't forget to stop by the Amateur Radio booth if you get up there. The Hartford Marathon needs ops October 13-contact Larry, K1IED. Congrats to The Tri-City ARC on continuing their club affiliation with ARRL for fifty years! At this writing, Director Frenaye and I are hoping to present their certificate at the hamfest in Wallingford at the ARRL Forum. CT has a newly-affiliated club: The Vinal Tech ARC with Bill, W2GUN, as its advisor. This club will receive its charter in early Fall. Congratulations! Best of luck to Don, WT1I, and his family moving to Florida. Don has been an active member of the Greater Norwalk ARC for about 20 years. Your SM spent a weekend in Newark Valley, NY, at a picnic and general get together with lots of NTS folks including members of the Eastern Area Staff who came from all over the East Coast. This event was hosted by Bill, W2MTA, and his wonderfully supportive wife, Betty, who, BTW, is terrific at explaining to others what we do as ham ops. It sure was neat to meet so many traffic handlers who operate together on HF. That's it folks-c u at the hamfests! 73. Net sess/QNI/QTC/NM: ECTN 29/216/30/WA4QXT; Wescon 31/232/55/KA1GWE; NVTN 29/106/39/KB1CTC; CPN 31/154/50/N1DIO; CN 27/ 88/39/N1AEH; BOMN 28/278/290/NM1K. Tfc: NM1K 2140, KA1VED 556, KA1GWE 118, WA4QXT 67.

EASTERN MASSACHUSETTS: SM, Phil Temples, K9HI—ASMs: WA1ECF, N1GTB, WA1IDA, N1UGA, AA1MO. ACC: N1DHW. BM: N1IST. OOC: K1LJN. PIC: N1PBA. SEC: W1MPN. SGL: K3HI. STM: NZ1D. TC: N1UEC. e-mail list: ema-arrl@qth.net, web: http://www.qsl.net/ema-arrl. Congrats to K8SH of N. Reading, newly appointed 1RN, Cycle 3, Net Manager. As of this writing there have been no new developments on S. 1217, the "cell phone ban" legislation which might adversely impact Amateur Radio in MA. Stay tuned. EMA ARES leaders held a staff meeting at the home of SEC W1MPN recently. ACC N1DHW is calling for reps from all EMA clubs to participate in the reconstitution of the Council of Eastern MA ARAs. Look for a CEMARC meeting in the near future. Mystic Valley ARG members provided communications for the 2nd annual Boston Fire Department 150-mile bike-a-thon. MVARG also hosted CPR training, given by N1IWF. A total of nine MVARG members are now CPR certified. Who says lightning doesn't strike twice? The Pentucket RA had their repeater struck twice in a one-month period! The Southeastern MA ARA's repeater also suffered a lightning strike, but it was quickly repaired. Ten members of the Billerica ARS provided communications for a 550-mile, seven day charity bike ride for the American Diabetes Assn. Rumor has it that Falmouth ARA members have been eating pizza and sorting lots of QSL cards for the W1 bureau. Speaking of W1, there is movement afoot to unite the disparate state QSO Parties into a single, New England-wide W1-QSO Party. Boston ARC members WN9T, N1IST and KA1TUZ performed minor repairs to the Boston ARC repeater recently. Some nice photos of the Police AR Team's repeater site can be found at http://www.pfeif.net/part/images/repeater_imgs/. Congratulations to the Wellesley ARS for 50 years of affiliation with ARRL! The HP club is alive and doing quite well. The company's Andover division was acquired by Philips Medical; the club's acronym "HPARC" now stands for "Hp/ Philips/ Agilent Radio Club." EMA club Web site of the month: Sturdy Memorial Hospital ARC at http://www.w1smh.com/ . Incidentally, kudos to SMH ARC for its "Old Magic Beans" project, a self-contained 38-foot TriEx tower mounted on a trailer with two stabilizing outriggers. 73 de K9HI.

MAINE: SM, Bill Woodhead, N1KAT— ASMs: WA1YNZ, KA1TKS. STM: NX1A. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst. Dirs: KA1TKS, K1NIT. Web Site: N1WFO. The Pine State Amateur Radio Club gets the gold star for featuring our hobby at the Bangor State Fair. This is a weeklong event, and requires giving up one of our most resources we have - time. It is not just the time spent at the site, but also the many hours spent getting ready, being there, tearing down, and recovering. A job well done. Thank yous go out to: W1DLC, K1GUP, N1KVJ, N1OJV, N1OJD, KB1FSO, KB1DLO. While visiting at the Waterville ARC Field Day site, I met WX1V, who would like to develop a 2 MT SSB net. This is something I personally enjoy doing, if interested, contact Dennis, WX1V@ arrl.net. I personally participated in the UHF contest, where I operated from FN53, along with N1DGF and K1ZE. We did very well. I encourage all to join us in the development of weak signal technology, the forefront of tomorrow's communications. 73, Bill, N1KAT. Tfc: W1KX 1778, W1JTH 32, W1QU 37, KA2ZKM 20, W1JX 29, KA1RFD 30. (June) W1KX 175.

NEW HAMPSHIRE: SM, Al Shuman, N1FIK (n1fik@arrl.org)—NH Web site (www.nhradio.org). It has been a while since I listed the NH-ARRL Cabinet officials: ASMs WB1ASL Rich Force (North Country),. N1SNH Bryan King (Tech. Initiatives), N1KIM Reese Fowler (Web Services). SEC: N3CLZ, Gary Okula. ACC: AA1QD, Dale Drake. SGL: K1KM, Ralph Rosen. OOC: W1JS, Jack Sheehy. STM: WA1JVV, Tom Mangels. PIC: KA1GOZ, Don Dillaby. BM: KH6GR, Mort Stahl. TC: WA1HOG. Dennis Hennigan. Thanks to these guys and the 100 or other volunteers who keep the Field Organization running. Feel free to contact them for your NH-ARRL needs. Cal, WA1WOK reports that NHOEM has taken possession of a new emergency Comm Van. The ambulance style vehicle is the pride of the Agency. There is serious discussion at the NE Div. level of a New England wide QSO Party with common rules and operating times. It is not the intent that the NE-QSO party replace the existing State QSO parties, but it has been reported that participation of the State QSO parties is down significantly in the past few years. Hope to see you at Hosstraders on Oct.5th and 6th at the Hopkinton Fairgrounds – 73, Al (603-487-3333). Net NM/Sess/QNI/QTC: GSFM N1RCQ/31/194/31; GSPN WB1GXM; VTNH WA1JVV 31/114/ 91. Tfc: W1PEX 1050, N1NH 114, W1ALE 49, K1STV 34, N1CPX 7, WA1JVV 48.

RHODE ISLAND: SM, Armand Lambert, K1FLD—Just as I started gathering info and preparing this report, I heard our SM, K1FLD, on our local 2-meter repeater. He was just entering RI upon completion of his 11K mile RV trip across the country. He was tired but feeling very well. Welcome back, Armand. Want a fall/winter club activity for your club? K1FLD has 800 pictures of the trip on a CD for easy viewing. He's willing to speak to your club and tell you all about their travels,

MFJ 1.8-170 MHz SWR Analyzer™

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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!

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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.

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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.

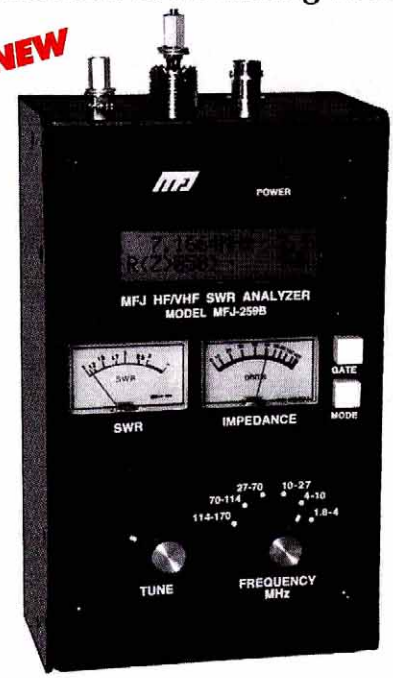
Take the guesswork out of building and adjusting matching networks and baluns.

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



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MFJ-259B **$259.95**

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!

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. 7½x2½x2¼ 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.

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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.

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More hams use MFJ SWR Analyzers™ than any others in the world!

including attending Ham-Com in Dallas with yours truly. After Field Day, many clubs and individuals took time for rest and enjoyment of the Rhode Island summer. I also found several clubs taking early steps to plan their fall programs and activities to stimulate interest in amateur radio. Fidelity is planning several demonstrations. PVARC announced a QSL design contest for their club call, WA1USA. Great idea! Newport Co. is planning their fall festival. BVARC hopes to show some DX films. Your SEC, N1JMA, and I are very grateful to see your enthusiastic activity and support on the repeaters when serious weather is anticipated. That SKYWARN training you took is useful in providing accurate reports to the NWS, isn't it? Good DX to all and 73, Bob W1YRC, ASM/RI.

