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COMMUNICATIONS & TECHNOLOGY

JULY 2001

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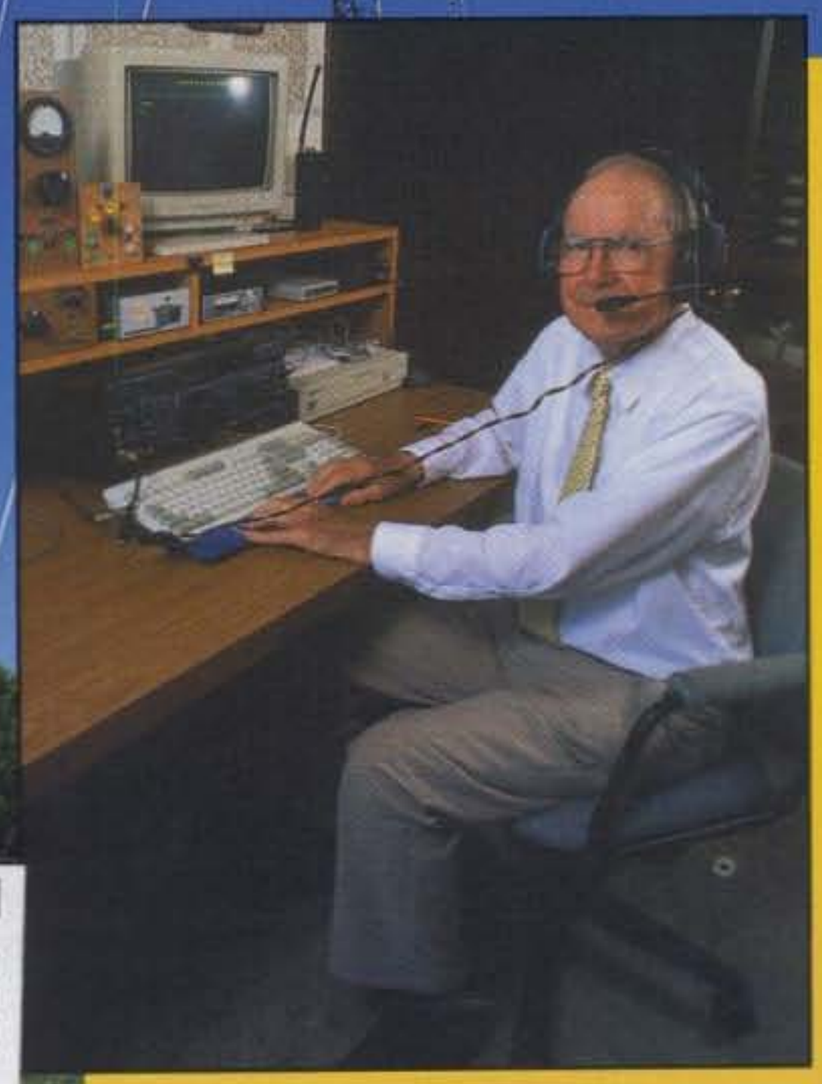
- **Remote Tuned Loop for HF DX, p. 44**
- ***CQ Reviews*: Hi-Q Tunable Mobile Antenna, p. 30**
- **Results, 2001 *CQ/RJ* RTTY WPX Contest, p. 11**
- ***CQ* Market Survey, VHF/UHF Mobile Rigs, p. 16**



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TH-11DX
$1079.95
11-Elements, 6.2 dBd gain.
10, 12, 15, 17, 20 Meters

TH-11DX, $1079.95. 11-element, 6.2 dBd Gain, 10,12,15,17,20M

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With 11-elements, 6.2 dBd gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

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TH-7DX, $819.95. 7-element, 6.57 dBd Gain, 10,15,20 Meters

7-Elements gives you an incredible avg *6.57 dBd gain -- the highest* of any Hy-Gain tri-bander!

Dual driven for broadband operation without compromising gain. SWR less than 2:1 on *all* bands.

Uniquely combining monoband and trapped parasitic elements give you an excellent 27 dB F/B.

Includes *Hy-Gain's* diecast aluminum, rugged boom-to-mast clamp, heavy gauge element-to-boom brackets, BN-86 balun. For high power, upgrade to BN-4000.

TH-5MK2, $699.95. 5-element, 6.1 dBd Gain, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you an outstanding 6.1 dBd average gain.

Separate air dielectric *Hy-Q* traps let you adjust for maximum F/B ratio on each band.

Also standard is *Hy-Gain's* exclusive *BetaMATCH™*, stainless steel hardware and compression clamps and BN-86 balun.

TH-3MK4, $439.95. 3-element, 5.9 dBd Gain, 10,15,20 Meters

The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

You get an impressive 5.9 dBd average gain and a whopping 25 dB average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

Features *Hy-Gain BetaMatch™* for DC ground, full power *Hy-Q™* traps, rugged boom-to-mast bracket and mounts on standard 2"O.D. mast. Stainless steel hardware. BN-86 balun recommended.

TH-2MK3, $339.95. 2-element, 3.4 dBd Gain, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can *double* your effective radiated power and hear *15-20 dB* (=F/B) better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

EXP-14, $549.95. 4-element, 5.9 dBd Gain, 10,15,20 Meters

Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

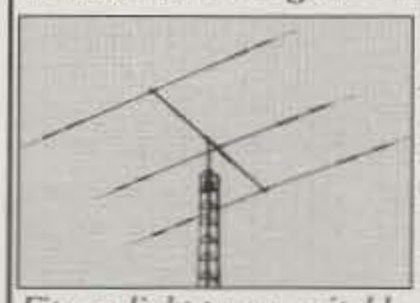
Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

***Truly** competitive against giant tri-banders at half the cost!*

QK-710, $169.95. 30/40 Meter option kit for EXP-14.

Compact 3-element 10, 15, 20 Meter Tri-Bander
For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



Fits on light tower, suitable guyed TV pole, roof tri-pod

TH-3JRS, $329.95. Hy-Gain's *most popular* 3-element 10, 15, 20 Meter tri-bander fits on most lots! Same top performance as the full power TH3MK4 in a compact 600 watt PEP design.

Excellent 5.8 dBd gain and 25 dB F/B let *you* compete with the "big guns".

Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

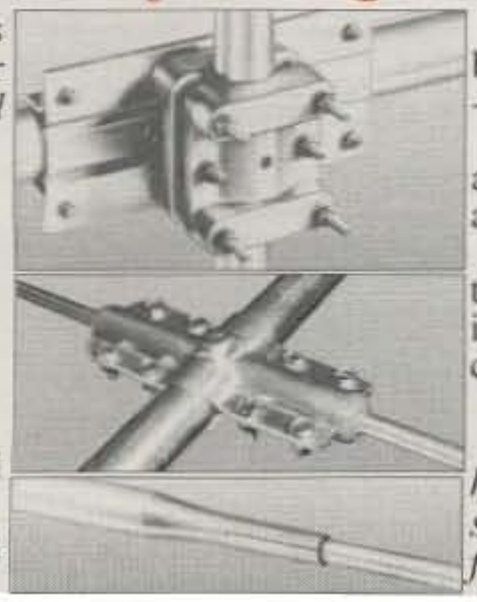
Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	6.2	22	4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1079.95
TH-7DX	**7**	**6.57**	**21**	**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$819.95**
TH-5MK2	5	6.1	20	1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$699.95
TH-3MK4	**3**	**5.8**	**25**	**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$439.95**
TH-3JRS	3	5.8	25	600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$329.95
TH-2MK3	**2**	**3.4**	**15-20**	**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$339.95**
EXP-14	4	5.9	25	1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$549.95

Tooled Manufacturing . . . Highest Quality Materials

1. Hy-Gain's famous super strong *tooled* die cast *Boom-to-Mast Clamp*

2. *Tooled* *Boom-to-Element Clamp*

3. Thick-wall *swaged* aluminum tubing



***Tooled** manufacturing* is the difference between Hy-Gain antennas and the others -- they just don't have it (it's expensive!).

Die-cast aluminum boom-to-mast bracket and element-to-boom compression clamps are made with specially *tooled* machinery.

Hy-Gain antennas feature *tooled* swaged tubing that is easily and securedly clamped in place. All tubing is deburred and cleaned for smooth and easy assembly.

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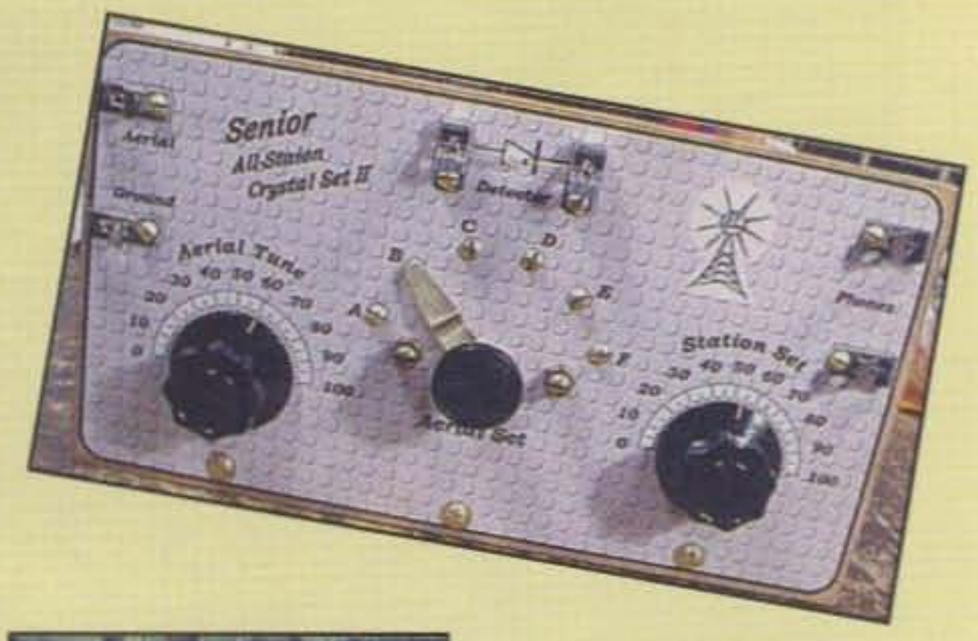
CQ Amateur Radio

JULY 2001 VOL. 57, NO. 7

FEATURES



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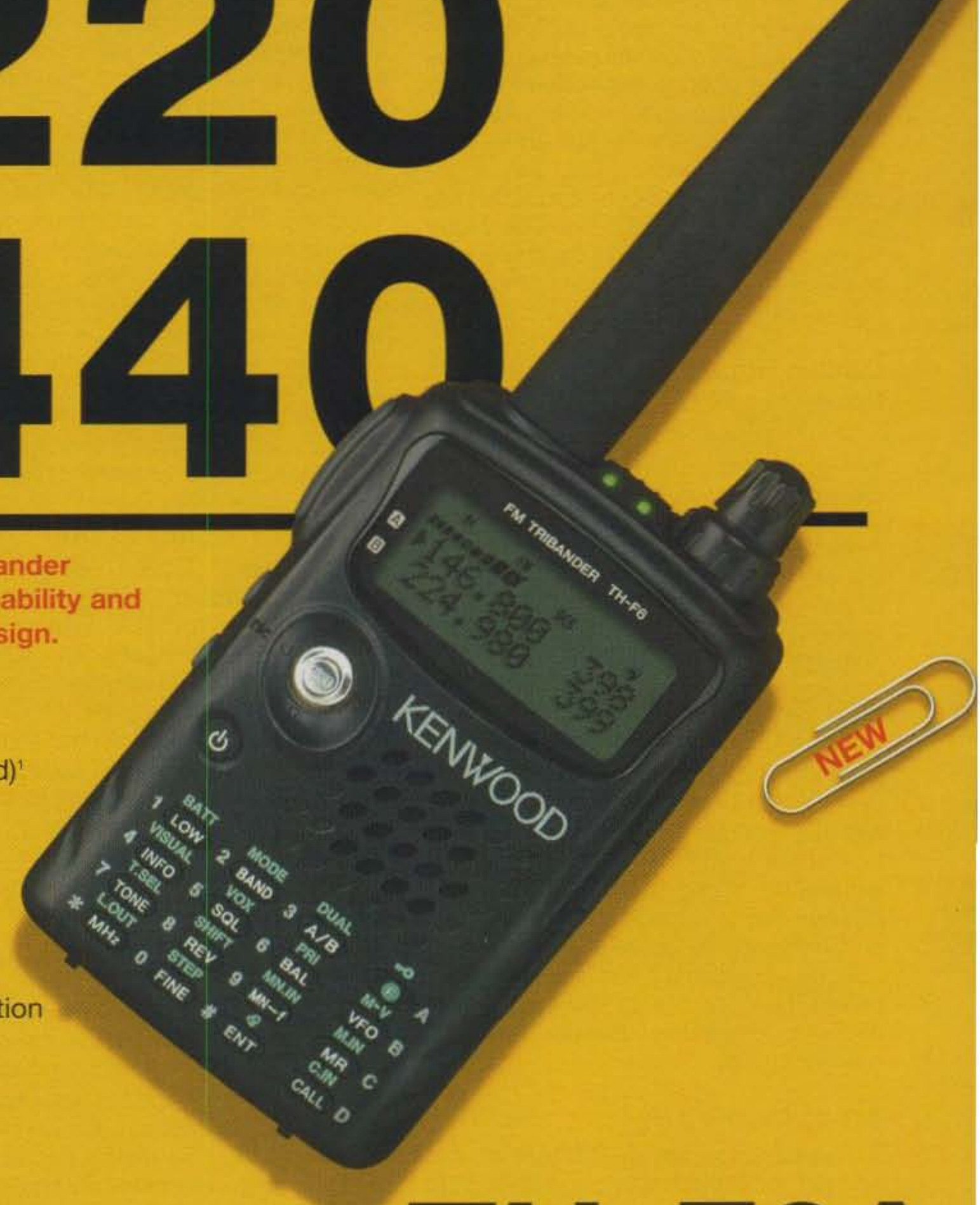
DEPARTMENTS

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

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Ham Radio News

From The CQ Newsroom

ARRL To Seek 5 MHz Ham Band

The ARRL is planning to petition the FCC for a new amateur band at 5 MHz, with hopes of eventually gaining an international allocation there. According to the *ARRL Letter*, the League's Executive Committee feels that a new band between 80 and 40 meters could improve amateurs' emergency communications capabilities. The petition will request a secondary allocation approximately 150 kHz wide. The ARRL already has an FCC for experimental license for the band (WA2XSY) and has been conducting test operations there since 1999. The *Letter* notes that the process of getting a new band, even if successful, could take several years.

League Hopeful on Upcoming FCC Actions

The ARRL's Executive Committee was told at its May 5 meeting that action is expected soon on the League's petition for low-frequency allocations in the vicinity of 136 and 160–190 kHz. According to the *ARRL Letter*, ARRL General Counsel Chris Imlay, W3KD, also said the FCC is expected to approve a League request to upgrade the current amateur radio allocation at 2400–2402 MHz from secondary to primary; and the ARRL recently petitioned the FCC for a similar change at 2300–2305 MHz.

No action is expected until fall on the ARRL's request for the full Commission to review the staff's denial of its petition to expand the scope of antenna regulation pre-emption to include deed restrictions and homeowner association rules. The League will request a formal presentation before the Commission this fall, once all the new commissioners have been appointed and confirmed.

AO-40 On the Air!

The transponder on OSCAR-40 was opened for limited amateur use in May, and satellite-active hams around the world immediately began making contacts and reporting excellent results. The satellite is currently operating with uplinks on 435 and 1269 MHz, and a downlink on 2401 MHz.

A recent attempt to activate AO-40's 10 GHz (X-Band) transmitter was unsuccessful, and AMSAT officials said it appears that no power is getting to the transmitter. According to the AMSAT News Service (ANS), the system had worked flawlessly before launch, and ground controllers are continuing to try to resolve the problem. A test of the 24 GHz transmitter appeared to be successful, but controllers said more tests are needed before it is fully activated.

One big success was the activation of LEILA, an innovative system designed to prevent overly strong signals from using up a disproportionate share of the satellite's power. With the system turned on, any signal stronger than the satellite's own beacon sets off a siren on the downlink frequency, warning the operator to reduce power. If the warning is ignored, the system will attempt to notch out the offending signal. It was turned on after complaints were received of some stations using too much power to access the satellite. According to ANS, "this is the first time that such a system has been used in space for a transponder with uncoordinated multiple accesses."

Users are reminded to avoid operating within 5 kHz of the satellite's Middle Beacon frequency of 2401.323 MHz.

Tito's Adventures in Orbit

Space tourist Dennis Tito kept in touch with family, friends, and the world's hams during his controversial visit to the International Space Station. Tito, who got a ham license while preparing for the flight, is KG6FZX. While in orbit, according to the *ARRL Letter*, he used the space station's US callsign, NA1SS, and made several random contacts as well as planned contacts with family members.

FCC Issues "Preliminary Views" on WRC-03 Issues

The FCC has released a lengthy compilation of "preliminary views" on the issues expected to be discussed at the 2003 World Radiocommunication Conference (WRC-03). These "views" are the tentative recommendations and positions agreed to by the various Informal Working Groups reviewing issues in their areas of expertise, and do not represent the final position of the FCC and/or the US government. Amateur radio is represented via the ARRL on at least two of these groups.

On issues of relevance to amateur radio, the preliminary view on 40 meters supports a worldwide realignment of the band to 6900–7200 kHz, with an alternative of making the current Western Hemisphere allocation of 7000–7300 worldwide. Another possibility now being discussed is 6800–7100 kHz. Two working groups opposed a proposal for the Earth Exploration Satellite Service to use 420–470 MHz for mapping purposes, unless proponents could prove that the systems would not interfere with amateurs and/or earth-based radar. No preliminary views were issued on the question of deleting the international rule requiring Morse code proficiency for HF amateur licensing. This means that no agreement has yet been reached by the participants.

Comments on the preliminary views may be e-mailed to the FCC at <wrc03@fcc.gov>; additional information as well as links to the 100+ page document (in PDF format) can be found at <http://www.fcc.gov/wrc-03>.

Comments Sought on Extra Class Syllabus

The Question Pool Committee of the National Conference of Volunteer Examiner Coordinators has released the draft syllabus for the new Element 4 (Extra Class) Question Pool and is seeking comments from amateurs. This question pool will become effective July 1, 2002. Committee member and ARRL/VEC Manager Bart Jahnke, W9JJ, says the proposed changes are minimal.

The draft syllabus is available for download at <http://www.arrl.org/arrlvec/pool.html>. Comments must be received prior to August 15, 2001 and should be e-mailed to all three members of the committee: Chairman Scotty Neustadter, W4WW, <W4WW@arrl.net>; Bart Jahnke, W9JJ, <vec@arrl.org>; and Fred Maia, W5YI, <fmaia@prodigy.net>.

ARRL/REACT Sign Agreement

The ARRL has signed a Memorandum of Understanding with REACT, an emergency response service that began in CB but has since expanded to include GMRS (General Mobile Radio Service) users and amateurs. According to the *ARRL Letter*, the agreement says the two organizations will "cooperate and utilize their resources ... to optimum mutual benefit." ARRL President Jim Haynie, W5JBP, himself a longtime member of Dallas REACT, says the agreement can benefit members of both groups, not only in terms of emergency communications, but also on matters such as antenna ordinances.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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Cross Band/ Cross Mode Operation
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Zero Bias

BY RICH MOSESON, W2VU

An Editorial

Dayton 2001

Each year, I come home from the Dayton Hamvention™ physically exhausted but with my ham radio spirit reinvigorated. Most any good hamfest can produce the same effect, but the experience is more intense at Dayton because of the scale of the event.