VERMONT: SM, Bob DeVarney, WE1U—Well, it's been a busy summer for Amateur Radio here in Vermont. The Vermont City Marathon on Memorial Day weekend saw lots of activity from some 39 hams representing several clubs in the Burlington area. The N2V Special Event Station commemorating 250 years of Lake Champlain Ferry service was a unique (at least to my weak memory) collaboration between clubs on both sides of the lake. Also this summer, the repeater crews have been hard at work, and the results show. The N1ELL 145.470 MHz repeater is back with a vengeance, as well as BARC's W1KOO 146.940 machine. Both do a nice job of wide area coverage throughout the state. It's nice to have these old friends back. Kudos to Paul, N1ELL, Dave, W1HRG, and Tony WA2LRE for all their hard work. I don't want to leave out the folks down south either...the Twin State Radio Club did quite a bit of work on their machines as well. We now have several Field Checkers for ARRL awards in our section: Linda, W1MP can check WAS (w1mp@arrl.net) Fred N1ZUK can check VUCC (n1zuk@adelphia.net) and Mitch, W1SJ (w1sj@arrl.net) can field check DXCC. No need to send cards in to the league any more. Lastly, congrats to RANV for their ten year anniversary as a club. 73 de WE1U.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1MAP. ASM (digital): KD1SM. STM: NZ1D. SEC: K1VSG. OOC: WT1W. Operating on the HF bands has been great all summer. Activity has been chasing stations that have incorporated their vacations with ham radio. Island on the Air enthusiasts have traveled to islands that I have never heard of. Set up a station and become sought after DX. It's surprising how many operators all over the world are involved in this facet of Amateur Radio. Next year, I think I'll find an island off the coast of Maine that is listed in the IOTA directory and become a participant. Another very popular operation is the Special Event Station. Each weekend, there are a number of stations that celebrate some event that happened in their local community. I've gone down the list in QST each weekend and worked them. All have special very attractive QSL cards. Have you ever thought of organizing a weekend operation to commemorate an event that is happening in your community? Sounds like a great way to get some PR for your club. Tfc: N1WAS 149, K1TMA 248, KD1SM 7, W1ZPB 143, W1UD 294.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T – Congrats to Juneau ARES hams for river rescue coordination! HF Pactor stations and amateur PACSAT stations needed throughout the section to interface communications networks between districts....can you help? Contact KL5T or AD4BL. APRS digipeaters needed throughout the section. All that is needed is a basic packet station. Consider dusting your equipment off and putting it to use. Again, contact KL5T or AD4BL. HF nets: Sniper's Net 3920 1800 AST, Bush Net 7093 2000 AST, Motley Group 3933 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. ALL HAMS – Please report communication drills and exercises, emergency communication activations, and public service activities via our online interactive FSD-157 (Public Service Activity Report) form at: http://www.qsl.net/aresalaska/fsd157/public_service.html.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP— In July several ARES units were activated due to fires. The Chelan/Douglas ARES/RACES responded to a call-out by the Red Cross for a large fire in the Chelan area. The Spokane ARES/RACES was put on stand-by for a fire north of Davenport near Porcupine Bay. The Walla Walla Valley ARES was activated for a fire at Port Kelly at Wallula Jct. Thanks to Rosalie White, K1STO, from the ARRL for attending the Spokane Hamfest in August. The Walla Walla hamfest scheduled for September was cancelled, the Spokane Hamfest was way down in numbers this year, and new hams are getting their licenses, but...where are they? Net Activity: WSN: QNI 873, tfc 139; Noontime Net: QNI 9088, tfc 318; WARTS: QNI 3450, tfc 84. Tfc: K7GXZ 146, W7GB 84, KA7EKL 28, KK7T 20, K7BFL 18. PSHR: W7GB 128, K7GXZ 120.

IDAHO: SM: M.P. Elliott, K7BOI — OOC: W7ZU. SEC: AA7VR. STM: W7GHT. Sorry to report that the CW demonstration that has been so successful in past years at the Western Idaho State Fair was cancelled. With so much of the fair being held during the workweek it was not possible to adequately staff the event. As opportunities arise to demonstrate or publicize our hobby please make every effort to participate. Amateur radio needs your involvement! The Simulated Emergency Training event is coming up. Once again the Idaho Bureau of Disaster Services will take the lead. Stay tuned your local repeater or the BDS monthly net for details. 73 - Mike, K7BOI. Tfc: W7GHT 209, KB7GZU 93, WB7VYH51. PSHR: W7GHT 123, WB7VYH 106. Nets: FARM-31/2363/49/ W7WJH; NWTN-31/1153/58/ KC7RNT; IDCD-22/434/15/ WB7VYH; IMN-31/401/ 117/W6ZOH. http://id_arrl .homestead.com/mainpage.html

MONTANA: SM, Darrell Thomas, N7KOR— The primary event during July in the Montana Section was the 67th Annual Glacier/Waterton International Hamfest held near Glacier National Park on July 21-22. There were 469 registered attendees at this year's event. This is down some from previous years but everyone enjoyed the event. As usual it provided a well-balanced program for amateurs and family members as well. Plans are already underway for the 68th Annual Hamfest to be held again at Three Forks Campground on July 19-21, 2002. To keep track on plans and check for registration information go to www.gwhamfest.org. This is the Hamfest Web Page and is currently being rebuilt by the new web master Bob N7CZ who is a Hamfest Director. I am sure you will all be pleased with the newly completed page. NetQNI/QTC/NM

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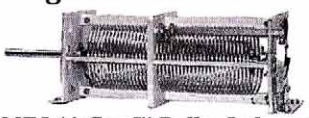
The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

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.

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MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

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MFJ-986 Two knob *Differential-T*™

MFJ-986 **$329.95**

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$129.95**

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$119.95**

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 VHF/UHF Tuners

MFJ-921 or MFJ-924 **$69.95**

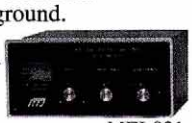
MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground



MFJ-931 **$89.95**

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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MSN 127/1 W7OW, MTN 1608/39 N7AIK, IMN 402/117 W6ZOH. PSHR: N7AIK 117.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: N7LA. ACC: K7SQ. The new HF ARES net is continuing to be held at 6 PM, Tuesday nights on 3993.5 kHz. Bob Boswell, W7LOU, continues to do a fine job with the net, which was activated in early August when fiber optics were cut between Central Oregon and Portland. All telephone communications were down, including cell phones, for nearly four hours. The ARES HF and VHF nets rapidly formed and members quickly manned the local hospitals. Some emergency messages were passed between Bend and Lakeview on the HF net. This proved to be very handy, as the 2 meter link between Klamath Falls and Lakeview, was down. This is the main reason we need to use the 80 meter band, even during "local" emergencies. All ECs and DECs are urged to check into the net, and all ARES members are urged to monitor and check in at the appropriate time. Speaking of ARES...The local ARES groups are putting on the annual Swaptoberfest at the Polk County Fairgrounds in Rickreall, on Saturday, October 20th. The yearly event features lots of swap tables and also centers around all phases of emergency communications. The grand prize this year is an Icom 207-H dual band mobile rig. Rickreall is located west of Salem. Take the "beach route" west, and turn south at the "blinking light." For more information on this event, call Bud Smith, N7BUD, at 503-838-0266. Keep in touch! NTS traffic totals for July: W7IZ 237, N7YSS 124, W7VSE 71, KC7SRL 57, KC7SGM 46, N7APE 7.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—The Mike and Key ARC of Renton, Washington owns a unique trailer that holds tower sections used for Field Day. After many years of use it needed a little rejuvenation. A new set of tires, a paint job, a flag, a little bunting and a code oscillator connected to a small sound system and the vehicle won second place in its category in the annual Renton Rivers Day Parade. Please welcome three new Official Observers, Scott Douglas, W7XC, George Hoffman W7POE, and James Stephens, W7CSX. The manager of Region Net 7, Cycle 2, is George, W7BDU, who reports the net times are 0945 and 1515 Pacific on 7238 kHz. Reporting via SEC N7NVP, we learn that Whatcom Co. members participated in 2 searches involving over 400 hour of operator time on Mt. Baker. EC Don Deadrick WL7FQ, formerly of Bellingham has now moved to Alaska. An ELT exercise was conducted in Jefferson Co., they included APRS in fun. Red Cross communications were provided by Cowlitz Co ARES for a trestle fire and a fun run. Clark Co had one of their "let's exercise in the field" meetings. Each team operated on 2 meters, 70 cm and HF, passing 2 simplex msgs to different teams. They also participated back in July with the 4th of July celebration and the Pedal the Pinchot 2001 bike ride. In King Co. Marina, N7LSL's Medical Team exercised to test and to demonstrate the ability to provide vital inter-hospital communications between hospitals and health care organization with the Co. Increased knowledge of simplex propagation was gained, equipment problems identified and increased recognition acquired. Well done to the entire team! A number of Snoqualmie City employees have now obtained the Amateur licenses and we can expect new members of local ARES teams. Have you handled traffic lately? Make sure a monthly traffic report is sent to the Section Traffic Manager Pati, W7ZIW. Time flies when you're having fun. The Radio Club of Tacoma will be celebrating its 87th birthday this fall. This club is the second oldest Amateur Radio club in the United States. The story that many of the original members are still members is just a rumor. Look for a commemorative call sign and lots of fun activities. 73.

PACIFIC DIVISION

EAST BAY: SM, Andy Oppel, N6AJO—ASMs: NJ6T, KE6QJV. SEC: KE6NVU. DECs: KE6QJV/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. OOC: KD6FFN. STM: W6DOB. ACC: NJ6T. EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. Everyone reportedly had a great Field Day: ACSCT from Cal State Hayward, MDARC from Bethel Island, ORCA from the East Bay Hills, Alameda ARES from a city park, EBARC, HRC from Greenridge Park, LARK, and the East Bay All Banders from a stunning site on Sunol Ridge to name a few. ROVARC participated in the Museum Ships Event on 7/21. EBARC welcomes new members KG6GUZ, KG6GUY, KG6CFY and KF6WXP; all proof that license classes do bring in new members. July tfc: W6DOB 158, WB6UZX 32. 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/3651/7052/8:30PM. Your check-ins are always welcome.

NEVADA: SM, Jan Welsh, NK7N—SEC: Paul, NN7B. Congratulations to ASM: Dick, W6OLD on winning the 2000 Excellence in Recruitment Award. Also get well soon! Thanks to newsletter editors of RARA and RARA Elko, Web address qsl.net/elkorara/ SIERRA, LVRAC, LVRA, SNARS, FARS and Nellis ARC for providing the rest of us with the Nevada happenings. The rest of us don't tell you often enough how much we appreciate your hard work so I'm saying thanks from us all. I know how much time goes into the newsletters. I did one of them for years. SNARS hamfest was the place to be last month. Caught up with old friends and saw Pac. Div. Dir. W6CF-Jim Maxwell and N7JEH-Joe Giraudo who coordinated the annual Elko County Comm. Disaster Drill last month. Also attended awards ceremony for the 32 amateurs that helped provide communication on behalf of the Martis fire. Well done! We also need to recognize that many amateurs work behind the scenes during this type of activity and you may never know who they are but they're there to help us. Request for info on digital nets, area of Sun Valley, NV from KD7GZR. 73 to all, Jan, nk7n@aol.com. Tfc: W7VPK 81, W7TC 30, N7CPP 18, W7YDX 7, K7NHP 6, NV7YL 4.

PACIFIC: SM, Ron Phillips, AH6HN—Lee Wical, KH6BZF, reports that the final planning for the Hawaii State Ham Convention in Honolulu on October 13th is moving along very well. This promises to be a well-attended event and all amateurs are welcome. As reported by Dean Manley, KH6B, the Hilo ARC and HI QRP Club continue the DAILY morning sessions at Hilo Jack in the Box Restaurant. July 2001 set a new

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

No RF Hash!

MFJ-4225MV
25 Amp
$149.95
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MFJ-4245MV
45 Amp
$199.95
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No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

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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
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monthly record of 264, an average of more than eight per session. Hilo ARC and HI QRP Club will activate Laupahoehoe Point 17-18-19 August for the International Lighthouse Weekend. Both CW and SSB is planned. The Big Island ARC assisted again in emergency communications for the annual Volcano Rim Run. Dan Spears, KH6UM, and friends are planning a one-week trip to Johnson Island in September. They will be operating both CW and SSB. This is the first ham activity on Johnson is over a year. The Hawaii DX Association will act as the QSL manager for the event. This event should be a great one. I would like to announce that Jim Reid, KH7M, is starting a CW practice session in Hawaii for all those interested in improving their code capabilities. Jim has put in a great deal of time and effort in setting up this event, including approvals from the FCC on the planned format. The times and frequencies will be forthcoming. The stats for the Emergency Amateur Radio Club Net (Diamond Head Rpt 146.88 and 444.5) for June 2001 as reported by Dale Fajardo, AH7D are as follows: Number of check-ins: 89; Total net time: 158 minutes. Mahalo and 73.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—Congratulations to both the El Dorado Amateur Radio Club and Tahoe Amateur Radio Club on achieving 25 years as ARRL affiliated clubs. PACIFICON is coming up soon. Hope to see many amateurs from the Section and Division there. I have enjoyed visiting a number of clubs from throughout the Section over the past few months. It is always great to see the enthusiasm of club members who sponsor so many worthwhile programs and activities. It is contest season. If you have never tried a contest before there is no time like the present. Contesting on both HF and VHF/above can be lots of fun. *QST* lists many of the upcoming contests each month. If you need help learning how to contest there are several contest clubs active in the section. Their members will be very happy to help you out. Sorry to learn of the passing of Ross, W0XJ (ex K6FRE). Ross was one of the founding members of the Mt. Vaca Radio Club. EMCOMM 2002 has been designated an Operating Specialty Convention by League Headquarters. It has its own Web site at *www.emcomm2002.net/* Check there for further information and registration. Finally, for those who think fire season is over since it is October, please remember that many years (1999 for example) some of the most disastrous fires of the year happened late in the season. Until next month 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. Early August and many fires are burning in northern California. Hope you are all keeping your ready bags packed and checking into your local nets. Now is also the time to think about switching to the winter ready bag and checking things around the house. REDXA has been having great dinners and meetings with very interesting talks and films. Try them out. Red Oak Victory club is looking for more folks to help on their ship. LARC Golden Gate Chapter has been working on many public service events including 100-mile bike rides. They are also improving communications by working with other non-ham groups. Humbolt and Del Norte clubs have been active with fire patrols and the Kinetic Sculpture Race. LCARS is actively working with the Red Cross and doing improvements to their repeater. Sonoma County has been active with public service events, one of which is held at the Pacific Air Museum. Mendocino County is becoming more active and the ACS office is working with ARES to recruit hams for emergency work. When traveling from San Francisco to the northern Lost Coast, there are several linked 2-meter systems for wide-area coverage. Humboldt through Sonoma are the main links and can be found in the repeater directories. Have a safe and enjoyable fall.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN – ASM: Mike Siegel, KI6PR. ASM: John Lee, K6YK. SEC: Kent LeBarts, K6IN. ACC: Charles McConnell, W6DPD. STM: Fred Silveira, K6RAU. OOC: Victor Magana, N1VM. Sadly, I must report the passing of John McFadzean, W6TRP, also known as Mac. John held the position of Emergency Coordinator and was Assistant Section Manager under the then Section Manager, Charles McConnell, W6DPD. Later John was appointed to the position of Assistant Director. John was a 50-year member of the ARRL and licensed for sixty-three years under the call of W6TRP as well as a long time resident of the San Joaquin Valley Section. John passed away after a short illness just after his seventy-eighth birthday. Condolences go out to the family of John from myself and the Amateur Radio operators of the Section. The Section will miss John, W6TRP, SK. Sal Trapani, KA6WHA, and Gary Stilwell, KI6T, worked the CQ Worldwide DX Contest this year from the Bahaman Islands with the call sign C6AGS. Sal and Gary scored 2,525,889 points by working 3,601 stations in 86 CQ zones and 253 countries on 4 bands. The station conditions were a R7000 Cushcraft vertical, a 40-meter inverted V antenna and a HF rig at 150 watts. These fellows were winners and a credit to the Section. Congratulations Sal and Gary.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KQ6FM. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. SCV Homepage is http://www.pdarrl.org/scvsec - Info on license exam sessions is also available on the SCV homepage...We have a change in section leadership. Our SEC is leaving the area and has asked to step down. We'll certainly miss you John! Stepping up to the plate is our new SEC, Don Carlson, KQ6FM. Don has been DEC in Monterey County for quite a few years and brings a wealth of experience to the job. Welcome aboard, Don! The Santa Clara County ARES group has reinstated the "training net". This is a very good source of basic training for ARES/RACES participants. The net is held every Tuesday at 8:30 PM or WB6ADZ/R (146.115+ 100 Hz), KY1Z (440.1+ 100 Hz) and others as well. Santa Cruz County ARC meetings are at 7:30 PM on the 3rd Friday of each month at Dominican Hospital, 1515 Soquel Drive, Santa Cruz. Visit their Web site at www.k6bj.org for more info...The Palo Alto Amateur Radio Association meets on the first Friday at 7:30 PM in the Menlo Park Recreation Center, 700 Alma Street, Menlo Park. West Valley ARA meets on the 3rd Wednesday of each month at 7:30 PM in the Mary Campbell room (Q-84) at the Campbell Community Center. Check out their Web page at www.wvara.org. The South County ARES has a new URL for their Web page, http://www.K6MPN.org. They have a wonderful ARES/RACES group in San Mateo County and also one of the better newsletters. They meet third Thursdays in the San Carlos City Hall. Room 207 at 7:30 PM. If you'd like to see your club mentioned in these pages, send me a copy

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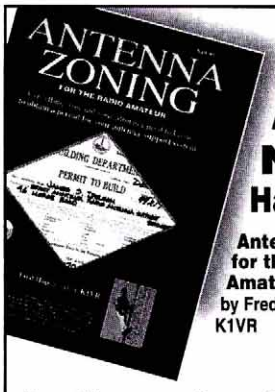

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of your club newsletter to me at home (address on page 12 of this issue of *QST*) or via e-mail (wb6w@arrl.org). I can't report it if you don't send it! - See you next month! 73 de Glenn, WB6W. Tfc: W6PRI 1.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC—SEC: KE4JHJ. STM: N0SU. BM: KD4YTU. TC: K4ITL. PIC: KN4AQ. OOC: W4ZRA. SGL: AB4W. ACC: vacant. http://www.ncarrl.org. We were fortunate to have FCC Special Counsel for Amateur Radio Enforcement, Riley Hollingsworth, K4ZDH, speak to a crowd at the Salisbury hamfest in July. He made many good points about the future of Amateur Radio during his presentation, but his most important point, in my opinion, is that we should be aware of how we conduct ourselves while we are on the air. There are no rules against bad manners; it's up to us to create the kind of Amateur Radio that we want to have, one that others would be proud to join. There are lots of folks listening to our bands, especially 2 meters, and it only takes a few unkind words to leave the impression that Amateur Radio is an activity they can do without. If we want young people to become hams, we need to make sure that parents listening to our bands will feel like it is an environment that will be good for their sons and daughters. Pointless bickering and name-calling turns off people of all ages, and some of the other bad-mannered conversations we are hearing on the low bands will do nothing to encourage anyone to become hams, and will provide ammunition for those organizations that covet our frequencies. Amateur Radio is self-policing not in the sense that we police each other; rather, it means we police ourselves. I am pleased to report that my travels through North Carolina have shown me that we are largely a good-mannered bunch of hams; let's do what we can to keep it that way. Congratulations on the Smith Chart Amateur Radio Society becoming one of our Special Service Clubs. The Cary ARC has also reached its 25th anniversary of ARRL Affiliation. Congratulations and keep up the good work, everyone! Hoping to see you at the Maysville Hamfest on October 13th. July Traffic: W4EAT 310, AB4E 299, NC4ML 197, K4IWW 152, N4AF 136, KI4YV 117, KE4JHJ 93, W4IRE 46, AD4XV 45, KB5WY 42, KE4AHC 35, W4CC 32, W3HL 27, N0SU 25, N4TAB 18, WA4SRD 17, N8UTY 13, K4WKT 13, KB8VCZ 8, WD4MRD 8, AE4HJ 6, KC4PGN 5, KE4YMA 4.