To a first-time visitor, the scale can be overwhelming—four large exhibit halls plus a few connecting corridors crammed with some 500 booths, plus what seems like miles of outdoor flea market spaces (more than 2500!) where you can find just about any imaginable piece of ham radio ju ... um ... treasure.

This was my 10th Dayton with *CQ* and my 16th or 17th overall, so I've finally learned my way around. But for me, the booths and the flea market and the opportunities for buying and selling are an elaborate backdrop for Dayton's main attraction—the people. About the only other place you might expect to see such a large and diverse group is the international arrivals building of a major airport. But unlike the strangers you'll rub shoulders with at the airport, the people at Dayton—all ages, sizes, shapes, colors and nationalities—are bound by a common love of radio communication and electronics. Plus, they're all on a first-name basis, even if they're meeting for the first time. I want to share with you a few personal stories that illustrate how I come home from Dayton with my ham spirit renewed. I'm sure everyone else has their own, and it's the fact that these experiences are so universal that makes them so special.

I had a chat with a ham who showed us pictures of his shack as other people might show you pictures of their grandkids. In the course of conversation, he mentioned that he's a doctor working on integrating a technology he's developed into heart surgery to reduce dangerous after-effects. Where else but in ham radio, and in Dayton, would I have had the opportunity to shoot the breeze with a guy working on the leading edge of medical technology?

Three and a half years ago, when I was editor of *CQ VHF,* Contributing Editor Don Rotolo, N2IRZ, and I had the opportunity to visit the Weinheim VHF Convention in Germany. Our host there was Wolfgang Mahlke, DF1GW, who treated us to dinner at his home, gave us a tour of his club station and generally made life easier for two foreign visitors. Don and I got the chance to return the favor this year, as Wolfgang and a couple of friends came to Dayton by way of New York. We picked them up at Newark Airport, took them sightseeing and then out to dinner, and Don took them to their hotel in New York City. In Dayton, Wolfgang and his friends visited us regularly at the CQ booth, sharing their impressions as first-time visitors. Even though they were in a foreign country, they were not alone. In fact, they met other hams from Germany who were also visiting Dayton. It is part of the unique nature of amateur radio that no matter where you travel, you are never far from friends.

That applies to time as well as distance. While I was preparing a bunch of QSL cards recently for some DX stations, I noticed a card sticking out from under one of the many stacks of stuff on my shack table (trust me ... my shack will *never* be on the cover of this magazine). After carefully excavating the material on top, I uncovered a rather large pile of cards for domestic stations —going back at least one callsign and 13 years! All I can figure out is that I filled out the cards years ago and didn't have postage for them at the time. I must have put them aside and then forgotten about them. If you've gotten a very old card recently from NW2L or W2VU, and you're wondering why it took so long, this is why.

Digging up this bit of personal history brought back many memories and gave me the opportunity to see how these folks have fared in the intervening years. I double-checked all the calls and addresses against the current FCC database. Out of 113 total QSLs, seven had become Silent Keys and three were no longer in the FCC database. Not a bad survival record! Among those still listed as alive and licensed, 25 had changed their callsigns since I'd contacted them, and at least 25 had changed their addresses (not all of the cards had been addressed at the time I'd filled them out). Another half-dozen or so have moved without remembering to update their records with the FCC, and those cards have come back in the mail.

Overall, I've been getting a pretty good return (I haven't been counting, but I have one or two in my mailbox every two or three days). The most interesting reply I've received so far was from Ora Smith, a ham I'd worked back in 1989, when I was NW2L and he was KE6GH. He lived in California and was planning to visit New York City, where I was working at the time. I gave him my office number and encouraged him to give me a call. I never heard from him and forgot about it. Fast-forward to May, 2001—I sent him my 11-year-old QSL and quickly got a response. Ora, now W9DJ and living in Ohio, explained that he did visit New York soon after our QSO, but never had time to call. I wrote back to him, noticing the Ohio address on his QSL, and suggested that he look me up at the CQ booth if he was attending the Hamvention. He was, he did, and we had a very pleasant, if long-delayed, meeting on Friday afternoon. Only in ham radio! Perhaps, only in Dayton...

New Stuff

Dayton is traditionally a time when manufacturers introduce new products. I'm planning to get into the new stuff I saw next month, but just wanted to mention here a few of the things that really caught my eye.

Kenwood introduced the TH-F6A, a new 3-band handheld that includes 222 as well as 2 meters and 440 (5 watts on all three bands). The F6A's very broad coverage receiver (100 kHz to 1300 MHz) will tune in SSB and CW as well as AM and FM, allowing shortwave listeners using the radio to once again tune in the HF ham bands.

Ten-Tec has introduced a new VHF multimode rig—the six- and two-meter "6N2." Operating SSB, CW and FM, it features a DSP (digital signal processing)-based receiver, a low-power output jack for transverters and is tiny enough to be used just about anywhere.

Speaking of transverters, Down East Microwave and Directive Systems antennas were showing off a perfect package for listening to OSCAR-40's 2400-MHz downlink signal. Directive Systems is offering a 17-turn helix

antenna built into a 21-inch-long piece of PVC pipe, and Down East has a 2400-144 MHz downconverter that basically plugs into the back of the antenna. All you need to add is a 2-meter SSB receiver.

AOR has introduced a box it's calling a "multi-media terminal." It's an outboard DSP filter that creates artificial stereo on SSB or CW signals and banishes much of the noise you'd normally hear. Plus, it includes an audio equalizer through which you can feed your microphone, and it has a built-in digital voice recorder. It also receives Baudot RTTY and PSK-31 without the need for a computer or additional software. It will transmit those modes, too, but you'll need some sort of input device, such as a computer or personal digital assistant with terminal software.

MFJ brought out a host of new accessories, including a Morse code reader that works by holding it close to the receiver's speaker (no connections needed), a metal base/grounding unit for mounting vertical antennas, and several accessories designed around the portable Yaesu FT-817 transceiver. It seems that a whole industry is sprouting up to provide accessories and support for this radio.

A company called Fluidmotion has introduced a unique multiband Yagi antenna. Electronically controlled, it's made of copper tape inside a plastic tube that's spooled out or in as you change bands to create a no-trap single-band beam for whichever band you choose between 20 and 10 meters.

Finally, outside the equipment domain, *CQ* and the ARRL have teamed up to present the entire collection of *Ham Radio* magazine on CD-ROM. *CQ has published a new book called The Mobile DXer,* and the ARRL has introduced several new publications, ranging from the always-popular *ARRL Repeater Directory* and a new *HF Digital Handbook* to a valuable resource for any ham who needs to know the legal ins and outs of getting permission to put up a tower and antennas.

Antenna Zoning for the Radio Amateur is written by attorney and amateur Fred Hopengarten, K1VR, and includes a CD-ROM packed with precedent-setting cases and sample letters for municipal officials. One of the major points made in the early part of the book—and repeated often—is that fighting a zoning battle can be a vary expensive proposition, so it's best to be prepared before you begin. This point is reinforced in the price of the book — at $49.95, *Antenna Zoning* costs more than either the *ARRL Handbook* or the *ARRL Antenna Book,* both of which are three times its size. My initial (tongue in cheek) conclusion was that Hopengarten must have been charging his regular hourly rate while writing the book, but several people I've spoken with who have been involved with tower cases say the book's advice is invaluable and well worth the investment.

All in all, Dayton was Dayton—a two and a half days of wall-to-wall, floor-to-ceiling, all-encompassing, ham radio. Congratulations to the Dayton Amateur Radio Association on its 50th Hamvention, and once again, to Dayton's 2001 Ham of the Year, our own George Jacobs, W3ASK, recognized for (among other things) his 50 years as *CQ*'s Propagation Editor. 73, W2VU

Announcements

• The following Special Events will take place during July:

W1B, from the national Baby Food Festival, Newaygo County, Michigan; 1500–2100Z July 17–21 in General portion of 10, 15, 20, 40, 75 meters. For certificate send SASE to Leo Woodard, WD8DCA, 304 N. Stone Road, Fremont, MI 49412.

K2RUK, from celebration of maiden voyage of the USCGC Maple WLB-207 to Sitka, Alaska and its visit to Ogdensburg, NY, its home port for 17 years; Ogdensburg ARC; 1800–2400Z July 21 on 7.240 and 14.240 ±QRM. For 9×12 certificate send SASE and QSL to Walt Brady, N2YMY, 17 Birch Heights, Edwards, NY 13635.

W2GLQ, in coordination with New Jersey Camp for the Blind Children, Marcella, New Jersey; Nutley ARS; 10 AM – 5 PM EST July 28 in General portion of the bands. For certificate send SASE to Nutley ARS, American Red Cross Building, 169 Chestnut St., Nutley, NJ 07110.

K7H, from Utah Hamfest 2001 and Rocky Mountain Div. Convention, Bryce Canyon, Utah; 1800Z July 13 to 1800Z July 15 on 28.350, 21.350, 14.275, 7.275. For certificate send QSL and SASE to Kelly Vining, AI7J, 762 E. Rosewood Lane, Layton, UT 84041-4244.

W8AL, from Pro-Football Hall of Fame Festival, Canton, Ohio; Canton ARC; 1300Z July 27 through 2400Z July 29 on 7.265, 14.265, 21.365, 28.365. For certificate send 9×12 SASE to Donald Perry, WQ9J, 968 Culverne Ave. NW, Massillon, OH 44647.

W8P, from Packard Automobile Museum celebration, Warren, Ohio; Warren ARA; 1200–2000Z July 22 & 23 on 80 meters. For certificate send $1.00 to WARA, P.O. Box 809, Warren, OH 44482.

W9C, from Great Circus Parade Showgrounds, Milwaukee, Wisconsin; West Allis RAC; daily 1800–0200Z July 11–14, 2001 on 7240, 14240, 21340, 28400. For certificate send QSL to W9C, 5436 Scenery Rd., Waterford, WI 53185.

W9D, from Great Circus Train; 1400–2200Z July 7–9 on 7.240, 14.240 (one at a time), some 146.55 FM. For certificate send 9×12 SASE with three units U.S. postage to K9ZZ.

• These hamfests are slated for July:

July 4, **W3UU – Harrisburg RAC Firecracker Hamfest,** Emerick Cibort Park, Bressler, Pennsylvania. Contact Pete de Volpi, K3PD, 408 Hillside Ave., New Cumberland, PA 17070 (717-938-8249, 6–9 PM; e-mail: <w3uu@aol.com>; <http://members.aol.com/w3uu>). (Talk-in 146.16/76; exams nearby 9 AM)

July 7, **Straits Area ARC Hamfest**, Central Elementary School, Petosky, Michigan. Contact Cliff Rosebohm, KC8NVI, 231-526-5645; e-mail: <peewee@freeway.net>. (Talk-in 146.68; exams 1 PM at American Red Cross, contact Floyd Davis, 231-526-5503)

July 8, **KARSFEST 2001**, Will County Fairgrounds, Peotone, Illinois. Contact Chip Moore, K9IOC, phone 815-933-1323; e-mail: <karsfest@yahoo.com>; <www.w9az.com>. (Talk-in 146.94 [–600])

July 13–15, **38th International Hamfest**, International Peace Garden, north of Dunseith, North Dakota. Contact Dave Syndal, VE4XH, 204-728-2463; <dsyndal@mb.sympatico.ca>; <www.mts.net/~holderr>. (Talk-in 146.52/52; exams Friday evening; Special Event station VE4IHF)

July 14, **Northern Colorado Superfest 2001**, Larimer County Fairgrounds, Loveland, Colorado. Contact Rod Cerkoney, NØRC, 970-225-0117; e-mail: <n0rc@arrl.net>; <http://www.qsl.net/n0rc/hamfest>. (Talk-in 145.115; exams)

July 15, **Mid-Atlantic ARC Hamfest**, Kimberton Fire Company Fair Grounds, Valley Forge, Pennsylvania. Contact Bill Owen, W3KRB, 610-325-3995; e-mail: <gem@op.net; <http://www.marc-radio.org/hamfest.html>. (Talk-in 146.835/– and 443.80/+)

July 15, **Zero-Beaters ARC Hamfest**, Bernie E. Hillerman Park, Washington, Missouri. Contact Bob Goza, WØBOB, 573-484-3718, e-mail <w0bob@arrl.net>. (Talk-in 147.24+; exams 9 AM)

July 21, **Mid-Summer Swapfest**, Cary Community Center, Carey, North Carolina. Contact Cary ARC, P.O. Box 53, Carey, NC 27512 (SASE); e-mail <n4nc@arrl.net>. (Talk-in 145.39 –.6)

July 20–22, **Northwest DX Convention**, Everett Holiday Inn, Seattle, Washington. Contact WWDXC, P.O. Box 395, Mercer Island, WA 98040; e-mail: <convention@ wwdxc.org>.

July 22, **Fox River Radio League Hamfest**, Waubonsee Community College, Sugar Grove, Illinois. Contact Maurice Schietecatte, W9CEO, 815-786-2860; e-mail: <w9ceo@arrl.net>; <http://www.frrl.org/hamfest.html>. (Talk-in 147.210 [+600], PL 103.5/107.2; exams 10 AM)

July 26–29, **RAC National Convention**, Vernon, BC, Canada. E-mail: <rac-bulletins@mail.eton.ca>.

July 27–28, **Ham Holiday 2001**, Oklahoma State Fair Park, northeast of I-40 and I-44 intersection, Oklahoma. Contact Ham Holiday 2001, PO 850771, Yukon, OK 73085-0771; e-mail: <corahams@swbell.net>; <www.geocities.com/heartland/7332>. (Talk-in 146.82; exams)

July 28, **SNARS Hamfest**, International Game Technology, Reno, Nevada. Contact Bill, K7NHP, 775-246-3756; e-mail: <k7nhp@arrl.net>. (Talk-in 146.610–, PL 123; exams 9 AM, preregister call Jess, N7BIP, 775-826-0329, walk-in okay)

July 28, **Western Carolina Hamfest**, Haywood County Fairgrounds, Waynesville, North Carolina. Contact Pat Kelsey, WA4OLA, 828-236-0181; e-mail: <ab5rb@bellsouth.net>. (Talk-in 146.910 [PL 91.5], 147.390; exams)

July 28, **OH-KY-IN ARS Hamfest**, Diamond Oaks Career Development Campus, Cincinnati, Ohio. Contact Lynn Ernst, WD8JAW, 859-657-6161; e-mail: <wd8jaw@arrl.net; <www.qsl.net/k8sch>. (Talk-in 146.670–, 146.925–; exams at 8 AM)

July 28, **BARC Hamfest,** Ella Burr School, Lincoln, Maine. Contact David Baker, 207-794-3398.

July 29, **Maryland Hamfest & Computer Fest**, Timonium Fairgrounds, Baltimore, Maryland. Contact BRATS, 410-461-0086; e-mail: <brats@bratsatv.org>; <http://www.bratsatv.org>. (Talk-in 147.030+, 224.960–, 448.325–; exams 9 AM preregistration required call 301-572-5124, e-mail: <creewb3gxw@aol.com>)

To place a item in the "Announcements" column, send the specifics about your special event or hamfest to CQ Announcements, 25 Newbridge Road, Hicksville, NY 11801; fax 516-681-2926; or e-mail: <hamfests@cq-amateur-radio.com>. Deadline is the first of the month that is two months prior to the event date (i.e., June 1st for an August event).

A publication of

CQ Communications, Inc.
25 Newbridge Road
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Offices: 25 Newbridge Road, Hicksville, New York 11801. Telephone: (516) 681-2922. FAX (516) 681-2926. E-mail cq@cq-amateur-radio.com. Website:http://www.cq-amateur-radio.com. CQ (ISSN 007-893X) is published monthly by CQ Communications Inc. Periodical postage paid at Hicksville, NY and additional offices. Subscription prices (all in U.S. dollars): Domestic—one year $31.95, two years $57.95, three years $83.95; Canada/ Mexico—one year $44.95, two years $83.95, three years $122.95; Foreign Air Post—one year $56.95, two years $107.95, three years $158.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government, including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc. will be refused and will not be returned or processed. Entire contents copyrighted CQ Communications Inc. 2001. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

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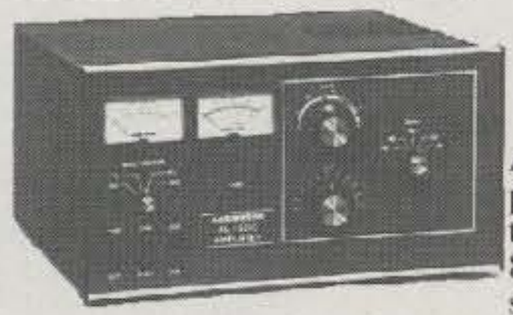

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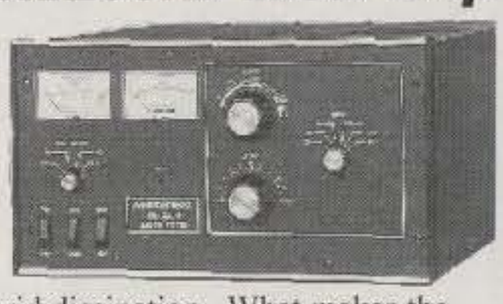

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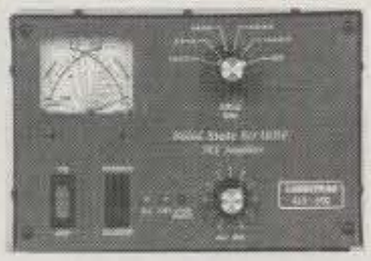

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Results of the 2001 CQ WW RTTY WPX Contest

BY GLENN VINSON,* W6OTC, AND EDDIE SCHNEIDER, GØAZT**

The seventh annual CQ World-Wide RTTY WPX Contest, sponsored by *CQ* and *The New RTTY Journal,* was held February 10–11, 2001, with solar flux hovering around 160, about the same level as the previous year. With these good conditions and the continuing increase in the number of RTTY contesters, new records were achieved in worldwide Single Op High Power, Single Op Low Power, Multi-Multi, Multi-Single, and Multi-2 classes, and many regional records were shattered. Given the double-point advantage of contacts made on 80 and 40 meters, those participants with low-band capabilities did particularly well.

More than 660 logs were submitted, approximately one-third in Cabrillo format. Although this was the first *CQ/RJ* contest to encourage strongly the use of Cabrillo format, and the first to require all large logs to be submitted electronically, most RTTY contesting software writers and their users responded enthusiastically, allowing the log-checkers to produce results quickly and accurately. One clarification: While some read the rules this year as creating low- and high-power classes for each band, that distinction has never been part of the RTTY WPX Contest. The only low- and high-power classes for single operators are in the single operator, all-band classes (Single Op High Power and Single Op Low Power).

Single Operator

Single Op, High Power (SOH). Continuing an annual tradition in this young contest, the top three finishers all broke the old SOH world record set only last year by CT3BX at 2.2 million points. This time Jacobo, P43P, who scored almost 3.4 million points (1798 QSOs, 6076 Q-points, 552 mults), was the winner. Second was EMØI (op. UT2IZ), scoring 2.5 million points (1694 QSOs, 4832 Q-points, 524 mults). Just behind, from Kazakhstan, was Romeo, UN5PR, operating as UP5P, who scored 2.3 million points (1478 QSOs, 4831 Q-points, 483 mults). World fourth place was Masa, JH4UYB, who set a new Japanese record with a score of almost 2.1 million points (1337 QSOs, 4198 Q-points, 489 mults).