SOUTH CAROLINA: SM, Patricia M. Hensley, N4ROS - SM reports are written two months prior to publication; therefore, this report is being written on August 13th four days before I attend the new SM seminar at ARRL headquarters. School has been in session for a full week now and as a principal, it is nice to begin the year with an interested faculty which leads to a smoothly running organization. By comparison, my attendance at the SM training seminar is similar to the staff development which I conduct with my teachers prior to school opening. During this time, the staff is introduced to the new educational policies and their application to the school's mission. The actual curriculum in each school is designed to meet the state requirements which maximize the students' learning experiences. In turn, one of the main purposes of this seminar is to familiarize the SM with the overall policies of ARRL, and how they can be applied to the Amateur Radio community in the their respective states. The actual application of these policies must be administered by the SM appointed state officials and implemented by the local clubs. Thus, the Presidents' Council concept is very important to our state's organization. Representation through local clubs; therefore, becomes the means by which individual amateurs can express their opinions and better realize the benefits of Amateur Radio. The successful outcome of our SC ARRL is contingent upon the formation of the Presidents' Council as quickly as possible. I would like to form this organization at the Rock Hill Hamfest on October 6th. I respectfully request an elected representative of every club in SC be in attendance at this time. If it is impossible for a club to be represented, please contact me by telephone at least one week prior to this hamfest. A follow-up meeting with be held at the Myrtle Beach hamfest on November 10th. I am looking forward to meeting with you in Rock Hill. Tfc: KA4LRM 93, KA4UIV 86, AF4QZ 50, KG4FQG 44, WD4BUH 21, K4BG 20, WB4PCS 6. PSHR: KG4FQG/KA4UIV 130, K4BG 128, AF4QZ 118, KA4LRM 113.

VIRGINIA: SM, Carl Clements, W4CAC—SEC: N4NW. STM: N1SN. PIC: W4PW. ACC: W4IM. OOC: W4NEZ. Last month, I mentioned that Jeff (his new call is N1SN) had been willing to take on the Section Traffic Manager's duties. I would like to welcome some others on board. Pat Wilson (W4PW) is the new PIC. He has a Web page up and running with much information about the section, but he is still looking for more. TheWeb page can be found at www.arrlva.org. Take a look at the page and let us know what you think. John Humphrey (W4IM) is our ACC and has he ever been busy. Shortly after his appointment, John started contacting clubs by email and letters. He has already visited several clubs. John has also been working with Pat to make sure that all clubs in the section, whether affiliated or not, have a link from the Section web page if they want one. Ed Ray (W4NEZ) is our OOC. Shortly after Ed's appointment, we received correspondence asking us to look into an issue, and Ed was quickly placed into service. Ed is looking for more qualified individuals that may wish to become OO stations, especially in the Southwestern portion of the state. Pat (W4PW), Tom (N4NW), and I attended the Roanoke Hamfest in August and spoke with many there at the show. Then I went on up to the Berryville Hamfest where many got to meet John (W4IM) and Tom Harmon (AK1E) at the ARRL booth. The Virginia Beach Hamfest will have been in September, and I hope to be able to meet many more of the amateurs from the Section there. My thanks to all that are helping out in whatever capacity with the ARRL programs in the state. Remember, it is you, the members that are the ARRL! Late traffic reports from June - K4IX 13, K4JM 1. 73 de Carl, W4CAC. Tfc: W3BBQ1 326, N1SN 218, WA4DOX 205, K0IBS 116, K4MTX 106, AA4AT 92, N4ABM 87, W4UQ 84, K4YVX 82, W4CAC 58, KV4AN 57, KE4PAP 56, W4VLL 49, WB4ZNB 48, WB4UHC 27, WD4MIS 24, KU4MF 12, W4YE 12, W4JLS 11, W4MWC 5, N3FDR 5, KU4TM 4, KB4CAU 4, K4JM 3, N4FNT 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart, WD8V—STM: KC8CON. SEC: W8XF. ASEC: KA8ZOO. SGL: K8BS. TC: K8LG. OOC: N8OYY. ACC: KA8ZGY. APRSC: W8XF. PIC: N8TMW. Well 5 days or ten more treatments and we will find

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out if radiation took care of cancer. Not much air time this month due to voice. That's it for July. See you at "THE MILL" God Bless. Tfc: W8YS 244, KA8WNO 280, WW8D 44, KC8CON 56, W8WWF 72, WD8DHC 14, N8NMA 13, N8BP 5, PSHR: W8YS 181, KC8CON 135, WD8DHC 104, KA8WNO 118, N8MNA 87, WW8D 78, WVFN 915/1127/771 KC8CON. WVMDN 673/23/433 WW8D; WVN E 88/47/222 W8WWF. WVN L 88/27/219 W8WWF; ARES/RACES 130hr training/ 132 operations.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Jeff Ryan, N0WPA— ASM: Tim Armagost, WB0TUB. 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. XYL Gloria, N0ZFX and I attended the RM division convention in Bryce Canyon, UT. Our first time in beautiful SW Utah and a great time was had by all. Excellent ARRL forum featuring Rosalie White, K1STO, from HQ, RM director Walt Stinson, W0CP and the FCC's Riley Hollingsworth, K4ZDH. Riley was also the keynote speaker at Sunday's breakfast banquet and spoke of enforcement activities and what we all can do to ensure the Amateur Radio service remains what we all want it to be. His remarks brought a standing ovation. It appears that the overwhelming vast majority of hams are glad he's on the job. Thanks to our Utah hosts, especially Jim Rudnicki, NZ7T and SM Mel Parkes, AC7CP for making us feel welcome. 73, de N0WPA. And de WB0TUB: In 1978, I had been licensed for two years and had gotten the bug to expand my fun in Amateur Radio. Traffic didn't light my tubes so I sent in one of the flyers found in *QST* looking for more info on Public Service radio. In about a month, I got a call from Joe Fair, WA0PXF, EC for Arapahoe County. Joe said "I got your application from HQ and I'd like you to be 10 meter net manager!" I said, "I've never run a net before!" Joe said, "Great! You'll have no prejudices!" So began my activities in Ham Radio: 10 mtr net mgr., ass't EC, EC, DEC, SEC, and finally for the past 10 years, SM. This past July 4, Joe had a massive stroke and on July 10, at age 83, he became a Silent Key. Joe mentored many—including me— and will be missed by all who knew him. S'long, Joe…and thanks! NTS Tfc: AD0A 178, K0TER 86, KI0RP 71, W0ZZS 53.CAWN: W0WPD 847, AB0PG 628, W0LVI 445, W0GGP 435, W0NCD 377, K0HBZ 311, AA0ZR 269, N0NMP 208, WB0VET 202, WB0TYT 149, WD0CKP 100, N0FCR 56.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5IBS, N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNO, W5UWY. TC: W8GY. ACC: N5ART. Roadrunner Net handled 95 msgs with 1252 checkins. Breakfast Club handled 126 msgs with 1006 checkins. Yucca Net handled 24 msgs with 595 checkins. Caravan Club Net handled 4 msgs with 62 checkins. SCAT Net handled 7 msgs with 473 checkins. Four Corners Net handled 15 msgs with 300 checkins. GARS Net handled 10 msgs with 25 checkins. Rusty's Net handled 85 msgs with 749 checkins (with FB assistance of KA5EMH & K5TCU). Valencia County Net handled 6 msgs with 43 checkins. Deming ARC Net handled 13 msgs with 67 checkins. The Socorro Hamfest is Oct 27 at the National Guard Armory. Certainly enjoyed the Ft Tuthill Hamfest in Flagstaff, AZ. Reported attendance of 3600 was great. The 2001 US ARDF Championships were held in the Manzano Mountains just east of ABQ. DF'ers from all over the world were including Mongolia, Ukraine, China, Australia, USA, etc. Twelve came from China including BG1HZF. We sincerely appreciate our ARRL President, W5JBP and SW Div Vice Director W6XD helping with this event. Sorry to report the passing of very dear friends K5DOT, KK5GX and WD8NVX. They will be deeply missed! 73, W5PDY.

WYOMING: SM, Bob Williams, N7LKH—WY Section members Jay Ostrem, W7CW, Laura Ostrem, N7VWV, John Hall, W7CA, Bill Edwards,WU7Y, Dave Riegert, K7YE, Christine Riegert, KC7MJI, Mary Williams, KF7MC, and myself attended the Glacier-Waterton Hamfest. This was the largest attendance by WY Section hams ever. It is a good place to meet the Canadian hams and compare the RAC to ARRL. WY hams provided communications for both the Tour de Wyoming bicycle tour and Cheyenne Frontier Days, producing a useful bit of public service to the community. It is pretty easy for Frontier Days because it is always the same place and the Cheyenne Club has the routine worked out over the years. Tour de Wyoming is more of a challenge because it covers over 400 miles in a different region of Wyoming every year. There is no way a single club can cover it so each year the word goes out where it will go and who can come help. The results for this year are not yet in. More participants for next year will be more than welcome. Tfc: NN7H 267. PSHR: NN7H 183.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland KR4TZ – ASMs: W4XI, WB4GM, KB4KOY. SEC: W4NTI. STM: AC4CS. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: KV4CX. TC: W4OZK. PIC: KA4MGE. It is time for the ARRL's annual Simulated Emergency Test (SET)! This year, the Alabama Section will have its SET operation the same time as the rest of the country, which is October 6 and 7. The scenario will be a category five hurricane hitting South Alabama, and causing severe weather and other problems throughout the Alabama Section. Please include the local EMA and American Red Cross in your plans to participate in this year's event. For more information, please check our Web site at www.kr4tz.org/al-arrl. Scouts Jamboree on the Air (JOTA) is held on the third weekend in October, which is October 20 & 21 this year. Our goal this year is to have all the counties with active clubs and ARES groups to participate with at least one Boy or Girl Scout troop this year. Please contact your local scout organization, and see if your club can help them participate. To find your local Boy Scout Council visit their Web site at www.scouting.org/councils/index.html. To find your local Girl Scout Council visit their Web site at www.girlscouts.org. For more information about JOTA please visit the ARRL-JOTA Web site at www.arrl.org/ead/jota.html. The number of traffic net reports is down and the Alabama Section needs the Alabama Net Managers to submit their reports. If you are a net manager, please send Chris Sell (ac4cs@arrl.net) and I (kr4tz@arrl.org) a net report. These reports are used to keep track of active nets in Alabama, and the ARRL uses them as evidence on how much public service is performed in amateur radio. God Bless & 73, Bill Cleveland KR4TZ. Tfc: W4ZJY 691, WA4GQS 267, AC4CS 179, W4CKS 113, WB4GM 86, KC4VNO 61, KG4KCC 40, W4QAT 35, W4DGH 20, W4NTI 15.

GEORGIA: SM: Sandy Donahue, W4RU— ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. Asst SM/IT: Mike Boatright, KO4WX. SEC: Lowry Rouse, KM4Z. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Susan Swiderski, AF4FO. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. Web site www.qsl.net/arrl-ga. I regret to report the death of an old friend. I worked with Phil Latta, W4GTS, in the Atlanta Radio Club for many years. Phil passed away in July after a long illness. He was 85 and an honor roll DXer and DXpeditioner. On a happier note, members of the North Fulton Amateur Radio League went on a DXpedition themselves…to Tybee Island on the coast near Savannah, to operate during the Lighthouse Contest. It was very hot and sticky but everyone had a wonderful time. I received a commendation for CW guru Bill Carter, KG4FXG, for helping recruit new CW traffic handlers and training them in proper net procedures. The ataboy for Bill came from WD9F in Illinois. AMSAT's National Space Symposium is slated for Decatur at the Holiday Inn-Select Oct 4-5. See AMSATS Web site www.amsat.org for more details. W4EPI is the chairman. The Alford RC hamfest at the Gwinnett Fairgrounds, Nov 3-4, has been named an official Ga. convention. Guest of honor will be HQ staffer, Brennan Price, N4QX. Bill Jay, K4KG, Douglasville, became a SK in July. Regrets from all Georgians go out to his family. 73 Sandy. Tfc July: WB4GGS 128, W4WXA 83, AF4NS 79, KG4FXG 74, K1FP 37, K4BEH 23, K4WKT 20, K4ZC 14.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP— ASM, Capital District: K4VRT, E Central District: N4BGH, W Central: NR2F, FL Crown: N4UF, Suwannee: W2DWR, E Panhandle: WA4NDA, W Panhandle: KO4TT. HAM RADIO STILL EXISTS AND NEEDED. CELL PHONES AND COMPUTERS HAVE NOT TAKEN ITS PLACE. Ham Radio still can provide a service when nothing else can. In Jacksonville recently, a flood knocked out a sophisticated 911 system, and it was ham radio that was call upon by the City to provide service none other could. There has been other times when more sophisticated systems have failed. ARES is still a valid system, and can be depended upon. Barry, a tropical storm, visited the Panhandle, and while it was not a hurricane, it lacked only a couple of MPH reaching the magic number. The Pensacola telephone exchange could not handle all of the phone calls, as many tried and got busy signals. Cell phones experienced similar conditions. Long distance incoming calls were delayed several hours. Had Barry been a Cat 1 or more, things could have been much worse as electric power outages would have caused more serious troubles. The ham radio ARES communications between the counties in the district, and the County EOCs with the shelters were available the entire evening and night. The ARES emergency net brought out many hams that are seldom heard on the local repeaters. The problem with people calling in to offer help without having been trained causes unnecessary problems because of their lack of understanding and knowing what, how, and when to be of assistance. The National Weather Service desires specific information, to "say it is raining hard, and the wind is blowing" does not help anyone. So what is the point? The point is to become active in your local Club attend training sessions, and conduct training on the repeaters in order to become proficient. Another point, be prepared to assist in assignments made by your EC. The ARES people operating in the W Panhandle District EOCs did an outstanding job and performed many hours conducting communications. The District Emergency Coordinator has scheduled a training session in the near future, and the local Emergency Management Directors' strongly supports the ARES program. Keep your equipment ready, and be willing to accept assignments from your EC. Let's keep the Ham Radio viable and responsive. Thanks to all of the hams participating in the Barry Storm. Your efforts are appreciated. de 73, Rudy. Tfc: WX4H 1056, AG4DL 210, KE4DNO 180, KE4WIJ 114, NR2F 98, WD4GDB 96, AF4PU 80, W5MEN 56, W4KIX 53, K4JPG 52, K4JTD N9MN 51, WA1VOP 28, KM4WC 27, W8IM 25, AB4PG 20, KG4EZQ 19, KB4DCR 16, K4DMH 12, W4CSF 9, WX4J 9, KJ4HS 7, WB9GIU 6, KF4ING 4, WD4ILF 2, WB2IMO 2, W4ZET 2, WA4EYU 1.

PUERTO RICO: SM, Víctor Madera, KP4PQ — Con la aprobación de la nueva ley de tablillas personalizadas hemos tenido que trabajar con el DTOP para que no se expidan tablillas con siglas de la FCC en es programa. Las siglas de la FCC al igual que otras utilizadas por el gobierno no se podrán usar en tablillas personalizadas. Los radioaficionados deben estar pendiente a cualquier violación a esta cláusula y deberán notificarla al SM inmediatamente. Se completó en San Germán el segundo taller en español para certificación de Observadores Oficiales dentro del programa de "Amateur Auxiliary". Participó un nutrido grupo de radioaficionados del area sur y oeste de la isla. Entre ellos WP3FR, KP4AQX, KP4GBF, KP4YH, KP3C, WP4MJP, KP4TAZ, WP3FQ, NP3S, WP4LI, NP4A, KP4CY, KP4RZ, WP4BV Y WP3GK. Todos están trabajando arduamente para obtener su acreditación. Próximos talleres serán en el área de Ponce y Fajardo. Si usted está interesado comuníquese con su "Section Manager", su dirección aparece en la página 12 de QST. Información adicional en http://prarl.org/secmgr.html. Ya se está trabajando en el programa de educación continuada para "Operadores de Emergencia". El ARRL certificará a todos los que aprueben dicho curso. Ya los radioaficionados que comprendían el grupo de ARES han recibido cartas con el propósito de reactivar el programa de comunicaciones de emergencia. Estamos listos para reactivar estaciones de HF en las cabeceras de Distrito en toda la isla. Interesados comuníquense con el Section Manager por correo regular, teléfono, o vía email a kp4pq@arrl.org.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI—SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. DEC/ASM: N4LEM, WB9SHT, AA4BN, KD4GR. Web Page: http://www.sflarrl.org. Thanks to the South Brevard, Dade, Ft. Myers, Indian River, Orlando, Vero Beach, Wellington Clubs, and ECs for newsletters and activity info. JOTA 2001! Scouting's Jamboree On