*e-mail: <w6otc@garlic.com
**e-mail: <edlyn@california.com>

While Europeans are often thought to have some advantage in this contest because of the point premiums for 80 and 40 meter contacts, Glenn, VA3DX, was world fifth with 2.0 million points (1272 QSOs, 474 mults), and Mario, HK3WGQ, was a close sixth at 1.9 million points (1253 QSOs, 463 mults), suggesting that Western Hemisphere entrants can be competitive with the Europeans.

Single Op, Low Power (SOL). As in most RTTY contests, the largest number of entries (here more than 300) is in the Single Operator, All Band, Low Power class. Reclaiming the SOL title he has held twice before, Don, AA5AU, set a world record in SOL with almost 1.9 million points (1567 QSOs, 3774 Q-points, 497 mults), edging past UP5P's 2000 world SOL record of 1.8 million points. Second in the world was ZX2B (op. PY2MNL), scoring 1.8 million points (1256 QSOs, 3742 Q-points, 482 mults). VP5JM was a strong third with almost 1.6 million points (1237 QSOs, 3613 Q-points, 437 mults). WT4I was fourth with 1.5 million points, while the top European entrant was LY6M (op. LY1DS), scoring 1.4 million points.

Single Op, Single Band, 28 MHz. Reflecting the high solar flux numbers, 10 meters attracted more than 40 entries, although not the highest single band scores. The world winner, by a very narrow margin, was LU6FAZ, scoring 715,787 points (645 QSOs, 1919 Q-points, 373 mults). Just behind was LU8EKC, who scored 712,752 points (648 QSOs, 1916 Q-points, 372 mults). This was a close race! Closely following were RN6BN with 696,344 points (759 QSOs, 1804 Q-points, 386 mults) and LW7EIC with 659,555 points (610 QSOs, 1807 Q-points, 365 mults.

Single Op, Single Band, 21 MHz. Fifteen meters produced the highest single band scores, with 9A5W scoring 1,101,525 points (894 QSOs, 2319 Q-points, 475 mults). Very close behind was EO6F (op. UXØFF), who scored 1,042,416 points (931 QSOs, 2286 Q-points, 456 mults). World third was AC1O at 715,139 points (758 QSOs, 1829 Q-points, 391 mults).

Single Op, Single Band, 14 MHz. DJ7AA set a new world single op 20 meter record with a score of 1,031,940 (895 QSOs, 2205 Q-points, 468 mults). Following were 9A7R with 831,466 points and 9A8A with 791,648 points.

Single Op, Single Band, 7 MHz. Forty meters continues to lag with the present high solar flux numbers, with Europeans being the dominant entrants. World winner was 9A6A with 791,184 points, second was RA6AZ with 696,890 points, and world third was EO1I (op. UT1IA) with 393,600 points.

Single Op, Single Band, 3.5 MHz. High solar flux or not, the top three entrants on 80 meters all beat the old single op 80 meter world record of 313,812 points set in 1999 by S57CQ. The new world record holder is S54E, who scored 469,224 points (433 QSOs, 1862 Q-points, 252 mults). Second was 9A3OY (op. 9A5AZ), scoring 410,546 points (411 QSOs, 1762 Q-points, 233 mults). World third was S51DX at 363,432 points (388 QSOs, 1594 Q-points, 228 mults). These scores will only get better as the solar flux begins to decline in the next few years.

Rookie. The Rookie of the Year for 2001 was MMØBQI, who scored an excellent 557,096 points (674 QSOs, 1678 Q-points, 332 mults), with contacts on all bands except 80 meters.

SWL. Seven listeners submitted SWL logs: DEØWAF, DE1EDD, F-17917, OI-500786, OH3-911, OK1-9149, and ONL-383, who won with score of 711,015 (740 QSOs, 2215 Q-points, 331 mults).

Multi-Operator

Multi-Op Multi-Transmitter (MOM). The large RKØAXX Siberian Team (RAØAH, RUØAB, RUØAM, RWØAR, RUØAT, RUØAAB, RUØAFA, RVØAR, RUØAU, RUØAX, RAØALM, UAØAGI, UAØANW, UAØWW) made a great effort and achieved a new world record, showing that Asia is also a good location for RTTY WPX. They exceeded 6.1 million points (2822 QSOs, 9875 Q-points, 622 mults), almost doubling their own Asian M/M record and far surpassing HG1S's 2000 world record of 4.7 million points. Second was W4GKM (W4GKM, W4RRE) with 1.5 million (1318 QSOs, 3344 Q-points, 444 mults), and third was JA6ZPR at 994,610 points (880 QSOs, 2518 Q-points, 395 mults).

Multi-Op Single Transmitter (MS). The Multi-Single class is very competitive, and this year again produced a new world record. HG1S (ops. HA1TJ, HA1DAE, HA1DAC, HA1DAI) moved from the MOM class to the MS class and scored 2.99 million points (1734 QSO's, 5572 Q-points,

2001 RTTY WPX TOP SCORES

Single Op, High Power

P43P	3,353,952	JH4UYB	2,052,822
EMØI (Op: UT2IZ)	2,531,968	VA3DX	2,001,228
UP5P (Op. UN5PR)	2,333,373		

Single Op, Low Power

AA5AU	1,875,678	WT4I	1,484,394
ZX2B (Op. PY2MNL)	1,803,644	LY6M (Op. LY1DS)	1,384,383
VP5JM	1,578,881		

Multi-Op, Single-Transmitter

HG1S	2,986,592	Z30M	2,371,058
RK3AH	2,733,057	MW2I	2,221,284
AH6OZ	2,633,664		

Multi-Op, Multi-Transmitter

RKØAXX	6,142,250	EA4ART	731,934
W4GKM	1,484,736	KE6YTT	526,656
JA6ZPR	994,610		

Multi-Op, Two-Transmitter

HC8N	8,411,106	S53S	2,988,808
YL4U	3,616,776	OH7N	965,550
HT9F	3,058,848		

Single Op

3.5 MHz

S54E	469,224	UW2N (UT5NM)	252,400
9A30Y (9A5AZ)	410,546	UX1NL	218,592
S51DX	363,432		

7.0 MHz

9A6A	791,184	UT2II	377,304
RA6AZ	696,890	US2YW	364,878
EO1I (Op: UT1IA)	393,600		

14 MHz

DJ7AA	1,031,940	OH2BP	667,968
9A7R	831,466	CT1AOZ	601,692
9A8A	791,648		

21 MHz

9A5W	1,101,525	T94MZ	697,544
EO6F (Op, UXØFF)	1,042,416	RN30A	684,684
AC1O	715,139		

28 MHz

LU6FAZ	715,787	LW7EIC	659,555
LU8EKC	712,752	HG1W (Op. HA1YA)	600,140
RN6BN	696,344		

536 mults), and beat HC8N's MS 1999 world record of 2.85 million points. RK3AH (ops RK3AH, RU3FM, RX3DCX, RA3ATX, UA3ASZ, RV3BA) made a new European record with 2.7 million points (1762 QSOs, 5147 Q-points, 531 mults). World third was AH6OZ (ops AH6OZ, KH6ND, AH7R), vastly exceeding VK6GOM's Oceania record with 2.6 million points (1630 QSOs, 5,568 Q-points, 473 mults). This will be a tough score to beat.

Multi-Op Two Transmitters (M2). The M2 class has always produced large scores in RTTY WPX. This year was no exception, with HC8N (ops. N5KO, W6OTC, N4GN, K7PN) setting a new world record and high score for any class with 8.41 million points (3486 QSOs, 12,333 Q-points, 682 mults), easily exceeding their own 2000 score of 7.6 million points and edging past P40K's 2000 record of 8.395 million points. These scores show, as in SOH with P43P, that the perceived "European advantage" in WPX can be offset by a location on or near the Equator. While only 600 (16%) of the HC8N QSOs were on 40 and 80 meters, they provided more than one-quarter of the total score. YL4U (ops YL2KF, YL3DW, YL3GDJ, YL2KL) was world second, exceeding their own European record with 3.6 million points (2137 QSOs, 6312 Q-points, 573 mults). World third was UT9F (ops UT9FJ, UR5FEO, UR5FJF, UR5FFC, UR5FEL, RU5FCZ, UR-F-55, US-F-3000), also breaking the old European record with a score of 3.059 million points (1992 QSOs, 5,928 Q-points, 516 mults). World fourth was S53S (ops S50N, S50M, S57IIO, S57LWG, S58DX) with 2.99 million points (1835 QSOs, 5464 Q-points, 547 mults).

Summary

Great conditions and great participation produced very big scores in this RTTY WPX. These results show not only that RTTY contesters are increasing in numbers, but that their skills are improving as well. The large QSO numbers achieved by the winning stations reflect not only good propagation and the rising number of participants, but also factors such as the ability of many competitors to make contacts at higher rates and to plan/manage their band selections more effectively. In addition, judging by much of the discussion on the internet reflectors, RTTY station design continues to be refined and optimized for contesting.

This was the first *CQ/RJ* contest in which Cabrillo-format logs were "highly encouraged" and computer logs were "required" if a computer was used during the contest and more than 200 QSOs were made. These rules will apply as well to the CQ WW RTTY Contest in September. While some contestants using some contest logging programs had problems complying with the rules, most submitted fine logs. Overall, the results were highly encouraging for the log checkers. Remember to use care in selecting the proper contest and entry class when creating the Cabrillo file header. Also send all e-mail logs to <wpxrtty@kkn.net> and not to W6OTC or to GØAZT. As most of you well know, do not send .exe, .bin, or .xls files; we do not use these for any purpose. However, do send in check logs. These increase the accuracy of the master callsign database compiled for each contest by the log checkers and are always welcome.

Some common problems: Naming of files continues to be erratic. Please use your full call in the filename, and send the log as an attachment to the e-mail message addressed to the robot. Do not put the results in the text of the message. For Cabrillo logs, send the .log file only. For non-Cabrillo logs, send the .all and .sum files, again with your call as the filename. No dupe or multiplier sheets are required for logs submitted electronically.

This was the second CQ/RJ contest to use computer log-checking extensively. From the logs actually submitted, the log checkers developed a Master Call database containing 8137 callsigns. Of these, and using an occurrence rate (in separate logs) of three or more, 2686 were verified as legitimate, leaving 5451 either busted, non-verifiable, or one-offs. The callsigns most often mis-copied were SP1/ DL5CE/P and F/KF6EDK. Next year serial-number cross-checking between logs will be implemented, making careful logging of exchanges even more important.

Soapbox

VA3DX...Great condx, especially 10 and 40 meters! **VE5RI**...A big bonus was working the invariably competent and friendly operators. **NT6K**...Had a great time. **WD9EWK/7**...After years of avoiding contests they (at least on RTTY) are starting to be fun. **AA5AU**...Man, I had a blast! Probably one of the most fun contests I've ever operated. All five bands were in excellent shape and the activity was very high. It's just impossible to win this contest from the US. *[Har, just look at the results—W6OTC.]* **GUØSUP**... Well, despite feeling like death itself due to a viral infection, I beat my previous scores by quite a bit. **KZ6D (K6AW)**...Fun to do this stateside for a change; lots of good ops and a fair number of new calls as well. **S52MM**...My vote is to have at least 36 hours of operating time, or better yet, full 48.

2001 RTTY WPX PLAQUE SPONSORS AND WINNERS

Single Operator, High Power

World: Sponsored by W2JGR. Winner: **Jacobo Oduber, P43P.**
N.A.: Sponsored by N9CK. Winner: **Glenn Wyant, VA3DX.**
USA: Sponsored by W6FFC Memorial (by K7VS). Winner: **Mike Sims, K4GMH.**
Canada: Sponsored by VE6RAJ. Winner: **VE5CPU.**
S.A.: Sponsored by P43P. Winner: **Mario Munevar, HK3WGQ.**
Oceania: Sponsored by W8JAY. Winner: **Ron Stewart, ZL2AMI.**
Africa: Sponsored by Doug Faunt, N6TQS. Winner: **5R8GQ (Op: Ken Pendarvis, AD6KA).**
Europe: Sponsored by NA2M. Winner: **EMØI (Op: Nick Nikitjuk, UT2IZ).**
Asia: Sponsored by *The New RTTY Journal*. Winner: **UP5P (Op: Romeo Y. Loparev, UN5PR).**
Japan: Sponsored by WØDC. Winner: **Masaki Okano, JH4UYB.**

Single Operator, Low Power

World: Sponsored by *CQ* Magazine. Winner: **Don Hill, AA5AU.**
N.A.: Sponsored by KP2N. Winner: **Jody Millspaugh, VP5JM.**
USA: Sponsored by K7WM. Winner: **Bruce Lifter, WT4I.**
S.A.: Sponsored by W7GG. Winner: **ZX2B (Op: W. F. Gomez, PY2MNL).**
Oceania: Sponsored by W6OTC. Winner: **Didier Lavisse, FK8VHN.**
Africa: Sponsored by KK5OQ. Winner: **Heijo Schulte, EA8/DJ1OJ.**
Europe: Sponsored by W6/G0AZT. Winner: **LY6M (Op: Dainius Savicius, LY1DS).**
Asia: Open

Multi-Op, Single Transmitter

World: Sponsored by Hal Communications Corp. Winner: **HG1S.**
N.A.: Sponsored by *The New RTTY Journal*. Winner: **KP2D.**
USA: Sponsored by RTTY by WF1B. Winner: **KJ7TH.**
S.A.: Open
Oceania: Sponsored by *The New RTTY Journal*. Winner: **AH6OZ.**
Africa: Open
Europe: Sponsored by W6OTC. Winner: **RK3AH.**
Asia: Open
Canada: Sponsored by VE6CKG. Winner: **VE3FJB.**

Multi-Op, Multi-Transmitter

World: Sponsored by *Amateur Radio Trader*. Winner: **RKØAXX.**
Europe: Sponsored by WA4JQS. Winner: **EA4ART.**
Asia: Open

Multi-Two

World: Sponsored by *Amateur Radio Trader*. Winner: **HC8N.**
North America: Sponsored by WØDC. Winner: **WB8SKP.**
USA: Open
South America: Sponsored by N7VGO/KC7AVS. No entry.
Oceania: Open
Africa: Open
Europe: I4AYP Memorial (by I4MKN and K4FTU). Winner: **YL4U**.
Asia: Sponsored by W7GG. No entry.

Single Band

World 28 MHz: Sponsored by W9OX. Winner: **Jose Luis Murano, LU6FAZ.**
World 21 MHz: Sponsored by Troy Amateur Radio Association (N2TY). Winner: **Nikola Percin, 9A5W.**
World 14 MHz: Sponsored by N2FF. Winner: **Wilfried Gottschald, DJ7AA.**
World 7.0 MHz: Sponsored by W9OL. Winner: **Peter Milicic, 9A6A.**
World 3.5 MHz: Open

Rookie of the Year

Sponsored by *The New RTTY Journal*. Winner: **Jim Martin, MMØBQI.**

ZL2AMI...Biggest thrill—working 8 EUs on 80 meters.

F/KF6EDK ...What a blast! Still a lot to improve the station, but it's all part of the game, isn't it? **S53S**...First try in M2. It was cool. **WØETC**...The most enjoyable contest I've worked in many a year. The limit of 30 hours is great for those of us who can no longer manage 48 hours without sleep. **WT4I**...First time running this one as a single operator. I like the strategy involved in choosing the 18 hours off time. **VE3FJB**...Great conditions. Started out to beta test WriteLog and RITTY; ended up going for it. Even with lock-ups and 75 or so lost Qs, we did have fun. **KP2N**...Great conditions with 10 meters open 18 hours and 20 never closing. **MMØBQI** ... Just starting with RTTY and was amazed at the stations I managed to work. Fun contest to work in. **AD1C** ...My highest QSO total in a RTTY contest to date. **JH4UYB** ... Great condx helped me to break old JA record.

(Continued on page 109)

CQ is recognizing the giants of our hobby—those who have made major contributions to amateur radio and those amateurs who have made major contributions to their professions or on the world stage—beginning with the first 50 inductees into our new Amateur Radio Hall of Fame.

Announcing:

2001 Inaugural "Class" of *CQ* Amateur Radio Hall of Fame

In January 2001 *CQ* announced the establishment of the *CQ* Amateur Radio Hall of Fame and solicited nominations in two broad categories: individuals, whether amateurs or not, who significantly affected the course of amateur radio; and radio amateurs who, in the course of their professional lives, had a significant impact on their professions or on world affairs.

Over 100 names were placed in nomination, and most were indeed deserving of this honor. Both the need to limit our selections to a reasonable number and the fact that this is the "inaugural" group of inductees led us to include only those nominees who had the most significant impact on amateur radio during their lifetimes, and those amateurs who made truly significant contributions on the world stage. If someone you feel belongs in the *CQ* Amateur Radio Hall of Fame does not appear below, don't get angry; just be sure to nominate that person next year!

We therefore are proud to present the initial 50 inductees into the *CQ* Amateur Radio Hall of Fame. (*Note:* Callsigns are those used by members while licensed/active. Under the FCC's Vanity Call Sign Program, some of these callsigns may have been reissued.) The names are listed alphabetically and include inductees in both broad categories.

2001 Inductees, *CQ* Amateur Radio Hall of Fame

1. Armstrong, Edwin Howard – Laid the groundwork for modern radio through inventions such as the regenerative receiver, the superheterodyne receiver, and frequency modulation (FM).

2. Bardeen, John – Co-inventor of the transistor, the basis of all modern electronics.

3. Brattain, Walter – Co-inventor of the transistor.

4. Clark, Tom, W3IWI – Leading authority on Very Long Baseline Interferometry; amateur satellite pioneer, president of AMSAT, digital communications pioneer.

5. Collins, Art, 9CXX/WØCXX – Founder, Collins Radio Co.; set the standard for amateur radio equipment in the 1950s, '60s, and '70s.

6. Cowan, Sanford – Founding publisher, *CQ* magazine.

7. DeForrest, Lee – Invented the vacuum tube, basis for the growth of electronics and radio communication.

8. DeSoto, Clinton, W1CBD – *QST* Editor, originated DXCC, credited with keeping ARRL alive during World War II, when amateur radio was shut down.

9. Ferrell, Oliver P. "Perry" – Propagation expert, *CQ* editor and propagation columnist, founding editor of *Popular Electronics*; introduced propagation science to amateur radio.

10. Fisk, Jim, W1HR/W1DTY– Founding editor, *ham radio* magazine; set new standard for amateur radio technical publications.

11. Gandhi, Rajiv, VU2RG – Prime Minister of India.

12. Garriott, Owen, W5LFL – Astronaut, first ham to operate from space.

13. Godfrey, Arthur, K4LIB – Entertainer, TV host.

14. Goldwater, Barry, K7UGA – U.S. Senator, 1964 Republican Presidential Candidate; amateur radio's leading proponent in Washington.

15. Gonset, Faust, W6VR – Amateur radio author and technician, founder, Gonset Laboratories; brought affordable VHF equipment to amateur market.

16. Green, Wayne, W2NSD – Founding editor/publisher, *73* magazine; former *CQ* editor/columnist; published *Byte,* the first consumer computer magazine.

17. Gross, Al, W8PAL – Invented handheld radio transceiver (walkie-talkie), telephone pager, and cordless telephone.

18. Hertz, Heinrich – Set the stage for radio by proving that electricity can travel in waves and developing the concepts of frequency and wavelength. The *Hertz* is the international unit of frequency.