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The Air. It's our chance to bring new, young life into the hobby. If you are willing to help please contact Sal Ippolito, JOTA coordinator (1621 NW 9th Street, Boca Raton, FL 33486, phone 561-392-1439, e-mail N4YQU@arrl.net). AROUND THE SECTION: Brevard County's EC, N4LEM, signed up new ARES members and issued a batch of new ARES badges. Broward's City of Sunrise ARES provided communications for the July 4th Parade. The Dade ARC is planning the ARRL Southeastern Division Convention in Miami on February 2-3, 2002. Dade had a picture and lengthy article in *The Herald* last month regarding amateur emergency communications. Congratulations! We appreciate WD4JR of the Miami NWS keeping ARRL informed of ham radio activity during the threat of Tropical Storm Barry. The Indian River ARC will again work the Lighthouse Special Event N4L. We wish you many contacts. Martin County's Skywarn was featured in the media. KE4UEI was interviewed with the emphasis on the roll of ham radio. Osceola ARES is now incorporated and working on their 501C3 paperwork. Palm Beach County's main net ran for 2.5 hours one week with discussions of safe rooms, building codes, hurricane preps, traffic accidents on I-95, CERT, evacuation, shutters, and the need for First Aid knowledge. Two troopers from Florida Highway Patrol added their views about the I-95 problems. The Clewiston APRS antenna was relocated to the top of a 320-foot tower. Port St. Lucie ARA's application to hold an ARRL approved hamfest on Nov. 10, 2001 has been approved by Director Butler. Best wishes for a successful hamfest. July Traffic: WA9VND 505, KA4FZI 244, KC4ZHF 123, KD4GR 115, KD4HGU 63, K4VMC 57, AA4BN 49, KD4JMV 49, KE4WBI 47, WB4PAM 44, WA4CSQ 38, KG4MLD 34, KT4XK 34, KG4MLC 32, W4WYR 14, KG4CHW 13. 73, Phyllisan West, KA4FZI, Section Manager, Southern Florida.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St. Croix—ASM: Drew, NP2E, St. Thomas. ASM: Mal, NP2L, St. John. Section Internet Mgr, SIM: Jeanette, NP2C, St. Croix. SEC: Duane, NP2CY. St. Thomas. PIC: Lou, KV4JC, St. Croix. ACC: Debbie, NP2DJ, St. Thomas. NM: Bob, VP2VI/W0DX, Tortola. Not too much going on as this is being written around the first part of August. No storms yet, but the season is still early. 147.25 machine on St. Croix has reduced coverage due to installation of "survivor" antenna. A reminder that the Intercontinental Amateur Traffic Net and the Maritime Mobile Service Net are active on 14.300 every day from 7 AM to 10 PM Eastern Time. Good place to meet for schedules and to get latest severe weather reports, also the Hurricane Watch Net on 14.325 when the "goin' gets rough"! V.I. section Web site www.viaccess.net/~jellis. 73, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR *ae4mr@arrl.org http://www.wcfarrl.org*— ASM: NA4AR. ASM-Web: N4PK. ASM-Legal: K4LAW. SEC: KD4E. TC: KT4WX. BM: KE4WU. STM: AB4XK. OOC: W4ABC. SGL: KC4N. ACC: AC4MK. PIC: WX1JAD. Reminder: If Section ARES and SKYWARN need to activate because of an impending Hurricane, we will operate on K4WCF/r 145.43, 146.76 & 442.95 (PL Tone 100Hz). HF operations will be on 7281 KHz (day) and 3911 kHz (night). Jim Haynie, W5JBP, President ARRL will be attending the SE Division Convention/ Tampa Bay Hamfest Dec. 1 & 2. Many interesting forums are scheduled, be sure to attend. Chet Carruth, AB4XK, STM reports "The Neuro-surgeon looked at my MRI pictures and X-Rays and told me the bones are healed, no fragments touching any nerves, no pinched nerves, and all looks good. He also said he did not want to see me again..... The feeling was mutual!! HI HI" Silent Keys: TS-Gary Hammell, AF4UD, Tandy Way, K4YSN, George Andrews, N2LNU, Ken Dale, N2KD, and Wanda Brooks. SEC KD4E reports an increase of 4 ARES members for a new total of 426. In July there were 50 Nets. 5 public service events, 9 drills and 10 emergencies for a total of 24 ops. The total man hours reported for July is 593 hours. July net report is available on the section's web page. July: PSHR: K4RBR 170, K4SCL 149, KT4TD 138, WB2LEZ 120, AE4MR 117, KT4PM 112, W4AUN 101, KF4KSN 99, AB4XK 93, KF4OPT 86, KE4VBA 83. SAR: K4SCL 206, AB4XK 83, KT4TD 64, KF4OPT 47, K4RBR 27, KE4VBA 20, W4AUN 19, AE4MR 18, KF4KSN 12, WB2LEZ 10. 73, Dave AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—Fort Tuthill for the year 2001 is over, and it was not a bad event. I even spent money this year to help out the local economy. The weather was perfect (maybe a little hot on Saturday) with no rain and the attendance was very good. ARCA officials reported that they sold over 3600 $1.00 entry tickets. Yes, they had to charge entry fee of $1.00 per person for the complete weekend. The Fair Grounds now requires that all users charge an entry fee for each event. They also had to increase the cost of each selling spot to $30.00 due to the increase of the cost of renting the Fair Grounds. Coconino County has increased our cost 3 times since 1994. Western Arizona ARA, Coconino ARC, Tucson Repeater Association, and Central Arizona DX Club have be recognized for their club affiliation with ARRL for over 25 years. Thanks to these clubs for there support. *The ARRL Net Directory* has been published and it shows that Arizona is still very active when it comes to passing traffic and performing public service. We have several state and local nets that are used to sharpen our skills so in the event of an emergency we are prepared. The state emergency net is every Sunday morning at 0800 local time on 3990 kHz. Please try and join as often as possible. Check with your local club to find out the time and frequency of the local nets. Now that the summer is over, it is time for the many public service events that take place in this state: The Tour de Phoenix bike ride, The Tour De Tucson bike ride, Climb A Mountain walk for Cancer, Etc. Are you a participant in these events? Don't forget to checkout the state Web site at www.qsl.net/arrlaz/. This site has all the latest state information and links to the many clubs here in Arizona and throughout the country. Thanks Tom, WB7NXH, for keeping this Web site updated. The Kingman ARC will hold its annual hamfest at the Mohave community college on 29 September 2001, then the Old Pueblo Radio Club will have its hamfest at the PIMA County Fair ground on 20 October 2001, then we have the Fall hamfest at Mesa Community College on 01 December 2001, sponsored by the Superstition ARC. I plan on being at all these events so if you have a complaint, new idea, or just want to say hello, please stop by the ARRL booth. 73, Clifford Hauser, KD6XH.

YAESU

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LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF— Fifteen meters has been very good for solid DX contacts this summer. 9V1RH, in Singapore provided an excellent hour long contact recently. David was telling me about land prices near his location. He said that 1/2 acre would be about one million US dollars. He said most people who were buying land at that price were planning to erect tall buildings. David also mentioned that many of the new buildings would be at least 60 stories. Next time I will ask about the Amateur Radio antenna permit situation in Singapore. The new Feb. 2001, Los Angeles building permit rules are on the Internet at: www.ladbs.org/Permits/Permits2/Buidling_Permits/buidling_permits.htm. Good luck; it came up ok for me the other day. If you have trouble with a long address, try the first half or so of the long address. This approach has worked for me many times. (You may notice that the word building has two letters reversed, that is the way it works in down town LA, don't try to change it!!) - K6HV, Bill Stewart, ex Collins Radio Engineer is now 91 years young. Bill's birthday celebration was attended by: N6OU, Edgar & xyl Irene, KF6RNX, W6EL, Shell, W6BF & xyl, Louise and several other hams. Several engineers who were in attendance have been on-the-air for more than 60 years. I first met Bill in 1938 when Art Collins introduced Bill as one of his best engineers to show me around the Collins facility. This facility was located on 1st Ave NE in Cedar Rapids, Iowa. One of the highlights of the visit was inspecting one the first transmitters built by Collins and used by Admiral Byrd on his trip to the South Pole. The frame support for this transmitter was solid oak soaked in paraffin. Bill, at the time, was researching the possible use of a new Raytheon tube, the RK-20 for use in the next generation Collins transmitters. - Don't forget to check out our Web site for the latest information about LA and speakers for your club meetings: www.qsl.net/arrlsw/lax . Vy 73 de W6BF, Phineas.

ORANGE: SM Joe Brown, W6UBQ, 909-687-8394— ASM: Riv. Co., Brett, N6NLN, 760-346-9291. ASM: Org. Co. Art, W6XD, 714-556-4396. ASM: SB Co. Jeff, W6JJR, 909-886-3453. ANAHEIM ARA reviewed the meaning of various call sign tag-ons, i.e. remote, mobile 6, portable, marine mobile, etc…but seeks meanings for 555 (used on 2M simplex) and FFF (used by YL breaking DX pile-up)…Could it be Fearless Frenzied Female? BEACH CITIES WIRELESS SOCIETY newsletter lists the month's birthdays along side a picture of cake 'n cookies…wonder if they recruit new members to insure each month has a party. CITRUS BELT ARC reports Field Day resulted in a surprise 2 M tropo QSO with KH6 from a mountain-top near Lake Arrowhead…KH6 reported it was furthest inland 2 M QSO ever. They have a neat clubhouse at Patton State Hospital (complete with HF rigs and tower), and serve as Alternate NCS for the State of California EOC Net… Is there a hidden message there? CORONA NORCO ARC has a T-Hunt Trophy awarded to the monthly hunt winner by the hidden-T…It's Snoopy holding a 4-el 2 M yagi and the plaque reads "CNARC T-Hunter". FULLERTON RC sadly notes long time member and T-hunter Clarke Harris, WB6ADC, now SK…They are celebrating the club's 50th year. RIVERSIDE COUNTY ARA had recent programs with on-the-air demos of PSK31, Hellschreiber and MM SSTV…Way to go. INLAND EMPIRE ARC reports President KG6ECQ taking his FT-817 on vacation to Oahu and Maui…Just to see if QRP really works. RIVERSIDE COUNTY RADIO NETWORK's repeater on 147.915/- MHz is now TASMA-coordinated. SAN GORGONIO PASS ARC joined in the Field Day festivities for the first time…complete with ice cream machine…what a neat idea. Words from the SECTION MANAGER: As a Wise Man once said, "It's not how many more years you live that counts, it's how many more solar cycles you have." NTS Traffic: QTC-KC6SKK 183, K6IUI 137, W6QZ 98, W6JPH 59. PSHR W6QZ 158, KC6SKK 109, W6JPH 90, K6IUI 75.

SAN DIEGO: SM, Tuck Miller, NZ6T, 619-434-4211— WOW!!! Wasn't that a great time at the 2001 Southwestern Division Convention in Riverside? It was great seeing everyone enjoying themselves. Now looking forward to the next convention to be held right here in the San Diego section on August 16-18 at the Center for the Performing Arts, Escondido. There will be 1500 FREE parking spaces. With lots of forums, prizes, and a great banquet, with a great speaker, how can you go wrong? These past few months have been very busy, as I have had the opportunity of attending several different ham functions. Those being Fort Tuthill in Flagstaff, AZ, also known as the Arizona State Convention, the Santa Barbara Hamfest, and also the Kingman Hamfest at the end of September. The San Diego DX Club hosted the annual Summer Bash at the home of Jim McCook, W6YA and all who attended had a great time. Mark your calendars. Coming up on October 20 will be our annual Ham Radio Roundup. Clubs from all over the San Diego section will put up displays on several different modes of operations, as well as some public agencies. Come one, come all to one of the biggest potlucks in the area. For more info, please drop me a line at nz6t@arrl.org. The San Diego Six Shooters, a 6 meter club is now meeting on the 3rd Tuesday of each month in El Cajon at the Top Sirloin at 7 PM. They have a net each Friday nite at 8 PM on 52.525. Why not check in? Remember, we have moved our monthly ARES meeting to Coco's Family Restaurant 5955 Balboa Ave, San Diego. Breakfast starts at 7 AM on the 2nd Saturday of each month, with the meeting starting at 8 AM. The ARES monthly training session starts at 10 AM the same day at the Kearney Mesa Rec Center, located at Mesa College Drive and Armstrong St. Thanks to Stan Rohrer W9FQN for all his hard work the past many years, not only as an EC for Valley Center, but also as the primary net control for the Northern District net on Sunday mornings. Stan has decided to "retire" if you will from his duties, and it is most well deserved. Thanks Stan, and all the best in your future endeavors. Tfc: KD6YJB 68, W6SLF 252, KC6NXZ 50, KF6YVQ 112.

SANTA BARBARA: SM, Robert Griffin, K6YR (k6yr@arrl.org or k6yr@arrl.net)—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). STM: Ed Shaw, KF6SHU (kf6shu@arrl.net). SGL: Paul Lonnquist, NS6V (paul@dock.net). ACC: Michael Atmore, KE6DKU (ke6dku@aol.com). OOC: Howard Coleman, N6VDV (N6VDV@arrl.net). PIC: Jeff Reinhardt, AA6JR (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ (wglennrz@ix.netcom.com). ASMs: Ventura, Don Milbury, W6YN, (w6yn@arrl.net). Santa Barbara, Marvin Johnston, KE6HTS (ke6hts@sbarc.org); San Luis Obisipo, Bill Palmerston, K6BWJ, (bpalmers@fix.net) & for Internet, Jack

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SC-41 Soft case; PB-32 ..... **4.99**
SC-43 Soft case; TH-79/PB-33/34 ..... **4.99**

Prices subject to change without notice.

Bankson, AD6AD (ad6ad@arrl.net); & DECs: Santa Barb-Dave Lamb, WA6BRW (wa6brw@arrl.net); SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net) & Ven-Dave Gilmore, AA6VH (aa6vh@arrl.net). REMINDER: WRITE your Congressional Representatives to urge co-sponsorship of The Amateur Radio Spectrum Protection Act (HR 817 & S 549). The 2001 SW Division Convention in Riverside was a success! My thanks to all the Section Cabinet members who attended. FREE instant Section news updates? Join the SB Reflector! E-mail majordomo@qth.net the message subscribe arrlsb. SB Sec Web: www.qsl.net/arrlsb/. SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90-(131.8) & 449.300-(131.8). That's 30 in memory of Silent Key, Gary Daitch, WB6LED, one fine OP!

WEST GULF DIVISION

NORTH TEXAS: SM, Larry Melby, KA5TXL—Well by the time you have started reading this, summer will be over and we will be in the fall Hamfest season and the beginning of contest season. It's also time to look at your antennas and make sure that they can handle the winter weather. If you thought it wasn't fun working on them when it was 100 degrees, it's a lot less fun when it's 20 degrees with a 25-mph wind is blowing. If part of your interest runs towards Collins Radio equipment, then the place to be is Dallas for the Collins User Conference on the 19 – 21 of October. There should be more info in this issue or you can go to *www.dallasposse.org* for more details. Tfc: (July) K5UPN 588, KC5OZT 192, W5AYX 164, K5NHJ 94, KB5TCH 73, WA5I 60, KD5NZA 59, AC5Z 27, N8QVT 1. BPL: K5UPN. 73, KA5TXL.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: KA7GLA. ACC: KB5BOB. PIC: N7XYO. OOC: WB9VMY. SGL: W5NZS. STM: K5KXL Ham Holiday was another big success this year. I'm sorry I was unable to attend. The perseids meteor shower generated more activity this year than I have heard in the last few years. I was active on 6 and 2 both SSB and WSJT. If you haven't heard about WSJT yet you need to check it out. It is a digital mode that works really well with short bursts of data. It works using your sound card, much like PSK31 but it is FSK441. The Tulsa Repeater Organization has a new Web location. http://www.tulsahamradio.org. We lost another good ham in the section recently. Bob Gimlin, N5ROR, became a Silent Key. Bob was an active weather spotter in the Southern Tulsa county area around Bixby. The weekly section ARES net has moved frequency and time. It is now on 3900, the same frequency as the Oklahoma Phone Emergency Net, at 16:30 local time. I enjoyed visiting the Choctaw club last month and speaking with them. I had a good time. I will be speaking at the Tulsa Amateur Radio Club this fall. If you would like me to come visit your club just drop me a line and we can work out a time and date. Be sure and let me know what is going on in your area so I can share it with others who read this column. Drop me an email or share it through the section email server. To subscribe send and email to majordomo@qth.net with SUBSCRIBE ARRL-OK in the BODY of your message. New location for the section web coming soon. 73, Charlie. Tfc: KF5A 1114, WB5NKD 476, N5IKN 396, WA5OUV 338, WB5NKC 306, KK5GY 253, WA5OUV 246, K5KXL 139, KE5JE 106, WA5IMO 103, KI5LQ 72, W5REC 21.

SOUTH TEXAS: SM, Ray Taylor, N5NAV—ASMs: KS5V, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, K5EJL, W5ZX, WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, K5SBU, W5JAM. STM: W5GKH. SEC: W5ZX. ACC: N5WSW. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: K5PNV. PIC: KD5HOP. Thank you for allowing me to serve as your Section Manager for another term. I'll try to do my best when dealing will issues concerning my constituents. We're making great headway in the response of the ham community in times of disasters. I believe the ARRL Emergency Course is responsible for some of the latest assistance given by new participants. This was evident during the Houston floods. We had a great time at the Austin Summerfest. Coy Day gave a good update on happening at the League. We had some interesting instructions in the ARES meeting. I know of one who passed his Technician License, Emery Waters of Lubbuck, Texas, is now KD5PKI. Along that same line, one of my students, Ryan Molenda, passed his test last month and is now KD5ORM. Ryan is already passing traffic on the CTTN traffic net. Congratulations to all the new hams, this will prove to be a great new start in life for you. You might want to think along the electronic engineer for your life time career. I'm looking forward to hearing you on the HF band as soon as you make the next step and upgrade. Hams have brought about great changes in the field of electronics and this should be recognized. Barry was a threat to Texas for awhile and then changed directions. I want to say a few words about those that love to interfere with nets. Nets do two things. They, first, perform a service in some cases, for mankind. Second, they put a lot of hams on one frequency. Just think what would happen if there were no nets and we all paired off on different frequencies, there would not be room for anyone to have fun with ham radio. With today's technology, we can cut out your interference and continue on. Putting a carrier on the nets just wastes your time, and who in their right mind can afford to waste their equipment that way? Everyone have a great month. Tfc: KA5KLU 204, W5GKH 98, W5KLV 91, W5ZX 70, N5OUJ 61, N5NAV 49, W5ZIN 31, K0YNW 28, KD5GM 25.

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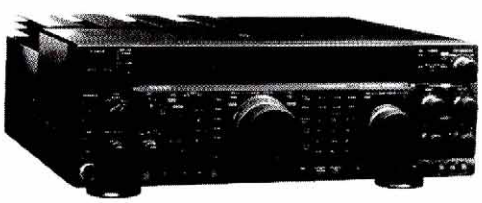

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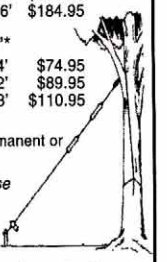

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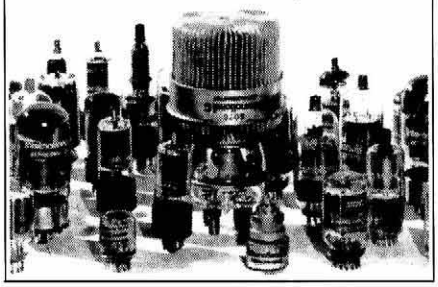

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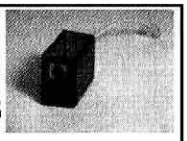

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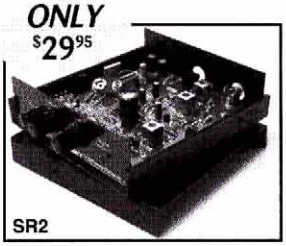

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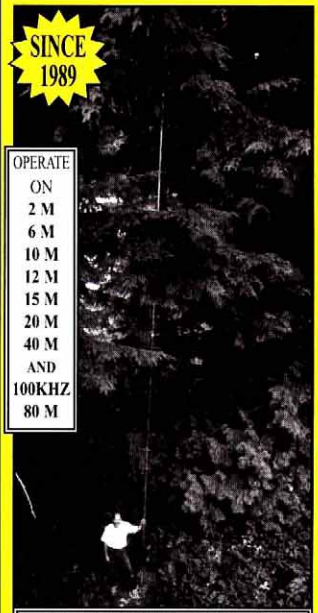

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Strong Signal Performance Cont'd
by Allan Kaplan, W1AEL

When there are two or more strong signals F1, F2, F3…, within the front-end bandwidth of a receiver, they will produce intermodulation distortion (IMD) products *in the receiver circuitry itself*. Considering only two signals for simplicity, the most important cases in an amateur band are [2F2 – F1] and [2F1 – F2]. We call these spurious signals *third-order*, because the coefficients add up to three. The spurious signals can QRM a weak one we are trying to hear.

We test receivers by applying two equally strong signals having a specified spacing from each other and from the receiver's center frequency. Test signals at 14.020 and 14.040 MHz will produce third-order products at 14.000 and 14.060. We tune the receiver to one of these last frequencies and observe the noise level at the receiver output. We then raise the power of both signals until a spurious signal causes the output power to rise 3 dB. At that "minimum discernible signal" point, the signal power just equals the noise power in the selectivity bandwidth. The decibel difference between the noise floor and the level of each interfering signal is the IMD dynamic range.

This number compares the resistance of different radios to interference from multiple strong signals. It is a realistic test for our busy bands where two very strong signals cause a receiver to generate a spurious signal that did not come in on the antenna!

20 kHz spacing has become a recognized testing standard. Many modern receivers incorporate a 15 – 20 kHz BW first IF "roofing filter". It affords the following receiver circuitry some protection from the two strong interferers. This IMD test therefore evaluates front end and mixer dynamic range. Recently ARRL has been testing receiver IMD with an additional test at 5 kHz spacing, a much tougher test, because the roofing filter does not help! This may compel manufacturers to strengthen IF stages to withstand heavier band occupancy – not a bad thing! See page 80 in July 2001 QST. Remember that it takes a village of specifications to evaluate a rig!

'Till next time, 73 de W1AEL.

Allan Kaplan, W1AEL, joined Ten-Tec as an RF engineer after retiring as Senior Staff Engineer at Raytheon, Falls Church, VA., where he designed high performance receivers. He holds a MSECE degree from the University of Massachusetts.