19. Hoover, Herbert Jr., W6ZH – U.S. Under-Secretary of State; ARRL President.

20. Hussein Ibn Talal, JY1 – King of Jordan.

21. Jacobs, George, W3ASK – Radio propagation expert, *CQ* columnist for 50 years, amateur satellite pioneer. HF broadcast engineering expert, developed Voice of America's worldwide broadcasting system.

22. Juan Carlos, EAØJC – King of Spain.

23. Jue, Martin, W5FLU – Founder and President, MFJ Enterprises; changed the way amateurs buy station accessories.

24. Karn, Phil, KA9Q – Developed basis for wireless internet communications by adapting internet communications protocol (TCP/IP) for radio use.

25. Kraus, John, W8JK – Authority on radio astronomy, antennas; inventor of W8JK antenna.

26. Krenkel, Ernst, RAEM – Polar explorer, expedition communicator, Russian radio hero, made first Arctic-Antarctic radio contact. (*Note:* RAEM was Krenkel's amateur callsign.)

27. Laine, Martti, OH2BH – Telecommunications expert, noted DXer, DXpeditioner, has introduced or re-introduced amateur radio to several countries.

28. LeKashman, Larry, W2IOP/W2AD – President of ElectroVoice; manager at RCA, Lafayette, and Bogen; early *CQ* editor.

29. LeMay, Gen. Curtis, W6EZV – US Air Force Chief of Staff, 1968 Candidate for Vice President of the United States (American Independent Party).

30. Leonard, Bill, W2SKE – President of CBS News.

31. Marconi, Guglielmo – Developed radio into viable communications medium; experimented with short waves, UHF, and microwaves before most people knew they existed.

32. Maxim, Hiram Percy, W1AW – Co-founder, ARRL, founding editor, *QST*.

33. McCoy, Lew, W1ICP – Amateur radio writer, educated thousands about preventing TVI.

34. Morse, Samuel F.B. – Developed the telegraph, the first viable electronic communication system.

35. Orr, Bill, W6SAI – Prolific amateur radio author, historian, *CQ* and *Ham Radio* columnist, amateur satellite pioneer, editor of *Radio Handbook*.

36. Potts, John – Founding editor, *CQ* magazine.

37. Reber, Grote, W9FGZ – "Father" of radio astronomy.

38. Scherer, Bill, W2AEF – *CQ* Technical Director, developed antennascope and brought grid dip meter to amateur radio.

39. Senti, Eugene, WØROW — As engineer for Collins Radio, invented the radio transceiver (transmitter and receiver in a single package, with shared circuitry).

40. Shepherd, Jean, K2ORS – Entertainer, radio host.

41. Shockley, William – Co-inventor of the transistor.

42. Stoner, Don, W6TNS – Amateur radio writer, *CQ* columnist, amateur satellite pioneer.

43. Sumner, Dave, K1ZZ – ARRL Executive Vice President, noted DXer and contester; has guided amateur radio through several World Radio Conferences.

44. Taylor, Joe, K1JT – Physicist, discovered binary pulsars, for which he won (along with Russell Hulse, ex-WB2LAV) the Nobel Prize for Physics.

45. Tesla, Nikola – Developed alternating current as means of efficiently generating and distributing electricity; also invented HF generators and the Tesla coil. Is said by some to have beaten Marconi in the development of radio itself. The *tesla* is the international unit of magnetic flux.

46. Tuska, Clarence, 1AY – Co-founder, ARRL.

47. Uda, Shintaro – Co-inventor (with Hidetsugu Yagi) of Yagi-Uda antenna.

48. Vail, Alfred – Built Morse's first telegraph, developed the code that bears Morse's name.

49. Weil, Danny, VP2VB – Popularized DXpeditioning.

50. Yagi, Hidetsugu – Co-inventor (with Shintaro Uda) of the Yagi-Uda antenna.

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Model 701, Accessory Hand Mic, not shown.

Here's the latest installment in our annual series of market surveys, this one examining what's on the market in FM rigs for your car (or home).

CQ Market Survey:

VHF/UHF Mobile Transceivers

BY GORDON WEST,* WB6NOA

While you can get by running your handheld radio in your car or truck, there are numerous benefits of operating mobile with a higher power, 12 volt DC transceiver specifically designed for use on the road.

Of primary concern is *safety* for you and your vehicle occupants, plus the other drivers around you. Trying to focus in on your tiny handheld LCD display while on the move is dangerous. Mobile-radio displays may easily be seen at a glance, and many mobile rigs also allow memory channel changing with up and down buttons conveniently located on the top of the microphone. Some even have a detachable head that may be mounted at eye level so you never need to take your eyes off the road for a quick check on the frequency you have dialed up.

Other benefits of the mobile transceiver for VHF and UHF over the modern handheld include a hot receiver that isn't as likely to desensitize or develop intermodulation when driving in downtown areas; dramatically better DC power filtering to minimize alternator whine or fuel-pump static; higher output power than a handheld (although this is a surprisingly small benefit, since top-quality repeater systems can hear just about any type of signal coming out of an external mobile antenna); a greater number of memories; and small but helpful features such as alphanumeric memory tags and, in some cases, "smart microphones" that may feature a backlit keypad, as well as additional buttons for common repeater functions such as input check, home channel, favorite auto-dial number, and scanning features. The more features on the mic, the less often you will need to take your eyes off the road to look down at the radio to get the right push-button.

Some dual-band mobile radios can also be used in the cross-band repeat mode. While many handhelds might have this feature, they could quickly go up in smoke if left on any power level above one watt. Mobile equipment with a built-in fan operated at medium power levels may support hours of cross-band communications without severely overheating the chassis. However, I caution all cross-band operators to ensure your system is absolutely compliant with FCC ID requirements, as well as local band plans. Cross-band operation is normally reserved for temporary radio events, emergency drills, or the real thing, and is not a substitute for a regular coordinated repeater.

Mobile radios also tend to have greater audio output than most handhelds. Finally, too, nothing beats jumping into your car and not having to mess around with a handheld with maybe low batteries, or one that you can't really see on the fly or that somehow is stuck beneath the front seat so you really can't get at it easily while flying down the expressway. A permanently mounted mobile transceiver will get you on the VHF and UHF airwaves in style, comfort, and *safety*.

Yaesu's new FT-7100M operates on 2 meters plus 430-450 MHz in the 70 centimeter band, giving you a choice of monitoring any two (different) frequencies at the same time. It also has broad out-of-band receive coverage, over 250 memories and both CTCSS (subaudible) and DCS (digital) tone encode and decode. (Photo courtesy Vertex Standard)

New Products for This Year

The new Yaesu FT-817 and Kenwood TS-2000 are capable of running mobile and operate multimode VHF/UHF as well as HF. Keep in mind, however, that the TS-2000 is a relatively big radio for mobile use, and the FT-817 runs a maximum of 5 watts unless you add an amplifier.

Among VHF/UHF-only rigs, brand new units for 2001 include the dual-band Yaesu FT-7100M. It offers remote head-mounting capability with the optional separation kit, 50 watts out on 2 meters and 35 watts on 440 MHz, plus encode/decode for both CTCSS and DSC. It holds a whopping 262 memory channels with alphanumeric characters. The 7100 also offers extended receive to include aeronautical, public safety, military, and even 810–999 MHz, with cellular blocked.

Alinco has upgraded its DR-430 single-band 440 MHz transceiver to the new DR-435. This transceiver now holds 100 channels of alphanumeric memory, adds DCS to its CTCSS encode/decode circuitry, and includes a back-lit microphone keypad for nighttime operation. It is also packet ready and APRS optional.

Alinco also offers the new DR-235T, a single-band 222 MHz FM transceiver with 45 watts output. It has almost all of

**CQ Contributing Editor at Large*
2414 College Drive, Costa Mesa, CA 92626
e-mail: <wb6noa@cq-amateur-radio.com>

Like other true dual-band mobile rigs, Kenwood's TM-V7A lets you listen simultaneously to both 2 meters and 70 centimeters (440 MHz). This rig also features a detachable control head and a reversible LCD front panel display. (Photo courtesy Kenwood USA)

The ICOM IC-207H is a two-band radio, operating on both 2 meters and 70 centimeters, but only on one at a time. With its small size and detachable control head, the 207H can fit in places many other rigs can't. Plus, it clusters many controls on the microphone for safer mobile operation. (Photo courtesy ICOM America)

the same features as the DR-435, including a street price of around $240.

A new single-band 6 meter mobile transceiver has just been announced by Ranger Communications. Now that we are at the peak of solar Cycle 23, there is some terrific 6 meter activity, and running 6 meter FM on either simplex or faraway repeaters is really a kick. Ranger has developed a good reputation with its 10 meter and 10/12 meter radios, so it will be interesting to see their new 6 meter mobile.

For mobile operators wishing to take advantage of long-range DX through tropospheric ducting on 2 meter single sideband, MFJ has introduced the 9402X, a 7 watt 2 meter SSB mobile transceiver priced at around $269. I have operated this rig, and the feel of the big VFO tuning knob is excellent for dialing around, looking for 2 meter SSB activity centered on 144.200 MHz. This is strictly a sideband transceiver for weak-signal work, and the receiver is quite hot.

Summertime means lots of time in the car, plus regular long-distance band openings on 6 meters. You can grab those openings on the road with a 6-meter mobile rig, such as this RCI-5054DX, one of the few 6-meter FM mobile rigs you'll find on the market today. (Photo courtesy Ranger Communications)

Spec Out Your Choices

As part of this *CQ* Market Survey you will find a detailed analysis of VHF/UHF mobile radio equipment. The prices we list are referred to as "street prices" and reflect an exhaustive phone survey of various radio sellers in early spring to find out what the best "deals" were. (*Due to the inevitable time lag between research and publication, some of the specific prices may have changed—ed.*) Also, while our charts compare major features, you may want to check out detailed "spec sheets" available on manufacturers' websites and in some dealer catalogs.

One of the best tests of a radio is real-life experience by local hams who drive around all day with the equipment under the dash. Is this particular set prone to intermod when riding around downtown? Does the receiver wipe out when you are anywhere near the big communications tower up on the hill? When you turn up the volume with your windows rolled down, is the audio still loud enough to be heard clearly? When you spin the frequency knob looking for a new contact, does the PLL (phase-locked loop) lock circuit stay up to speed with your knob cranking? It's hard to find these features listed on a spec sheet, so again, ask your friends who may have the same radio how they like its performance under less than ideal mobile conditions.

Last year we received many comments about power-output specifications. Many *CQ* readers were surprised to see that the inexpensive Alinco DR-135, ICOM IC-2100, Kenwood TM-261, and Yaesu FT-1500 all put out as much power as higher-priced transceivers with many more features. What's really interesting is that each manufacturer and each high-power, 50 watt transceiver has its own unique way to run cool under prolonged transmissions at maximum power output.

Instead of seeing big heat sinks on the rear of every high-power radio, we sometimes find exotic air circulation systems that pump enough cool air through the entire chassis to keep things from burning up on the inside. The ICOM IC-2100 and Yaesu FT-2600M use plenty of diecast aluminum chassis as the heat sink, not just relying on cooling fins on the rear. The tiny Yaesu FT-1500M is so small that you would swear it's going to heat up quickly, but it doesn't, thanks to the patented air circulation system that keeps the final power-output transistor brick within heat specifications.

As important as specifications are, though, they're only part of the equation. The rest involves getting your eyes, ears, and fingers on the equipment you're considering (if at all possible), and this will be one of the biggest things that will help you make up your mind which transceiver to purchase.

Pricing Points

Pricing of single-band, 2 meter transceivers starts from $179 for the Ken-

Simultaneous Reception

V_{HF}/V_{HF} | U_{HF}/U_{HF} | V_{HF}/U_{HF}

A New Dual-Band Engineering Milestone:
Introducing the Dual Band Mobile for the 21st Century's Active Ham!

The Yaesu Engineering Team has done it again! The exciting new FT-7100M Dual Band Mobile brings you the ruggedness and operating ease of our single-band mobiles, and the convenience of remote-head mounting capability (optional YSK-7100 Separation Kit required), in an all-new 144/430 MHz Dual Band design!

Providing 50 Watts of power output on 2 meters, and 35 Watts on 70 cm, the FT-7100M has power to spare when you're in a fringe area. For repeater access or selective simplex calling, you get built-in encoder-decoder circuits providing 50 CTCSS tones and 104 DCS (Digital Code Squelch) codes. And the FT-7100M's huge 262-channel Memory System lets you store up to six Alpha-Numeric characters, for easy channel identification.

Operation of the FT-7100M is simple and straightforward, with separate Volume and Squelch controls for each band during dual-band reception, and eight single-function front panel keys provide the easy feature access you need during mobile operation. What's more, you also get three user-definable keys on the microphone to use for important control functions.

Rugged, reliable, and versatile, the FT-7100M provides the highest cost-performance available among Dual Band FM Mobiles. See your Yaesu Dealer today for a test drive!

144/430 MHz FM Dual Band Mobile Transceiver

FT-7100M

FEATURES

- Frequency Range: TX 144-148, 430-450 MHz RX 108-137 MHz (AM), 137-180 MHz, 320-480 MHz, 810-999.99 MHz (Cellular blocked)
- VHF/UHF, VHF/VHF, and UHF/UHF Dual Receive operation*
- Channel Steps: 5/10/12.5/15/20/25/50 kHz/step
- Power Output: 50 Watts (144 MHz) 35 Watts (430 MHz)
- Power Amplifier Type: 2SK3478 Power MOS FET
- Efficient Cooling System: Direct-flow heat-sink and thermostatically-controlled fan
- 262 Memory Channels: 120 "regular" memories, 5 pairs of band limit memories, and one "HOME" channel on each band
- Alpha-Numeric Memory Labels: 6 Characters on lower display field, 5 Characters on upper
- Smart Search™ Automatic Memory Loading System
- 50 CTCSS Encode/Decode Tones
- 104 DCS Encode/Decode Codes
- CTCSS and DCS Search
- ARTS™ (Auto-Range Transponder System)
- Automatic Repeater Shift (ARS)
- TMF Microphone (U.S. version): Includes 16-memory Auto-dialer, and Direct Frequency Entry
- Band Scanning, Band-Limit Scanning, and Memory Scanning
- Three Priority Channel Modes: VFO, Memory, and Home Channel Priority
- RF Squelch: Opens at user-defined signal level
- Tx Time-Out Timer (TOT)
- Automatic Power-Off (APO)
- 1200/9600 bps Packet Compatible
- Battery Voltage Meter
- Compact Size: 5.8" x 1.9" x 6.9" WHD
- Large (0.9" x 2.3") Liquid Crystal Display
- Cloning Capability: To other FT-7100M Transceivers
- Optional YSK-7100 Separation Kit
- Optional CT-39A Packet Cable

*Simultaneous reception on two different Frequencies, in-band or Cross-Band. Cross-band Repeater Function not available.

Actual Size

For the latest Yaesu news, visit us on the Internet:
http://www.vxstd.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

YAESU
Choice of the World's top DX'ers

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US Headquarters
17210 Edwards Road,
Cerritos, CA 90703 (562)404-2700

PROFESSIONAL-GRADE MONITORING IN THE FIELD

Rugged and compact, the new Yaesu VR-120 Hand-Held Communications Receiver provides leading-edge performance on the shortwave, public safety, and military-communications bands. All at a surprisingly affordable price.

- RUGGED OUTDOOR-READY CASE CONSTRUCTION
- ULTRA-LONG BATTERY LIFE
- BNC-TYPE ANTENNA CONNECTOR
- STRAIGHTFORWARD 4-BUTTON OPERATION
- WIDEBAND FREQUENCY COVERAGE WITH EASY ACCESS
- SPECIAL "PRESET MODE" AIDS IN QUICK TUNING
- CATCH ALL THE SHORTWAVE BROADCAST ACTION FROM AROUND THE WORLD
- SUPER-SIMPLE ONE-TOUCH MEMORIES FOR HIGH PRIORITY STATIONS
- VERSATILE 640-CHANNEL MEMORY SYSTEM
- WIDE SELECTION OF SCANNING MODES
- EXPANDED FUN AND GAMES
- AND MUCH, MUCH MORE. . .

COMMUNICATIONS RECEIVER
VR-120
Wideband Coverage: 0.1~1299.995* MHz AM/FM/WFM
*Cellular / image / restricted frequencies Blocked

Actual Size

Tomorrow's Technology - Today
THE PROFESSIONAL STANDARD

COMMUNICATIONS RECEIVER
VR-500
0.1~1299.99995 MHz*
LSB/USB/CW/AM/FM/WFM
All-Mode Wide-Band Receiver
*Cellular blocked

COMMUNICATIONS RECEIVER
VR-5000
0.1~2599.99998MHz*
LSB/USB/CW/AM-N/AM/WAM/FM-N/WFM
All-Mode Wide-Band Receiver
*Cellular blocked

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wood TM-261 up to just under $300, with $259 average for a 2 meter mobile. Two-band, 2 meter/440 MHz radios operate on both bands but show only one at a time. They start at around $300 for the ICOM IC207 and go to $400, with an average price of $349. True dual-band transceivers that show and listen to both bands at the same time start out with the Alinco DR-605 at $340 and go up to around $500, with $429 typical.

High-end mobile transceivers, such as the Kenwood TM-742/642 with triple-band capabilities, are up in the $600 bracket, and equipment such as the Kenwood TM-D700 with built-in APRS capabilities may be found in the high $500 range.

Our survey also found a slightly higher price on single-band equipment for bands other than 2 meters or 440—such as a single-bander for 222 MHz, 6 meters, or 1200 MHz (if you can find one). If you're looking for 902 MHz FM gear, NCG/Comet says it still has some radios available, but they are in relatively short supply and are almost twice as expensive as a deluxe 2 meter single-bander.

Pricing for all of the existing single-band, dual-band, and tri-band equipment remains virtually unchanged from last year. You won't need to do a lot of comparative pricing, as most of the ham dealers are operating just a few points above cost with these mobile transceivers, and the street prices all will be relatively close. You can sometimes save a few bucks if you buy the equipment during an open house, or hold off on buying your equipment until the last few hours at a local hamfest when they're about ready to box things up and ship them back home.

Occasionally, manufacturers offer "coupons" or other promotions, so watch for these specials if you don't mind waiting. For most of us, though, when the time is right, it's right.

In our survey of mobile VHF/UHF transceivers in use by our Radio School students over the last two years, we found little correlation between selling price and the degree of satisfaction with how the radio operates. Most surprising, as our comparison chart in this article will reveal, we also found that some less-expensive units may actually have *more features* than more expensive units. It's really up to you to figure out what features are most important to you, and which you are absolutely never going to use. Why pay more for features you don't want or need?

Last year we received many responses to this survey indicating a preference for single-band transceivers because of their larger LCD frequency display, simpler operation, and the ability to keep eyes on the road while manipulating the equipment without fear of adjusting the wrong band. Many pointed out that driving safety should always be number one when selecting a new transceiver, and getting a rig with too many buttons, too many bands, or too many options could distract the driver. Good points.

The "Crisp" LCD Battle

Manufacturers continue to do battle against LCD (liquid crystal diode) displays that fade out when they are placed on a hot dash and the sun begins to beat down on them. This is no easy task. There are few LCD displays that aren't just a little sensitive to heat or cold, and may need some shade or warmth in order to perform properly. If an LCD display is beginning to look blurry or show signs of a lack of contrast, the equipment may need to go back to the manufacturer for a display "transplant."

The ICOM IC-2100 lets you switch the LCD colors from amber to green. The little Yaesu FT-817 multi-band/multi-mode, portable/mobile transceiver may be switched from blue to amber. The ICOM IC-2800 display is a trans-reflective, all-colors display that may be shifted into various colors to match daytime, evening, or dead-of-night operation. This same display may also support fast-scan and slow-scan TV video while continuously monitoring 2 meters and 440 (but it can't receive TV signals directly off the air).

I recently tried the little ICOM IC-R3 scanner/receiver/TV portable, took the R3 output to the video input jack of the IC-2800, and came up with some great TV viewing. Just keep in mind that watching TV from the front might be in violation of local motor vehicle laws... not to mention trying to watch fast-scan ham TV while zipping down the expressway. Don't get over-captivated by this very functional ICOM display!

Not all displays can be seen under direct sunlight conditions. If you indeed plan to put the LCD display on your dash, do a sunlight test before buying the equipment to make sure you're still going to be able to see it on the dash at high noon. Some show up well, yet others wash out. Also, don't forget to bring along your polarized sunglasses to make sure they don't cancel out the display due to cross-polarization and leave you staring at what appears to be a blank screen.

Understated but Important Specs

Now let's take a look at those specs that are extremely important for running your equipment mobile, such as number of memory channels and ability to give them alphanumeric tags, PC-programmability, tone encode/decode capability, and more.

If you plan to put the equipment in your vehicle, safe operation while running mobile dictates having plenty of memory channels that store simplex channels and repeater outputs, plus shifts, tones, and—very important—alphanumerics. This lets you assign a name to each repeater in memory, which requires less of your attention while driving than looking at a frequency and remembering which repeater it's for. More and more manufacturers are incorporating alphanumerics into their equipment, and this makes good sense when dialing and driving at the same time.

If you're into scanning, you may find that you can use up 100 memories in no time. If you purchased a set that only holds 20 memories, you're out of luck. Fifty memories might be barely enough, with 100 memories adequate. Two hundred memories should do you well, and 300 is about the most that manufacturers offer. You may need to check the instruction manual

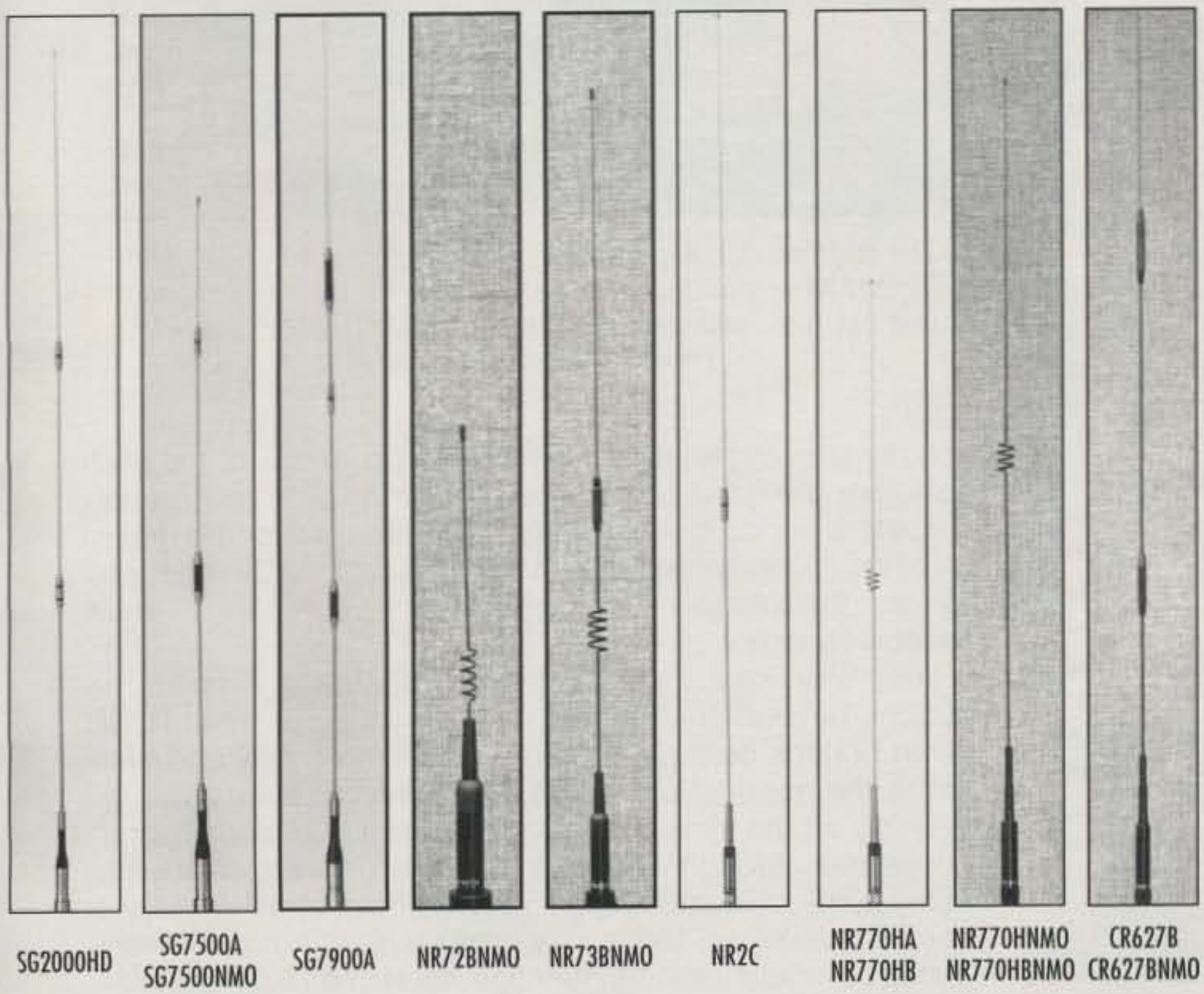
The latest addition to the now-growing roster of equipment available for the 222 MHz band is the new single-band Alinco DR-235 -- the only radio we know of on the amateur market with built-in capability to use the 219-220 MHz band segment authorized in the US for intercity digital networking (with restrictions; see FCC rules). (Photo courtesy Alinco)

DIAMOND ANTENNA

DIAMOND'S STATE-OF-THE-ART

VHF/UHF And HF/VHF Mobile Antennas– Maximum Performance Without Compromise

You've seen the rest...now own the BEST!



SG2000HD | SG7500A SG7500NMO | SG7900A | NR72BNMO | NR73BNMO | NR2C | NR770HA NR770HB | NR770HNMO NR770HBNMO | CR627B CR627BNMO

HV7A Mobile Antenna System

For New HF/VHF transceivers (Such as: IC706 series and FT100) NEW!

Optional Loading Coils

HVC7	40m
HVC14	20m
HVC18	17m
HVC21	15m

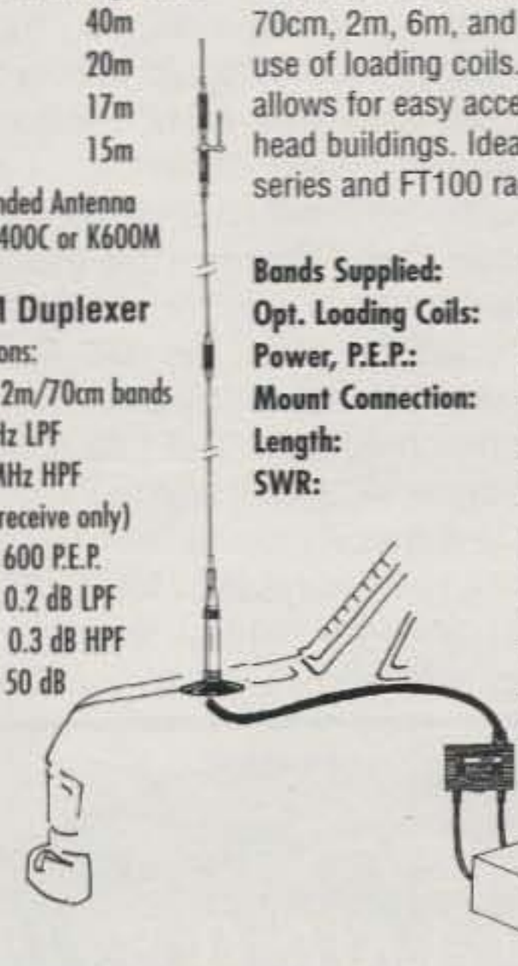
Recommended Antenna Mounts: K400C or K600M

The NEW HV7A has 5 band capability: 70cm, 2m, 6m, and 2 HF bands through use of loading coils. Foldover feature allows for easy access into low overhead buildings. Ideal for users of IC706 series and FT100 radios.

Bands Supplied:	10m/6m/2m/70cm
Opt. Loading Coils:	40m/20m/17m/15m
Power, P.E.P.:	HF 120w/VHF 200w
Mount Connection:	UHF
Length:	54"
SWR:	1.5:1 nominal

MX62M Duplexer

Specifications:
HF/6m & 2m/70cm bands
1.6-56 MHz LPF
76–470 MHz HPF
(76–120 receive only)
Watts: 600 P.E.P.
Loss: 0.2 dB LPF
0.3 dB HPF
Isol.: 50 dB



MX62M

Use with HF/VHF mobile transceivers such as IC706 series, FT100, or combine 2m/70cm and HF rigs.

SPECIAL FEATURES:

- Factory pre-tuned/no adjustment
- Highest Performance antennas
- NMO and UHF (PO) base styles
- 24 Kt gold plated connector pin
- No grounding required unless noted
- Fold-over feature on most models

FOLD-OVER

Patented One-Touch Fold-over Feature
(Not available on NR72BNMO, NR73BNMO, & NR770SA.)

MODEL	BAND (MHz)	GAIN (dB)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR72BNMO*6	2m/70cm	2.15	100	NMO	13.8	1/4λ, 1/2λ
NR73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2λ, 1-5/8λ
NR770HA7	2m/70cm	3.0/5.5	200	UHF	40.2	1/2λ, 2-5/8λ
NR770HNMO8	2m/70cm	3.0/5.5	200	NMO	38.2	1/2λ, 2-5/8λ
NR770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2λ, 2-5/8λ
SG7000A*6	2m/70cm	2.15/3.8	100	UHF	18.5	1/4λ, 6/8λ
SG7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2λ, 2-5/8λ
SG7500NMO	2m/70cm	3.5/6.0	150	NMO	41.0	1/2λ, 2-5/8λ
SG7900A*	2m/70cm	5.0/7.6	150	UHF	62.2	7/8λ, 3-5/8λ

MODEL	BAND (MHz)	GAIN (dB)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR2C	2m	4.1	150	UHF	55.5	1/2λ+1/4λ
SG2000HD*	2m	5.2	250	UHF	62.6	1/2λ+3/8λ
SG6000NMO*6,9	6m	2.1	150	NMO	39	1/4λ
CR224A*6	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8λ, 2-5/8λ
CR320A*6	2m/1-1/4m 70cm	2.15/3.8/ 5.5	200 100/200	UHF	37.4	1/4λ, 1/2λ 2-5/8λ
CR627B*6,9	6m/2m/	2.1/4.5/	120	UHF	60	1/4λ, 1/2+1/4λ/
CR627BNMO*6,9	70cm	7.2	120	NMO	60	2-5/8λ

1/4λ rated in dBi.

* Not recommended for Magnet Mount
6 Grounding required.
7 NR770HB same specifications but in black finish.
8 NR770HBNMO same specifications but in black finish.
9 52-54MHz only

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carefully to see whether all of the memory channels will indeed hold alphanumerics. You might also discover that a dual-band transceiver with 100 channels of memory may limit you to 50 channels on each band. Others allow any band in memory, in any order, or allow you to customize the memory into operating banks.

When you start programming in all of your favorite simplex, repeater, and scanning frequencies, along with alphanumerics, you soon will appreciate the *software programming* feature, important if you plan on putting in a lot of channels. Most of the equipment priced over $300 has software programming and cloning capabilities, but equipment priced under $300 may or may not include this feature. Programming channels via computer software makes it a snap to load in a couple of hundred channels along with alphanumerics. Loading in these frequencies and names on the front control panel is tedious, and unless you have a buddy who has a similar set with cloning capabilities, you may wish that you had purchased equipment that could take a PC upload.

With 2 meter and 440 MHz repeater channels getting reused at ever-shrinking distances, I strongly recommend you select equipment with not only CTCSS encode capability, but decode, too. Sometimes the board for decode is optional. Buy it and put it in your radio before you install it in the vehicle; you'll be glad you did. For those of you in the south, you may find that many of your repeaters require digital coded squelch (DCS), and this is yet another feature to check out on our spec sheet and to look for when you're ready to buy your new mobile radio.

Another feature I always look for is automatic repeater shift. You would think every set has this feature, but some don't. Auto repeater shift allows you to turn the dial, with the offset

The year-old ADI AR-247 from Pryme was the first new radio for 222 MHz introduced in many years. It's easy to program and operate, and gets you onto 222 with plenty of power. (Photo courtesy Pryme/ADI)

usually knowing where to go—either up or down, for each band per the band plan. Sure, there may be a few splinter repeaters or odd-shift repeaters out there, but for the majority of repeaters throughout the United States, Canada, and Mexico, the shifts are "per the book," and your radio will know which way to go.

I certainly like the microphone with lighted keys and a few buttons beyond push to talk on it. Even a mic with up and down buttons on the top promotes driving safety and minimizes the need to look down and see what button you are pushing on the face of the equipment. If you plan to make phone calls through your local autopatch, double-check how many auto-dial numbers your set may hold, and how easy or hard it is to select those numbers on a full-function microphone. Sometimes a full-function microphone comes standard with the new radio, but sometimes it must be purchased as an option—check it out.

If you're into the digital side of VHF and UHF operating, including APRS (Automatic Position Reporting System), many modern transceivers have capabilities for direct connection to 1200/ 9600 baud packet controllers. Some equipment comes with a DIN-plug, while others may show up with a DB-9 connector, and yet others require you to use the mic and speaker sockets. Alinco has a model that lets you add a TNC board inside the equipment, and the Kenwood TM-D700 offers full packet and APRS compatibility with *everything* inside the equipment.

The Kenwood D700 at $629 is certainly one of the most expensive dual-band transceivers on the market, but it has everything you need for a direct hook-up not only to APRS, but to your GPS (Global Positioning System) receiver as well. And although I anticipated it last year as something we would see *this year*, we still haven't seen any manufacturer offer either handheld or mobile VHF/UHF equipment with a *built-in GPS receiver*. However, *this year* I think we at least will see a preview of an all-in-one navigation transceiver for the future from one of the manufacturers. Let's wait and see!

Another feature to look for might be simultaneous reception of two different frequencies on one band. On the new dual-band Yaesu FT-7100, they call this "VHF/VHF, UHF/UHF, VHF/UHF capable." Several other manufacturers have this feature—a good way to keep track simultaneously of one simplex channel and one repeater channel on the same band or

monitor frequencies on two bands. Yaesu is unique with its ARTS—Auto-Range Transponder System, the capability of knowing when there is a similar Yaesu unit in the vicinity.

Here is another great feature to look for—TOT, time-out timer. I don't know about you, but every so often my transceiver encounters a stuck microphone, and this will time out the equipment after a preset interval. If you plan to run your equipment as a cross-band repeater, in close adherence to the rules and regs, the time-out timer, along with CTCSS decode, is an absolute necessity. I have seen many a mobile unit burn up when in the cross-band mode, and an errant signal locks it. Also, if you are prone to forgetting to turn off your equipment, automatic power off (APO) is a handy feature, too.

Car Questions...

So what is your vehicle going to look like with all of those antennas on the roof? A lot depends on whether the equipment has a built-in *duplexer,* or for tri-band equipment, a *triplexer.* These allow the use of a single multiband antenna, if that's your preference. If it doesn't, you will be faced with multiple antenna outputs and either *you* supply the duplexer (or triplexer) or plan on having multiple antennas on the roof.

Finally, you need to take a good look at your vehicle and decide exactly where you are going to mount your equipment, whether a transceiver that has a remote head is worth a little extra money, and how much room you have on the dash to affix the display screen. Although most manufacturers supply mounting hardware for remote heads, you may find that a simple "hook and loop" fastening system such as Velcro™ is a great way to hold the head relatively securely, yet allow you to remove it when you want to keep it out of sight when parked. For a more permanent installation, but without having to punch holes in the dash or vehicle interior, double-sided tape is amazingly strong and holds like a champ if you apply it in warm weather and thoroughly clean both the back of the head and the mounting surface with alcohol.

Before the Big Install

Okay, so you made your purchase and you are ready to go mobile with your new high-power transceiver. I suggest that before you take it out on the road, you first set it up on your bench at home and program it and become familiar with all the bells and whistles it may offer. It's much easier to clone and PC-program on the bench than in the car!

Also, if you are a member of MARS, the Coast Guard Auxiliary, or the Civil Air Patrol, getting the unit on the bench allows you the opportunity to make the modifications for additional frequencies that some equipment offers if you have the proper authorization.

Now check out our buyer's guide tables, manufacturer websites, and dealer catalogs, and then begin your word- of-mouth survey among friends who may own the same equipment. Ask them how easy it is to see the display, how well the receiver performs downtown, and whether their equipment has the capability to clone some of those neat channels to your new set if you buy what they have.