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2) The Ham-Ad rate for commercial firms offering products or services for sale is $1.25 per word. Individuals selling or buying personal equipment: ARRL member 65¢ per word. Non-ARRL member $1 per word. **Bolding** is available for $1.75 a word. You may pay by check payable to the ARRL and sent to: Ham Ads, ARRL, 225 Main St., Newington, CT 06111. Or, you may pay by credit card sending the information by fax to 860-594-0259 or via e-mail to hamads@arrl.org. The credit card information we need is: the type of credit card, the exact name that appears on the credit card, the credit card number, the expiration date, and the credit card billing address.

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 printed clearly on an 8 1/2" X 11" sheet of paper.

4) 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 March 16th through April 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 the Advertising Department at 860-594-0231 or hamads@arrl.org for further information.

5) 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.

6) 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.

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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, Chat Room, V.E. teams, web page: www.rara.org. Privacy respected. E-mail: rara@qsl.net or P.O. Box 191, Chesterland, OH 44026-0191.

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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	208
0508G	1	170	28	15/0.7	Standard	367
0510G	10	170	25	15/0.7	Standard	319
0550G	5-10	375	59	15/0.7	HPA	524
0552G	20-25	375	54	15/0.7	HPA	486
144 MHz						
1403G	1-5	10-50	6	15/0.7	LPA	163
1405G	1-2	100	14	15/0.7	Standard	295
1410G	5-10	160-200	28	15/0.7	Standard	328
1412G	25-45	160-200	22	15/0.7	Standard	286
1450G	5-10	350+	56	15/0.7	HPA	572
1452G	10-25	350+	52	15/0.7	HPA	525
220 MHz						
2203G	1-5	8-35	5	14/0.8	LPA	168
2210G	5-10	130	20	14/0.8	Standard	346
2212G	25-45	130	16	14/0.8	Standard	316
2250G	5-10	225	40	14/0.8	HPA	579
2252G	10-25	225	36	14/0.8	HPA	537
2254	75	225	32		HPA	494
440MHz						
4405G	1-5	15-50	9	12/1.2	LPA	309
4410G	10	100	19	12/1.2	Standard	367
4412G	15-30	100	19	12/1.2	Standard	355
4448G	1-5	75-100	25	12/1.2	HPA	429
4450G	5-10	185	35	12/1.2	HPA	585
4452G	25	185	30	12/1.2	HPA	547

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LPA=Low-power amp	3x6x5	4lbs	UHF
Standard=Mobile/Base	3x6x11	6lbs	UHF or N
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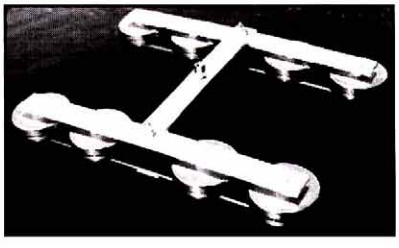

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- A college degree, preferably in a technical field
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- Demonstrated ability to work effectively and productively with a variety of people
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To be considered for this position, send a resume, cover letter and salary expectations to *QST* Technical Editor Position, Robert Boucher, ARRL, 225 Main St, Newington, CT 06111-1494; fax 860-594-0298; **rboucher@arrl.org**. No telephone calls, please. ARRL is an Equal Opportunity Employer.

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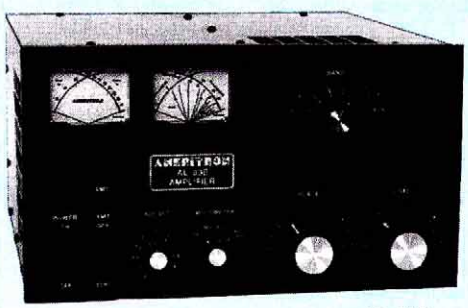
Two tubes, 1500 W plus

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*™!

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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.

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Ameritron's 3CX1200A7 linear Amp

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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.

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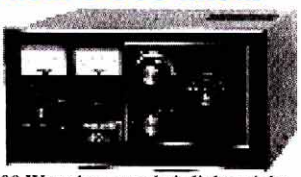

AL-82
$2395
Suggested Retail

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.

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ALS-500M 500 Watt Mobile Amp

AL-500M
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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.

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AL-600
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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.

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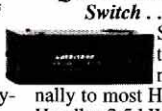

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500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7 5/8" Wide x 6 15/16" Deep x 2 13/16" High

Frequency Coverage: 25.0000-512.0000 MHz., 806.000-823.9875MHz., 849.0125-868.9875 MHz., 894.0125-1300.000 MHz.

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Bearcat® 895XLT Trunk Tracker

Manufacturer suggested list price $499.95

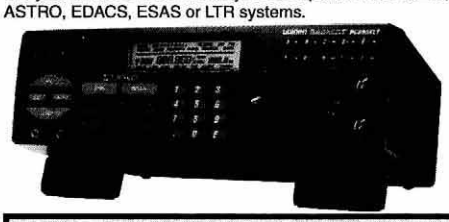
Less -$320 Instant Rebate / Special $179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10 1/2" Wide x 7 1/2" Deep x 3 3/8" High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



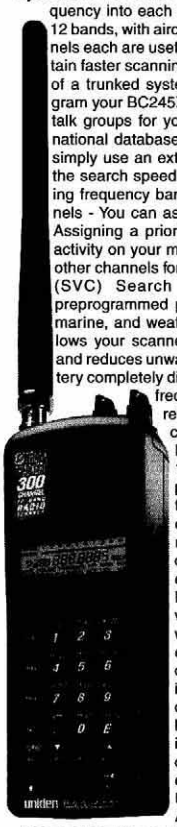
Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
Size: 2 1/2" Wide x 1 3/4" Deep x 6" High

Frequency Coverage:
29.000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

Our Bearcat TrunkTracker BC245XLT is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for $159.95.



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Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
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1,000 Channels • 20 banks • 50 Select Scan Channels
PASS channels: 50 per search bank + 50 for VFO search
Frequency step programmable in multiples of 50 Hz.
Size: 2 1/2" Wide x 1 3/8" Deep x 6 1/8" High

Frequency Coverage:
500 KHz to 823.995 MHz, 849.0125-868.995 MHz, 894.0125-2,040.000 MHz (Full coverage receivers available for export and FCC approved users.)

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multifunctional band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, user selectable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier reinsertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: **CT8200** CTCSS squelch & search decoder $89.95; **EM8200** External 4,000 channel backup memory, 160 search banks. $69.95; **RU8200** about 20 seconds chip based recording and playback $69.95; **TE8200** 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. **CC8200A** personal computer control lead $109.95; **CR8200** tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. For fastest delivery, enter your order on-line at http://www.usascan.com.

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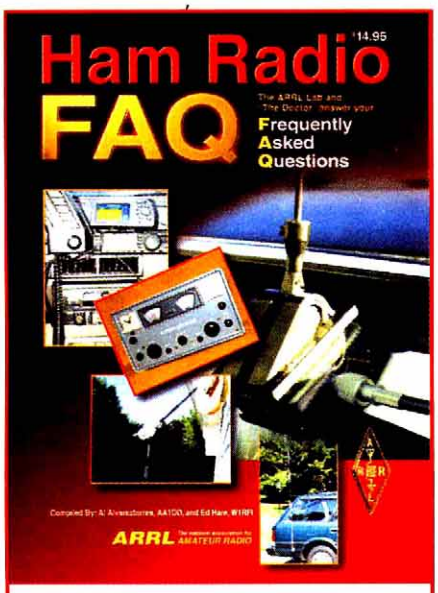

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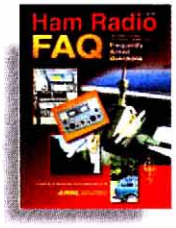

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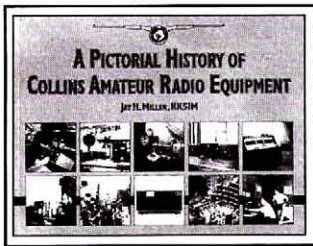

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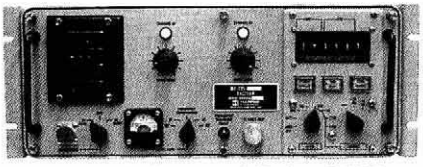

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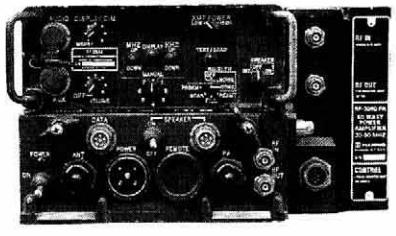

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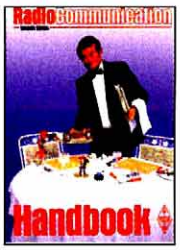

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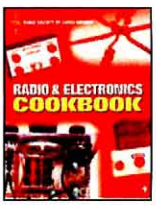

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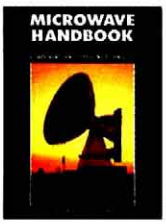

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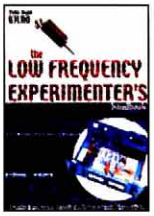

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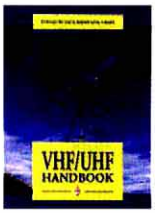

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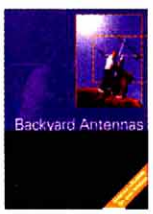

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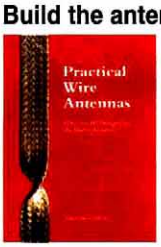

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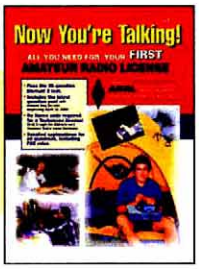

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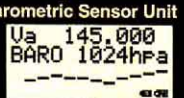

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