Remember, driver safety is most important, so get your set all programmed before it goes under the dash, and get the display head up nice and high so as you zip down the road, you'll always know where you are on the highway and on the airwaves with your VHF/UHF mobile transceiver. Keep this guide handy, refer to the tables to compare features, go get the rig that offers the greatest number of features that *you* want within your budget, and *have fun!* ■

FM Mobile Transceivers

$300 and Under

	Kenwood TM-261	ICOM IC-2100	Radio Shack HTX252	ADI AR-147	Yaesu FT-1500	RadioShack HTX-252	Yaesu FT-2600	Alinco DR-235	MFJ 8621	Alinco DR-435	Alinco DR-135	ADI AR-447	Alinco DR-M06	ADI AR-247	ICOM IC-207	Ranger
No. of Bands	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	2 Band	Single
Freq. Coverage																
6 m	—	—	—	—	—	—	—	—	—	—	—	—	TX/RX *	—	—	TX/RX
Air	RX	No	—	RX	No	—	No	—	—	—	RX	—	—	—	RX	—
2 m	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	—	144	—	TX/RX	—	—	—	TX/RX	—
148–174 MHz	RX	RX	RX	RX	RX	RX	RX	—	—	—	RX	—	—	—	RX	—
220 MHz	—	—	—	—	—	—	—	TX/RX	—	—	—	—	—	TX/RX	—	—
440 MHz	—	—	—	—	—	—	—	—	—	TX/RX	—	TX/RX	—	—	TX/RX	—
450–470 MHz	—	—	—	—	—	—	—	—	—	RX	—	1/2	—	—	RX	—
800–900 MHz	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1270 MHz	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Power Out	50	50	25	60	50	25	60	35	5 SSB	35	50	\35	20	30	50V/35U	25
Display Bands	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Memories	61	113	11	81	149	11	175	100	0	100	100	81	100	81	182	20
Alphanumeric	Yes	Yes	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No
LCD Color	amber	both†	white & black	amber	blue	amber	orange	red	dial	red	amber/red	amber	amber	amber	amber	amber
Remote Head	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No
Band Scope	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CTCSS																
encode	✓	✓	✓	✓	✓	Yes	✓	Yes	No	✓	✓	✓	✓	✓	✓	Yes
decode	opt	✓	✓	✓	✓	Yes	✓	Yes	No	✓	✓	✓	opt	✓	✓	Yes
DCS	No	No	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No
Auto Repeater Shift	Yes	Yes	No	No	Yes	No	Yes	No	No	No	No	No	No	No	Yes	No
Attenuator	No	variable	No	No	No	No	No	No	Yes	No	No	No	No	No	variable	No
DTMF Memories	15	14	—	9	8	—	8	10	No	10	10	9	—	9	14	—
Mic Direct Freq. Input	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	—
Backlit Mic Keypad	Yes	Yes	—	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	—
Packet Compatible	No	Yes	1200	Yes	DB9, 1200/9600	No	1200/9600	DB9, 1200/9600	opt	1200/9600	DB-9, 1200/9600	Yes	No	Yes	1200/9600	No
APRS Ready	No	No	No	No	No	No	No	opt	opt	opt	opt	No	No	No	No	No
Software Programming	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	—
Cloning	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	—
Crossband Repeat	n/a	n/a	No	n/a	n/a	No	n/a	—	No	n/a	n/a	n/a	n/a	n/a	No	No
Dual In-Band RX	n/a	n/a	No	n/a	n/a	—	n/a	—	—	n/a	n/a	n/a	n/a	n/a	No	—
Built-in Duplexer	—	—	—	—	—	—	—	—	No	—	—	—	—	—	Yes	—
Size	small	small	small	small	vy small	small	medium	small	small	small	small	small	medium	small	medium	medium
Weight (lbs.)	2	2	2	2	1	2	3	2	1	2	2	2	2	2	3	2
Lowest "Street" $$ Seen	$179	$179	$179	$189	$199	$230	$229	$245	$250	$250	$250	$249	$249	$299	$299	$300

** RX 47-60MHz*

† Amber & Green

*** Awaiting FCC type acceptance as of this writing.*

Affordable World Class DX

12 and 10 Meter Bands

Multi-Mode

Repeater Tone Option

Noise Blanker

The new RCI-2950DX (25W PEP) and RCI-2970DX (150W PEP) offer a unique opportunity for operators to own a two band/multi-mode transceiver at a price anyone can afford. Tech Plus waiting to upgrade? This rig can get you started on HF!

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Toll-free: (877) 536-0772

Email: rci@rangerusa.com **website:** www.rangerusa.com
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FM Mobile Transceivers

Over $300

	Alinco DR-605	Kenwood TM-G707	Yaesu FT-3000	Yaesu FT-90R	Yaesu FT-8100	Alinco DR-610	Kenwood TM-461	Kenwood TM-V7	Kenwood TM-541	Kenwood TM-331	Icom IC-2800	Kenwood TM-D700	Kenwood TM-742/642
No. of Bands	Dual	2	Single	2	Dual	Dual	Single	Dual	Single	Single	Dual	Dual	Tri
Freq. Coverage													
6 m	—	—	—	—	—	—	—	—	—	—	—	—	opt
Air	No	RX	RX	RX	RX	RX	—	RX	—	—	RX	RX	RX
2 m	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	—	TX/RX	—	—	TX/RX	TX/RX	TX/RX
148–174 MHz	RX	RX	RX	RX	RX	RX	—	RX	—	—	RX	RX	RX
220 MHz	—	—	RX	RX	RX	—	—	—	—	TX/RX	—	RX	opt
440 MHz	TX/RX	TX/RX	RX	TX/RX	TX/RX	TX/RX	TX/RX	TX/RX	—	—	TX/RX	TX/RX	TX/RX
450–470 MHz	RX	RX	RX	RX	RX	RX	RX	RX	—	—	RX	RX	RX
800–900 MHz	—	MOD	RX	—	RX+	—	—	—	—	—	—	RX	—
1270 MHz	—	—	—	—	RX	—	—	—	TX/RX	—	—	RX	opt
Power Out	50V/35U	50V/35U	10W	50V/30U	50V/35U	50V/35U	35	50V/35U	10	25	50V35U	50V/35U	50V/35U
Display Bands	2	1	2	1	2	2	1	2	1	1	2	2	3
Memories	100	180	81	180	310	120	61	280	20	20	232	200	300
Alphanumeric	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No
LCD Color	amber	amber	omni-glow	blue	omni-glow	amber	amber	blue	amber	amber	full colors	amber	amber
Remote Head	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes × 2
Band Scope	No	No	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	No
CTCSS													
encode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
decode	opt	✓	opt	✓	opt	opt	opt	✓	opt	opt	✓	✓	opt
DCS	No	No	Yes	Yes	No	No	No	No	No	No	No	Yes	No
Auto Repeater Shift	No	✓	Yes	Yes	Yes	No	Yes	Yes 2M	No	Yes	Yes	Yes	No
Attenuator	No	No	No	No	No	Yes	No	No	No	No	Yes	Yes	No
DTMF Memories	No	8	—	8	6	5/10*	15	15	—	—	14	10	—
Mic Direct Freq. Input	No	✓	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes	Yes	Yes
Backlit Mic Keypad	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	opt
Packet Compatible	1200/9600	Din, 1200/9600	1200/9600	1200/9600	1200/9600	1200/9600	No	1200/9600	No	No	Yes	1200/9600	No
APRS Ready	No	Yes	No	No	No	No	No	Yes	No	No	Video Input	Yes	—
Software Programming	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes	—
Cloning	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes	—
Crossband Repeat	Full	No	Yes	No	Full	Full	n/a	Full	n/a	n/a	Full	Full	Full × 3
Dual In-Band RX	No	No	Yes	No	All	All	n/a	All	n/a	n/a	No	All	No
Built-in Duplexer	Yes	Yes	Yes	Yes	Yes	Yes	—	Yes	—	—	Yes	Yes	No
Size	small	medium	Medium	micro	medium	medium	small	medium	small	small	medium	medium	medium
Weight (lbs.)	2	3	3	1	2	3	2	3	2	2	3	3	3
Lowest "Street" $$ Seen	$339	$340	$399	$399	$429	$439	$439	$449	$449	$469	$499	$629	$639

**with add-memory board*
†1200/9600

MFJ *tunable* Super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP Filters

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phasse filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

U.S. Patent D374,010
MFJ-784B
$249.95

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive *tunable Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with variable aggressiveness, new quieter 2½ Watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and automatic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95**. Gives you most features of the MFJ-784B.

60 dB Null *wipes out* noise and interference

MFJ-1026
$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

MFJ-1025, $159.95. Like MFJ-1026 less built-in active antenna, use external antenna.

Add DSP to any Multimode

MFJ-781
$129.95

Add "brick wall" DSP filtering to any TNC or multi-mode data controller. Copy signals buried in noise and QRM. Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, GTOR, Clover, RTTY, SSTV, WeFAX, FAX, CW -- nearly any digital mode. Automatic gain control, On/Off Bypass switch. Plugs between transceiver and multi-mode. Uses 10-16 VDC or 110 VAC with MFJ-1312B, $14.95. 4½x2½x5 inches.

DSP for your MFJ-1278/B

MFJ-780
$99.95

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

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MFJ . . . the world leader in ham radio accessories!

Today's home-improvement superstores have it all, it seems: lumber, tools, hardware, plumbing, ham radio antennas. Ham radio antennas? Well, they've got all the parts you'll need for this one.

The "Lowe's Dipole"

BY JOSEPH M. PLESICH,* W8DYF

I call this antenna the "Lowe's Dipole" because all the materials used in the construction of this antenna were purchased at Lowe's. This includes the antenna wire, feedline, insulators, and rope. I could just as well have called this antenna the "Home Depot Dipole" or the "Local Hardware Store Dipole," since I'm sure the same types of materials needed to construct this antenna are available at those stores, too. However, since Lowe's is so close to my house that my car hardly gets out of second gear getting there, it's usually my first stop for wire and hardware.

The antenna is the classic 135 foot, 80–10 meter Multiband Tuned-Line Fed Antenna that is featured in the old ARRL Handbooks as well as many antenna manuals (see fig. 1). The Lowe's dipole is simple and inexpensive to construct. It works great on all bands. There is only one catch, though. You have to use an antenna tuner with it. Many are available from several amateur radio dealers or you can build one. With this antenna I've used three different tuners: a Johnson Matchbox, a Dentron Super Tuner, and an MFJ-971. All worked just fine. I've also used three different rigs: a Yaesu 757, a Ten-Tec Argosy, and a Ten-Tec Scout. All worked equally well. Let's build the antenna!

Insulator construction for the Lowe's dipole.

Antenna Construction

First gather your materials. At Lowe's you can purchase No.14 solid black insulated copper wire for 6 cents a foot. However, since I'm always making some kind of antenna, I bought a 500 foot reel for less than $14! For only 9 cents a foot I purchased some nice black twin-lead with No.20 copper wire. I only needed 50 feet of it to go from the top of my 30 foot PVC mast down to my rig in the basement. (See April 1999 *CQ* for a photo of this mast.)

At home I cut three 3 inch pieces from a length of scrap 1 inch PVC pipe I had. I drilled 1/8 inch holes at the ends of two of them. Then I enlarged the holes with a reamer to fit the wire and rope. These would be the end insulators. For the center insulator I drilled holes in each end and another in the center. The end holes were reamed for the wire and the center hole was reamed for the 300 ohm feedline (see the photo). As you can see, I also drilled two other holes in the center insulator and passed a short piece of rope through and tied the ends together. I used this loop to tie to the rope that I used to pull the antenna up the mast. Simple and inexpensive. I soldered the feedline, wrapped it with electrical tape *(a waterproofing sealant, such as CoaxSeal®, is an even better idea—ed.)*, and was ready to put the antenna in the air.

With a rope on my mast, I pulled the center of the antenna up to its full 30 foot height. Then I tied off each end to trees on my lot, getting them up as high as I could. Next I fished the feedline into the shack. I tried to get the antenna as horizontal as possible, but if an inverted-Vee is better for your location, go for it. Also, if you can't or don't want to fit 135 feet on your lot, try making it 67 feet. You will also find the antenna to be quite sturdy. Mine has survived winds of over 50 miles per hour!

Now fire up your rig, load the antenna on the various ham bands, and jot down the settings on the tuner for future reference. It loads on all bands. The twinlead has less loss than coax, and on the bands above 80 meters it gives you a little gain.

Running only 50 to 100 watts I get great reports. In the ARRL SSB DX Contest I worked four continents in less than a half an hour. On 75 meter SSB I've worked Spain, France, and Ireland with my Ten-Tec Scout.

Yes, I could have purchased a commercially manufactured antenna. Many excellent ones are advertised in this magazine. Some use specialized con-

**173 Brockton Road, Steubenville, OH 43953*
e-mail: <w8dyf@hotmail.com>

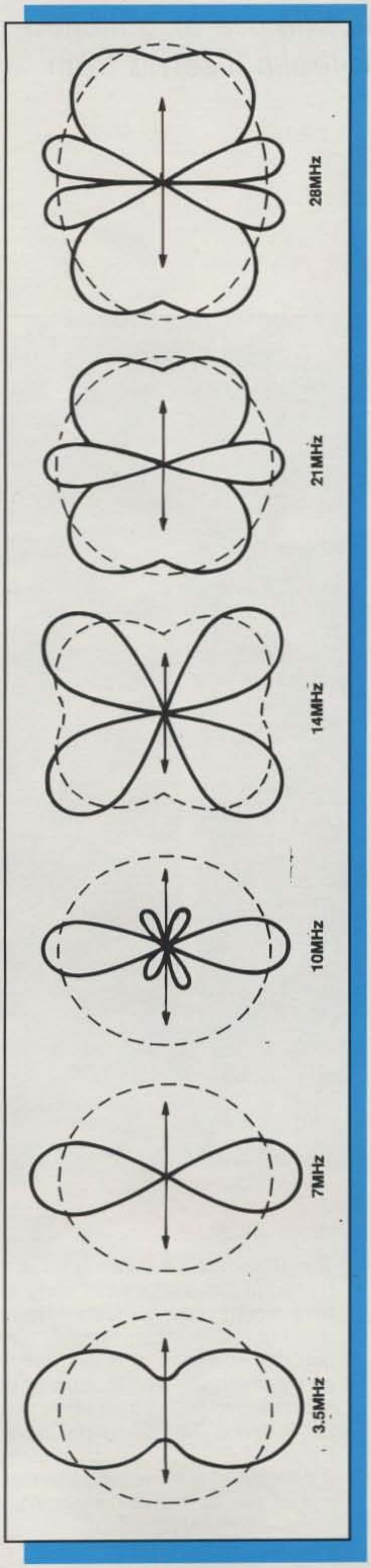

Fig. 1– Typical radiation patterns found in a variety of antenna handbooks for this old standby, an 80 meter dipole usable on all bands with an antenna tuner. You can build this for $20 or less from parts available at your local hardware store.

struction, traps, or coils that I wouldn't attempt to replicate. You also may want to purchase one to fit your particular needs and QTH.

I just wanted to show you that you could construct a simple wire antenna for all bands for the average 100 watt station with readily available and inexpensive materials—and it will work and work well. Antennas are still an aspect of ham radio that the average ham can construct and have fun doing it. I know I still get a lot of satisfaction when I put up an antenna like this, hook up the feedline to my tuner, pump a little RF into the antenna, and watch the SWR come down to zilch. It's also fun to describe your homebrew antenna on the air. If you would like to hear what my signal sounds like, I'm usually on 40 meter SSB weekday mornings at 9:15 eastern time. Have fun. Build an antenna! ■

If you're looking for a multiband HF antenna for mobile use or a limited-space location, be sure to consider the motorized Stealth II series from Hi-Q (and its trusty sidekick, the SAM Controller).

CQ Reviews:

The Hi-Q Stealth II Antenna *and* KO6YD SAM Controller

BY KEN NEUBECK,* WB2AMU

The use of reduced-size HF antennas is of growing interest in the amateur radio hobby as more and more hams choose to operate HF mobile and others, such as hams living in apartments or condos, are forced by limited space to put up compromise antennas. The basic principle behind antennas such as the screwdriver antenna and tunable mobile antennas is that the physical length of the antenna can be made shorter through the use of a large tuning coil that shortens the antenna electrically. Thus, instead of dealing with a 33 foot high vertical for 40 meters, you instead may be able to use a 12 foot high antenna by using a tunable-antenna design.

There are things to be aware of when using this design, and we will touch upon them in this review. Primarily, you have to recognize that an antenna that is electrically shorter than a dipole for a given band is not going to perform as well on that band as a dipole or beam antenna. However, that is not the purpose of these types of antennas, which are intended to get you on the air from places where a larger antenna just is not feasible.

Description

The Hi-Q Antenna Company's Stealth II series is one group of these tunable mobile antennas. The basic unit weighs approximately six pounds and is under four feet long. All parts are CNC (Computer Numerically Controlled) machined. The antenna consists of a machined rod that is driven by a gearhead actuator motor with a tuning coil section that is set on top of the rod. Inside the tuning coil is a platform that moves up and down. This platform, which Hi-Q calls a "contactor," is encircled by a strip of beryllium copper fingers. These fingers make contact with two turns of the tuning coil (720 degrees) at all times. On top of the tuning coil is a machined cap with a 3/8-24 threaded hole into which you would place a whip antenna with a threaded base. (The whip is not supplied with the Stealth II.)

There are three models in the Stealth II series. The Stealth II-2.5 tunes from 6 to 40 meters, while the Stealth II-3 and II-4 each tune from 6 to 80 meters (80 meter operation is possible with the 2.5 by attaching a Hustler 80 meter coil between the whip and the Stealth tuning coil).

The tuning area to obtain an SWR of 1:1 is a smaller bandwidth than you might be accustomed to with conventional dipole antennas. Again, this is a compromise antenna. Due to the high Q of the Stealth II loading coils, it is critical on 40 meters to carefully tune the antenna with an SWR meter. The Q value for the Stealth II-2.5 on 40 meters is 480. Thus, it becomes fairly important to either mark the best SWR for a particular band on the coil or use an electronic controller such as the SAM controller (which we'll discuss later) which can electronically store specific locations. The antenna is rated for more than 1.5 kilowatts.

The Stealth II-2.5 is rated by Hi-Q on 40 meters as having a 2:1 SWR band-

The Stealth II-2.5 antenna as attached to the author's car using a mag-mount configuration. Note that the setup shown here is for portable operation or testing only, as the antenna's weight cannot be supported by the magnet when the car is driven. The tuning coil is on top of the CNC-machined rod and a 6 meter whip is inserted into the top of the tuning coil assembly. (WB2AMU photo)

*Contributing Editor, CQ, 1 Valley Rd., Patchogue, NY 11772
e-mail: <wb2amu@cq-amateur-radio.com>

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

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

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

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

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

HAM-IV, $529.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to 2 1/16 inches diameter. Rotator size is 13 1/2Hx8D 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 1/16Hx9 3/16D 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 3/8Hx8 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 3/8Hx8D 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.

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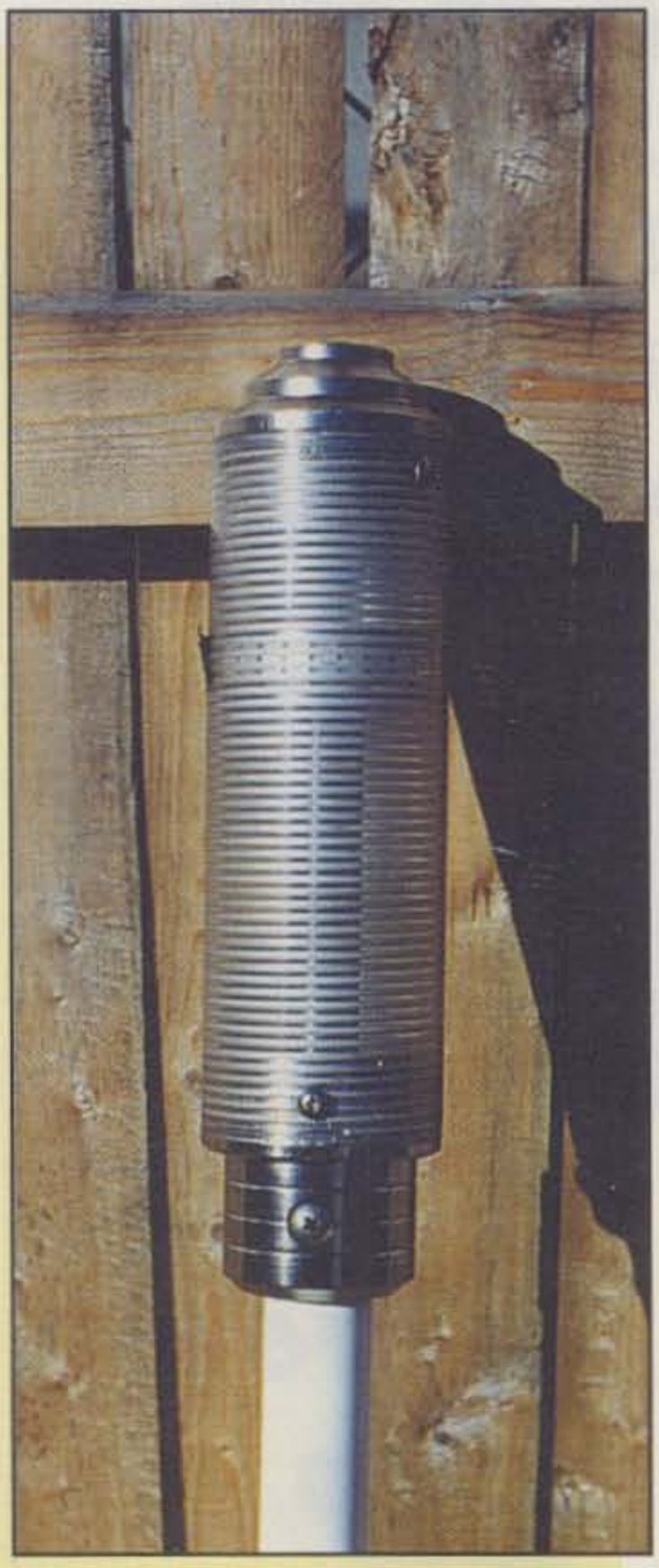


Close-up view of the tuning-coil assembly of the Stealth II-2.5 antenna. Note the excellent machining of the metal pieces that are located on the top and bottom parts of the tuner. You can see the tuning platform inside the coil itself. (WB2AMU photo)

width of 74 kHz. This puts the Stealth II-2.5 in the middle of the range of most tunable mobile and screwdriver antennas out there. However, as per the manufacturer's comparison using computer software analysis, the Stealth has a 29 percent radiation efficiency, which is three times higher than many of its competitors. The relative radiated power is advertised as –5.4 dB, which is very good for a shortened antenna.

Operation

I initially tested the Stealth II in a manual mode in which I used a DPDT switch to move the tuning platform up or down. I used a 6 meter quarter-wave whip that screwed into the threaded hole on top of the loading coil and attached the antenna to a magnetic-mount base on the roof of my compact car, as shown in the photos. Because of the weight of the setup, I did not drive with the antenna on the roof, so it was used in a portable fashion with the car parked.

I was able to load up on most of the HF bands using the 6 meter whip. For 40 meters a longer whip, such as a 10 meter quarter-wave vertical, will provide greater radiation efficiency. This may be impractical for mobile applications, as we are talking about almost 15 feet of antenna installation on the roof or bumper of a big car or truck. However, it could work out very well for fixed operation from a limited-space setting. A note for fixed installations using a longer whip: Hi-Q will supply at no extra charge a "loop top hat" for enhanced performance. Be sure to ask for it.

Loading up the antenna manually requires a bit of effort, as you have to move the tuner platform up and down until a low SWR is found. I marked off the resonant points on the tuning-coil section for each band using electrical tape. This step is eliminated if the SAM controller is used, as it "remembers" the point of lowest SWR for each band.

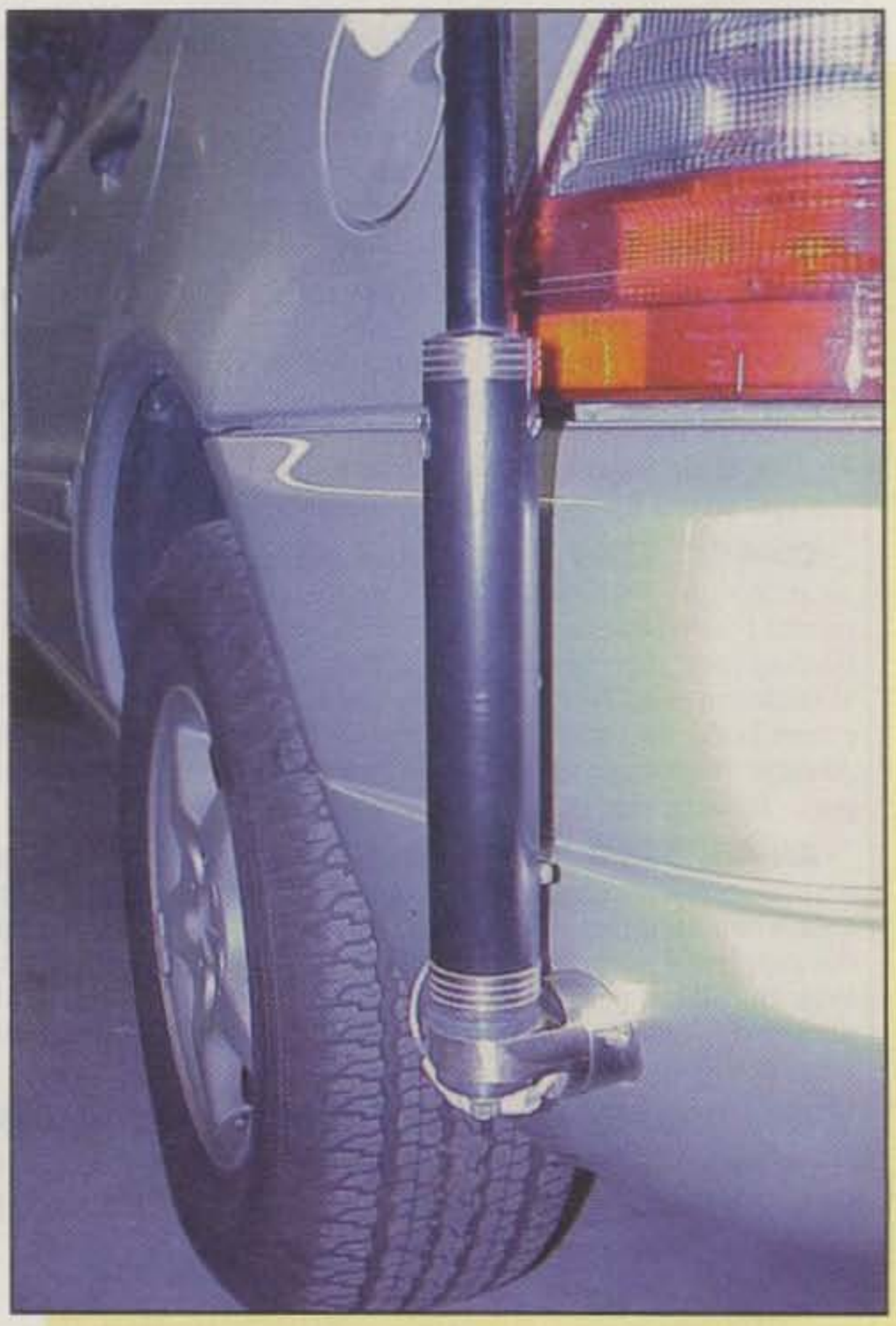
I tested the antenna during the CQ WW DX SSB Contest and made several contacts with DX stations on 10 and 15 meters with good reports received. This antenna is a viable product for use in limited space or mobile situations.

The SAM controller by KØYD Designs was reviewed along with the Stealth antenna, and electrically it performed as advertised. As mentioned before, it eliminates the step of physically marking the coil for the resonant positions, as the SAM controller will electrically store the values in its memory. There are a number of modes available when using the SAM controller, such as Joggle and Storage, and you still will have to initially set the positions while visually observing the radio for a low SWR. However, once the settings are made, tuning the antenna for a specific band becomes quite simple.

Summary

The Stealth II is designed primarily for mobile use and would be most suited to a ham looking for an HF mobile antenna for a truck or van. In some cases it could also be used as a base antenna for apartment or condo dwellers. Fellow *CQ* Contributing Editor Gordon West, WB6NOA, has told me this style of antenna would be popular in Alaska and other cold areas where antenna access is limited during the winter months.

A couple of cautions: For mobile use, the vehicle needs to have a heavy-duty mounting bracket on the bumper or roof. Again, this antenna is best-suited for a van or truck. Also, do not leave the motor running for more than a few seconds when the tuning platform reaches



Possible Stealth II mounting method on a van. (Hi-Q photo)

the bottom of the coil. This could either stall out the motor or, in my case when I was testing the antenna, push the safety stop down and not allow the tuning platform to be able to go back up. When this happens, the antenna has to be sent back to Hi-Q so that they can reset the bottom safety stop. Thus, care must be taken not to top out or bottom out the contactor platform.

Hi-Q suggests that an inexpensive way to prevent this problem is to examine the position of the tuning platform within the coil before tuning. This would have to be done while initially setting up the antenna in a mobile installation. Another recommendation is an IR (infrared) device for limiting the upper and lower ranges of the platform, such as a 12 volt 15 or 20 watt tail-light bulb in series with the 12 volt line. Hi-Q is expected to have an optional IR limiting device available by the Dayton Hamvention in mid-May *(even though you won't get this issue until July, it was put together before Dayton—ed.).*

An important point to bring out is that if you plan to install this on the roof of a house or condo, the SAM controller or an IR device will be *required equipment,* as it will be impossible to visually sight the tuning platform as it goes through the tuning coil. In addition, all settings should be made in a portable setup on the ground with the SAM controller prior to permanent installation on the roof.

In my opinion, the Stealth II-2.5 antenna will meet specific needs of hams using it as a mobile antenna on certain vehicles or in a condo-type situation. It is a well-machined unit and should be able to endure most weather conditions. However, the antenna requires careful initial set up and noting of the location of the contactor platform for the best spot on the coil for different frequencies so that future use on these bands is made easier. I recommend adding the SAM Controller to simplify operation. This antenna is a significant investment, so you should consider everything carefully when making the choice to buy this product.

The price of the Stealth 11-2.5 is $295 and the SAM controller is $150. For further information on ordering both products, call 909-674-4862 or fax 909-245-2031. Also, check the website <http:// www.qth.com/stealthantennas/description.htm>, or write to Hi-Q Antennas, 21085 Cielo Vista Way, Wildomar, CA 92595. ■

Reader Feedback

On Square-Conductor, Open-Wire Transmission Lines

By Stephen D. Stearns, K6OIK

In a recent article[1], George Murphy, VE3ERP, addressed the analysis and design of square-conductor open-wire transmission line. His central thesis was that "significantly" lower characteristic impedance is achieved by using square conductors instead of round ones. A subsequent note[2] corrected a typographical error in his main formula. This article corrects other misconceptions and misstatements contained in the article. We comment on the historical development of the subject of square and rectangular cross-section conductors in transmission lines and antennas and give a formula and design tables with better accuracy.

The formula published in VE3ERP's article was

$$Z_0 = 120\ln(A + \sqrt{A^2-1})$$

This formula contained two errors which are corrected by using the proper equations $A = S/D$ and $D = 1.18034W$. In addition, we can eliminate the cumbersome logarithm and square root in favor of inverse hyperbolic cosine, a single button push on many modern calculators, and we reduce the speed of light from 300,000,000 to its exact value of 299,792,458. With these changes, the corrected formula becomes

$$Z_0 = 119.917\cosh^{-1}\left(\frac{S}{1.18034W}\right)$$

Let me discuss the basis for this formula and its limitations before giving a better formula.

The idea of equivalent cross-sections dates to James Clerk Maxwell[3] and is used in inductance calculations[3, 5] and in the theory of cylindrical antennas[4, 6, 7, 8, 9, 10]. In free space, a wire of arbitrary cross-sectional shape is equivalent to a round wire of appropriate radius. Broadly speaking, there are two methods for finding this "equivalent" radius, both involving calculus. One method, which is approximate, is to calculate the geometric mean distance between all pairs of points in the cross-section's area or periphery[3, 5, 10]. The second method, which is exact, uses conformal mapping. In the case of regular polygons, the equivalent radius is found by the Schwarz-Christoffel transformation[7].

In particular, the equivalent diameter D_{eq} of a square is proportional to its side length W according to the ratio[7, 11].

Now if we are using square wire, the formula changes as follows:

$$\frac{D_{eq}}{W} = \frac{\Gamma(1/4)}{\sqrt{2\pi}\Gamma(3/4)} = 1.180340599...$$

Let's examine the basis for this impedance formula. It is obtained by substituting the equivalent diameter of square wire into the formula for round-conductor open-wire transmission line. It is interesting to note that the result is independent of the rotational orientation of the square conductors. The predicted impedance is independent of whether the squares' sides or vertices are facing one another. This is because equivalent radius theory assumes that the wires are in free space away from other objects, including each other. Consequently, the formula above is only correct in the limit as the spacing between conductors becomes infinite. In practice, the formula is considered good when $S/W > 3$. However, the impedance region of interest to amateurs generally lies in the range $S/W < 3$, for which the formula substantially underestimates the characteristic impedance. As a result, VE3ERP's assertion in his article that the use of square conductors can reduce transmission line impedance significantly is suspect inasmuch as his conclusion relies on a formula that predicts too low an impedance for square-conductor line.

To remedy the problem, I offer an accurate formula for the impedance of square-conductor open-wire line that overcomes the deficiencies noted above. The formula is based on Harold A. Wheeler's work on square-conductor air-dielectric microstrip[11 equation (41)]. Of dozens of formulas for "thick" microstrip, Wheeler's is the only one that specifically covers the case of square cross-section conductors.

The following formula for square-conductor open-wire transmission line is valid provided $S/W < 3$.

$$Z_0 = \frac{376.730313461}{\frac{1}{S/W-1} + 0.483 + \frac{2}{\pi}\ln\left(\frac{S/W}{S/W-1}\right) + \frac{1}{(S/W)^{1/3}-0.1}}$$

The numerator is recognized as the TEM (Transverse Electric Mode) wave impedance of free space $Z_0 = m_0 c$, where c is the speed of light and $m_0 = 4p \times 10^{-7}$ is the magnetic permeability of free space. When comparing the characteristic impedance of round and square-conductor trans-

Impedance	50 ohms	70 ohms	80 ohms	90 ohms	100 ohms	110 ohms	120 ohms
S/W Ratio	1.2047	1.3318	1.4071	1.4910	1.5844	1.6880	1.8025
Side Length W (inches)	Gap Width S – W (inches)						
0.25	0.051	0.083	0.102	0.123	0.146	0.172	0.201
0.50	0.102	0.166	0.204	0.246	0.292	0.344	0.401
0.75	0.154	0.249	0.305	0.368	0.438	0.516	0.602
1.00	0.205	0.332	0.407	0.491	0.584	0.688	0.803

Table – Square-conductor, open-wire transmission line dimensions.

mission line side by side, we can see that for diameter equal to width, the difference in impedances between square and round lines is just under 20 ohms. It is, therefore, an overstatement to assert that transmission lines made of square wire have significantly smaller impedances. For practical purposes, the difference is 20 ohms.

Table I gives the dimensions needed to build square-conductor open-wire transmission line having characteristic impedances ranging from 50 to 120 ohms. The table corrects the dimensions given in VE3ERP's article by reducing the gap between conductors to the proper values.

As a final comment, in the article VE3ERP asserts: "Open-wire transmission lines of less than 83.1 ohms impedance are not physically realizable with round conductors because the space between the conductors theoretically would be zero or less." This assertion is false. By way of counterexample, the impedance of ordinary 18-gauge zip cord is generally in the range 30 to 45 ohms, which is less than 83.1 ohms. The number 83.1 ohms has no particular significance in open-wire transmission line design.

Acknowledgments

I wish to thank Nelson M. Blachman, WG6R, for helpful discussions on the mathematical analysis of equivalent radii, and John Eisenberg, K6YP, for discussions on approximations for square-conductor microstrip.

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About the Author

Stephen D. Stearns, K6OIK, started in ham radio while in high school at the height of the Heathkit era and holds an Extra Class license. He is currently Chief Technologist at TRW Firestorm Wireless Communication Products in Sunnyvale, California, where he is leading the development of smart antenna technology for the cellular and wireless industries. He may be contacted at <stearns@ieee.org>.

Oops...

We had a few gremlins get into the tables in our May "Market Survey" of handheld transceivers. ICOM's IC-2GXAT (not G2XAT) is a 2-meter-only radio, with ham-band-only receive, while the ICOM IC-W32 is a dual-bander, transmitting on 144–148 and 440–450 MHz and receiving on 118–174 and 400–470 MHz. It has only two power levels, 5 watts and 500 milliwatts. Also, ICOM has decided not to bring its IC-T82 onto the market, saying the radio "did not meet the high standards of technical excellence that ICOM sets for all our products."

Finally, while we generally do know singular from plural, you wouldn't know it from reading the title of last month's 6 meter DXpedition article. It was the unfortunate result of a last-minute (but incomplete) edit. W2VU has been reintroduced to the Wouff Houng as a result. We apologize for any inconvenience or confusion.

Antennas

BY ARNIE CORO, CO2KK

Connecting Your Station To The World

Ten Easy Ways to Improve Your 2 Meter HT's Antenna

Two meters nowadays is the most popular amateur band worldwide, spanning from 144 to 148 MHz in some parts of the world and limited to the first two megahertz in others. The availability of battery-powered handheld FM transceivers and thousands of repeaters worldwide has made nearly every amateur a user of this VHF band.

Rubber Dud . . . um, Duck

Essential to the 2 meter FM handheld transceiver (HT), the helically-wound, short, vertical, monopole antenna—commonly known as a *rubber duck*—is regrettably a very poor antenna. To make things worse, the popular flexible rubber-duck plug-in radiator has to work against a "ground" or "counterpoise" that is very small indeed.

The above two factors combine to lose a lot of the radio-frequency (RF) energy generated by the radio, which, by the way (and we all know this very well indeed), is working most of the time from a rechargeable battery *(that's almost never fully charged!—ed.)*.

It is a fact of life that when used with a rubber-duck antenna, your 2 meter handheld radio is regrettably turning a significant part of its RF power into heat, due to the very low efficiency of the antenna system. Follow me, however, and learn ten easy ways by which you can improve the radiation efficiency of your HT at very low cost, and often by doing it all by yourself—homebrewing different types of easy-to-build and adjust antennas that will improve your 2 meter FM HT's operation and even let you extend the battery's operating time by allowing use of the rig in a lower power setting.

Number 1: Don't forget this one ... the rubber duck's efficiency becomes lower and lower as the antenna is made shorter and shorter.

You can prove this and improve your 2 meter HT's efficiency by running some easy outdoor tests. Here is what you have to do: Find as many rubber-duck antennas as you can: Borrow them from friends, search for them at hamfests, and of course use the one that came with your HT as the reference antenna. You will be amazed with the results of running simple relative-field-intensity tests comparing different rubber ducks.

For example, I found out that the antenna that came with my most-used HT—yes, I do have more than one—was *not* the one recommended by the manufacturer. In fact, the antenna was intended to be used in the 150 to 160 MHz segment of the VHF band, and not in the 140 to 150 MHz range required for 2 meter operation. This finding led to a very interesting discussion on our long-range mountaintop repeater and to several local amateurs finding out that their HTs also had the *wrong* antenna installed.

By looking for the appropriate antenna, which in my case was color-coded for each sub-band, I soon found out that my HT's efficiency increased significantly, letting me use the battery-saving LOW power setting much more often, something that is particularly appreciated during emergencies.I also noticed that the HT's case was heating up a lot less after long transmissions, an obvious indicator of better overall efficiency.

Therefore . . . check the rubber duck your radio is using, test several different ones, and keep the most efficient one, although I do warn you that it may be the longest antenna of all tested in most cases, something that may prove to be inconvenient when you are using the radio clipped to your belt. Of course, you can keep the better antenna ready for action, and just plug it into the RF output connector when required.

Antennas for handhelds come in all shapes and sizes, and very few are efficient. On the left here is a shortened duck antenna, which loses in effectiveness what it gains in convenience. In the center is a "standard" rubber-duck antenna, and at right is a telescoping half-wave antenna. (W2VU photos)

c/o CQ magazine
e-mail: <co2kk@cq-amateur-radio.com>

The telescoping half-wave antenna is 38 inches long when fully extended. This will do wonders for your signal, but is hard to use while moving around. It's best carried with you and attached when needed.

Number 2: Go to a quarter-wave vertical radiator, or better yet, follow the antenna gurus' advice and make your own 0.28-wavelength-long whip.

Changing from even the best rubber-duck helically-wound antenna to a simple 0.28-wavelength whip is one of the most dramatic and impacting experiments that I run at radio club meetings. Also, building your own 0.28-wavelength antenna is a very enjoyable weekend project that will cost you the price paid for a male coaxial connector that fits your HT's antenna output, as the flexible wire usually can be obtained locally from piano-supply stores or people who tune pianos for a living.

Why the 0.28-wavelength choice instead of the classic quarter-wave ? Very simple: The slightly longer vertical element will provide a better match to the HT's output stage and will also slightly increase the radiation efficiency by lowering the take-off angle of the antenna.

Soldering the very flexible, steel piano wire to a BNC-connector center pin can certainly be described as tricky, to say the least, so here I opted for making the piano wire itself the center pin, something that was not so obvious at the start of the experiments with this antenna. Finally, I came across a piano wire of the right diameter and developed the proper way of holding it in place by filling the BNC male connector with fast-setting epoxy resin.

You must place some kind of plastic ball or any other object at the tip of the antenna to prevent possible injuries from the very sharp point at the end of the antenna.

This 0.28-wavelength antenna is one I can carry in my backpack and plug in quickly to bring in distant repeaters or extend the range of simplex contacts as required. It has also proven to be very useful during emergencies, because it allows the use of the lower power settings of the HT, thus extending precious battery life when you are not near a place where it can be recharged.

Number 3: Go from the 0.25 or 0.28 whips to the 3/8-wavelength antenna.

There are several commercially manufactured telescopic-whip antennas designed to be used by 2 meter HTs. Making your own will be somewhat more complicated than the 0.25 or 0.28 versions, as this one does require a matching network that has to be placed at the base of the radiator. My findings show that the 3/8-wavelength-long HT antenna has very little gain above the 0.28-wavelength one, something that led to Number 4.

Number 4: A half-wave element atop the HT!

Here again we see at least several commercial antennas that do work very well, and there are some that claim that when retracted, they behave in such a way as to provide a near-perfect match to the HT's output stage.

Building your own half-wave telescopic-whip's matching network will require above average skills, and for a long time I haven't seen a construction article dealing with a half-wave 2 meter band antenna especially designed for HT use. As in the case of the 3/8 whip, there are commercially built telescopic

Attaching a 19 inch (quarter-wave) "ground radial" to the base of your rubber duck will greatly improve performance at virtually no cost. (Modeled by Rachel Moseson)

Detail of the hose-clamp connection of the "ground radial" to the base of a rubber-duck antenna.

half-wave antennas available at rather low cost.

Using one of these *long telescopic whips* on your HT makes handling the rig a not-too-easy job, but the increase in antenna efficiency is certainly worth the inconvenience. Carrying one of these along during field trips will always be worthwhile, and the half-wave-long end-fed element will teach you some very practical lessons when compared with other shorter length whips.

Number 5: Clip a ground radial onto your HT!

Strange as this may seem, I always carry a quarter-wavelength No.14 wire with a small hose clamp. This provides the HT output stage with a much better (and much needed) ground system.

The wire—with its end carefully cleaned to a shinning, bright copper—is placed at the base of the female BNC connector, and then the hose-clamp adjustable clip is turned tight with a screwdriver, holding the quarter-wavelength wire in full contact with the connector's outer ground ring. After you do that, just move the wire *down,* so that it forms the missing lower part of a *dipole.*

This easy to carry around and install ground radial increases the efficiency of all verticals used with your HT, especially the ones that are 1/4-wavelength or less long. It proves to be particularly effective with rubber-duck antennas, and it is so easy to "build" and take with you that every HT owner should have at least one always available when traveling.

Number 6: Ever tested a *magnetic loop* for 2 meters ? If not, then by all means you must try to build one. It has to be less than one-third of a wavelength long in order to work properly, and matching it can prove to be a rather difficult and time-consuming process. However, this simple system is a very effective replacement for the rubber duck, as it provides good radiation efficiency combined with the advantage of been able to null interference sources.

Again, there are commercial versions of 2 meter magnetic loops, but this is a project that can be tackled during a rainy weekend. Once you hit the appropriate matching, they can make a very nice club project, plus you can't imagine how many questions will be asked by fellow hams when they see your HT ending on that small copper-strap circle!

Number 7: An obvious choice—also *magnetic*—not the antenna itself, but the antenna mounting system.

I build my own magnet-mount verticals for mobile work using powerful magnets from large-size loudspeakers. Again, here is a lot of room for homebrewing, or if you prefer, just buy one. However, follow Arnie's advice and place a 0.28-wavelength whip on your magnetic-mount antenna. It does work a lot better than the standard quarter-wave whip! *And* . . . when using magnetic-mount antennas on places other than a metal car top, remember that just adding four radials will tremendously improve the efficiency if the antenna is mounted on a very small metal surface.

Carrying around a steel plate of at least 10 inches (or about 20 centimeters) in diameter will also provide the magnetic-mounted antenna with a very

effective ground. If you really want to create an almost-perfect ground, then a steel plate of some 20 inches (51 centimeters) in diameter will be your choice, and of course the magnetic mount should be placed right at the center of the circular steel plate .

Number 8: Although rarely used by 2 meter band HT owners, the DDRR, or Directional Discontinuity Ring Radiator, is a very low-profile antenna that is worth considering for some applications. The antenna does produce a *vertically polarized* wave, despite its appearance, and it is another one that you can certainly homebrew, as I have never seen a commercially designed and built DDRR for the 2 meter band. *(There have been some in the past, but I'm not aware of any currently on the market. Antenna manufacturers, please let us know if we're wrong.—ed.)*

In practice, the 2 meter DDRR is easy to build, and it can be fitted atop a square of high-quality printed-circuit material. It is easy to adjust, and results are more or less similar to a quarter-wave whip, although the antenna is barely a few inches above the ground plane. Modern DDRR designs call for the use of two turns of heavy copper wire or copper tubing placed above the high-conductivity ground plane. Again, here you have lots of room for experimenting! *(The DDRR seems to have disappeared from most of the reference books. We'll have to bring you details in a future issue.—ed.)*

Number 9: A single quad loop with an easy match.

Be careful: Do not use insulated wire to make the full one-wavelength loop element, as you will soon find out that the antenna will not tune to the frequency for which you calculated the loop! Matching is very easy, due to the fact that the typical single-element full-wavelength loop has an impedance of around 110 ohms, so a 1.4-wavelength section of 75 ohm coaxial cable will make an almost perfect matching section to your 50 ohm cable. Please realize that this one cannot be mounted atop the HT's antenna connector. It requires some sort of portable mast, although I have mounted the single quad elements hanging from nylon or other insulating rope lines. Remember that generating a vertically-polarized signal does require the feedline to be connected to one of the vertical *sides* of the loop! This one will not only produce a little gain, it will also make possible both noise canceling and basic direction finding, too!

Number 10: Last but not least, a flexible J-pole made from TV twinlead.

No, I wasn't going to forget this one. There are several commercially built versions offered around the world, but this is one of the easiest to homebrew, 2 meter antennas of them all! You will want to make not one or two, but several of them on that rainy or snowy day.

After a lot of experimenting, I found out that the standard measurements provided by several TV-twinlead J-pole building articles were somewhat different from my practical results. Therefore, in an upcoming *CQ* "Antennas" column I'll bring you the step-by-step building instructions for two different, but both easy-to-build, TV-twinlead and also 450 ohm window-line J-poles.

In the meantime *have fun,* and do experiment building a 300 ohm TV-twinlead J-pole with whatever measurements you can find. This is a very good antenna to carry in your vest pocket or car's glove compartment, ready for action whenever it is needed, and believe it or not, it provides enough gain as compared to the typical HT rubber duck to sound as if you have actually added a linear amplifier to your handheld!

73, Arnie, CO2KK

Reader Survey
July 2001

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Reader Service Card and returning it to us (we've already paid the postage). As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, with sunspots still riding at or near peak levels, we'd like to know how well we're doing at providing you with helpful propagation information.

Please indicate... **Circle Survey Card #**

1. Please indicate your primary bands of operation (choose one):
- Mostly HF 1
- Mostly VHF/UHF 2
- HF and VHF/UHF about equally 3
- Not active on the air 4

2. Please indicate whether you make use of published, online, or broadcast propagation information in your station operation:
- Yes, regularly 5
- Yes, sometimes 6
- Yes, occasionally 7
- No 8

3. Please indicate which statement comes closest to matching your views on getting propagation information (choose one):
- Essential to my operation 9
- An important part of knowing where and when to operate 10
- Interesting for general knowledge, but not for specifics 11
- I just pick a band with activity and see where it takes me today 12
- Not active / no interest 13

4. Please indicate the ways in which you use propagation information:
- To plan DX or contest operating 14
- To choose bands and/or times for operating 15
- To look for specific types of propagation (i.e., aurora) 16
- To better understand band conditions 17
- For general knowledge 18
- Do not use propagation information 19

5. Please indicate your main source(s) of published, online or broadcast propagation information:
- *CQ* "Propagation" column 20
- Other *CQ* column(s) 21
- *CQ* feature articles 22
- Other magazines 23
- Personal propagation websites 24
- Government or university propagation websites 25
- WWV or other broadcast sources 26
- E-mail propagation alerts 27
- Other 28
- None 29

6. Please indicate which aspect(s) of *CQ*'s "Propagation" column is (are) most useful to you.
- Discussion and explanation (main article text) 30
- Short-Skip Propagation Charts 31
- DX Propagation Charts 32
- Last-Minute Forecasts 33
- All equally useful 34
- Do not read "Propagation" column 35

Thank you for your responses. We'll have more questions for you in our next reader survey.

What You've Told Us...

Anyone who says ham radio is a solitary hobby doesn't know *CQ* readers very well. In our May survey on hamfests, 97% of you said you'd been to at least one, and 85% of you attend regularly.

Local hamfests are the most popular, with 87% of you going at least once and 62% attending regularly; followed by regional hamfests (74% at least once, 47% regularly); ARRL section/state/division conventions (50%/28%); the Dayton Hamvention® (40%/17%); ARRL national conventions (25%/2%); and other regional or national conventions, such as AMSAT or the Visalia DX Convention (13%/5%).

The vast majority of you (83%) go to hamfests to shop for stuff for your station, but a majority of you (64%) also see them as social events. In addition, 45% have talks and forums on your list of reasons for attending, while 23% of you go to sell and 16% go to help as volunteers (and 3% don't go at all).

The responses to our question on your feelings about hamfests suggest that very few of you go with a specific shopping list in hand. The largest group (49%) said, "I go to hamfests to browse, even if there's nothing particular that I need," followed by "I go to hamfests to socialize, and if I happen to see something I like, I'll buy it" (40%). All the other responses were in single digits: "I go to hamfests to sell, and might bring something new home with me as well" (5%); "I go to hamfests mostly for the forums; I'm not really interested in buying or selling" (4%); "I don't go to hamfests" (4%), and finally, "I go to hamfests to buy; I know what I want and go home if I don't find it" (2%). Since 83% of you say you go to hamfests to shop, this suggests that most of you aren't sure what you want before you get there, and depend on help from dealers and fellow hams in deciding what to buy.

This month's winner of a free one-year subscription to *CQ* is Hal Vincent, NN4S of Buckhead, GA. As always, thank you to all who responded to our survey.

Stereo SSB and CW? Yes! (and more!)

A "Must Have" Station Accessory!

AOR's new Multi-Media Terminal (MMT) is a powerful new tool to add to your station. More than just DSP, transmit and receive PSK31 and RTTY, listen to amazingly clear audio, equalize your mic, apply potent filtering and hear "weak ones" others may miss.

AOR MMT TDF-370

- Derived Stereo SSB and CW signals are incredibly clear.
- Use powerful DSP noise reduction and filtering technology, including Fast Fourier Transform.
- Decode and display PSK31 or RTTY, on the LCD panel, no external PC required!
- Enhance your transmitted audio with 8 channels of mic equalization.
- Digitally record up to 102 seconds of audio in up to 8 memories.
- Receive SSTV 56.7 kHz (external PC and software needed for viewing).

AMAZING AUDIO

With a new Fast Fourier Transform audio filter, the MMT applies DSP filtering and creates a more "natural" sound, pleasing to the listener. Line enhanced noise reduction uses new algorithms to dramatically reduce background noise. An auto-notch function can be used to reduce or eliminate annoying interference. You won't believe your ears!

"HIGH FIDELITY" SSB

This is not a conflict of terms! AOR's unique technology derives unbelievable audio from a 2.4 kHz source in simulated stereo, through the provided headphones. The results are amazing and have been compared to "FM quality" reception. You didn't know your radio could sound this good. Just about everyone who hears it says, "Wow!"

BETTER TRANSMITTED AUDIO

Use the built-in microphone equalizer to enhance your transmitted audio. Contour a profile for your vocal characteristics or overcome some of the limitations that may exist in your microphone.

IMPROVED CW OPERATION

Built-in 100, 200 and 300 Hz audio band pass filters. Center frequency is adjustable from 800 Hz with 450 Hz pitch. There is also a special noise reduction circuit just for CW operation.

"STEREO" CW RECEPTION

The built-in band pass filter has independent outputs for the left and right channels, allowing independent bandwidth settings heard through the included stereo headphones.

DIGITAL MODES WITHOUT A PC

Receive and display PSK31 and RTTY (Baudot) modes without the need for a PC. AOR's MMT displays text on its easy-to-read LCD display. PSK31 formats include BPSK and QPSK. RTTY operations include 170, 425 and 850 Hz shifts.

PC INTERFACE

The MMT has a rear panel DSUB9 connector and a serial cable is provided. You can set internal parameters of the MMT and operate PSK31 and RTTY using a simple terminal program. You can also transmit and receive SSTV (56.7 kHz) through your computer (optional software needed for SSTV).

DIGITAL VOICE RECORDER (DVR)

Capture up to 102 seconds of audio, in as many as 8 memories, in the MMT's DVR. DPCM compression saves space and delivers good fidelity.

POWER MISER

The AOR MMT operates with just 4 internal AA batteries or from a regulated external supply of 9 ~ 15 VDC.

ACCESSORIES INCLUDED

With the AOR MMT, you get: input cable, stereo connectors, 8-pin mic connectors, power cable, stereo earphones and serial cable for connection to a computer. Note: some soldering of wires and connectors may be required to adapt your transceiver's mic and mic input with the MMT. No alteration to your existing equipment is necessary.

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Many hams use horizontal loop antennas, primarily for receiving and on one or two low HF bands. W9SR has designed a loop with a tuner that gives him all the benefits of this antenna, for transmit as well as receive, on all HF bands.

A Large, Remote-Tuned Loop For HF DX

BY RICHARD W. STROUD,* W9SR

I have experimented with several antennas over the years. One which intrigued me recently is the large horizontal loop, because many DX stations I hear regularly are using versions of the loop. I finally convinced my XYL that we should give it a try, and a 160 meter full-wave (540 ft.) loop was erected. Four 60 ft. poles were purchased through the local electric company and installed by a local contractor. The poles were placed in a square 150 ft. apart.

The antenna was built of No. 14 copperweld wire and is about 53 feet above ground. The open-wire feedline is made of the same wire, as we wanted the option of running equal

*Box 73, Liberty Center, IN 46766
e-mail: <dikw9sr@citznet.com>

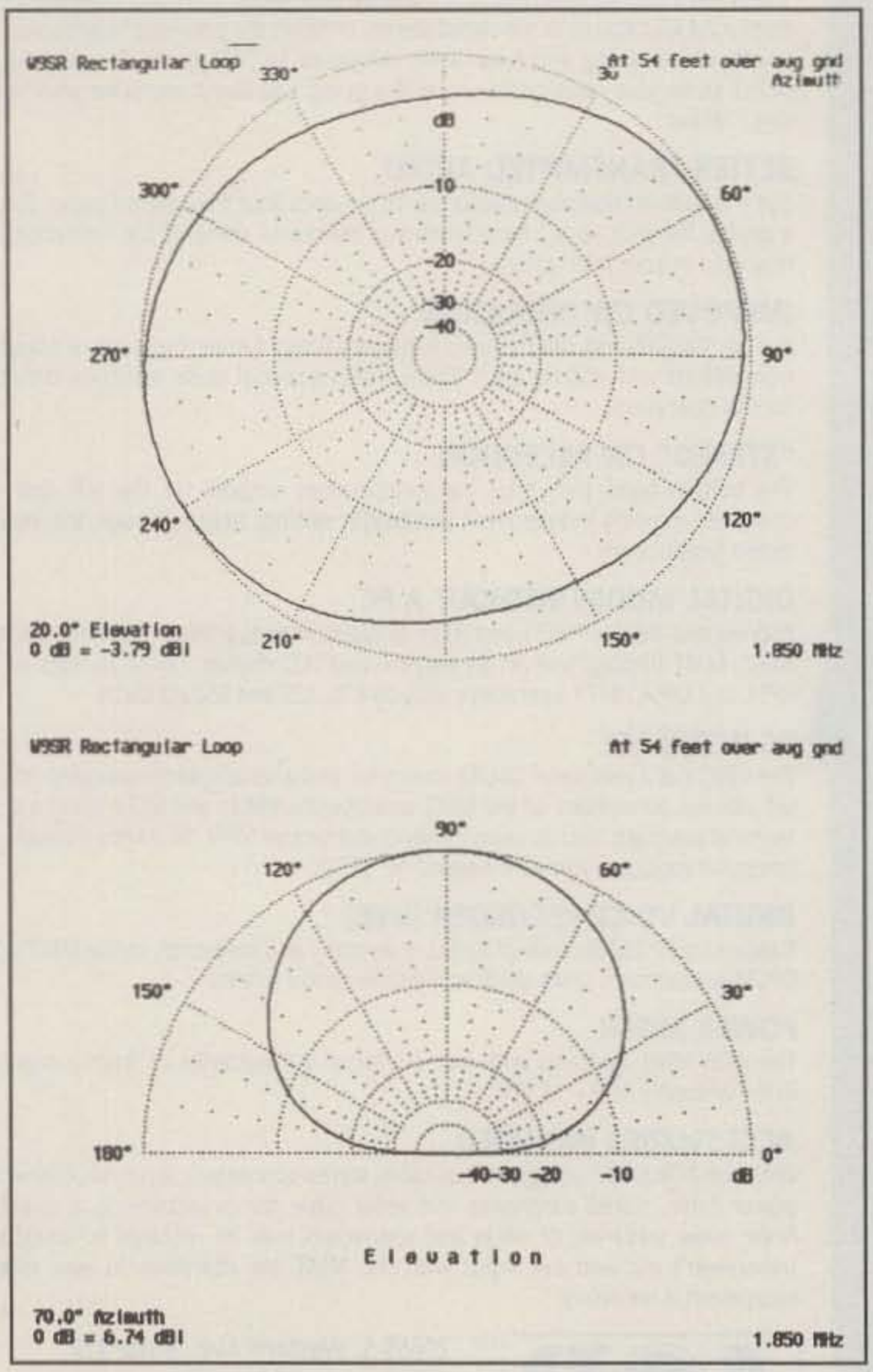


Fig. 1(A)– Horizontal and vertical radiation patterns of the loop antenna on 160 meters.

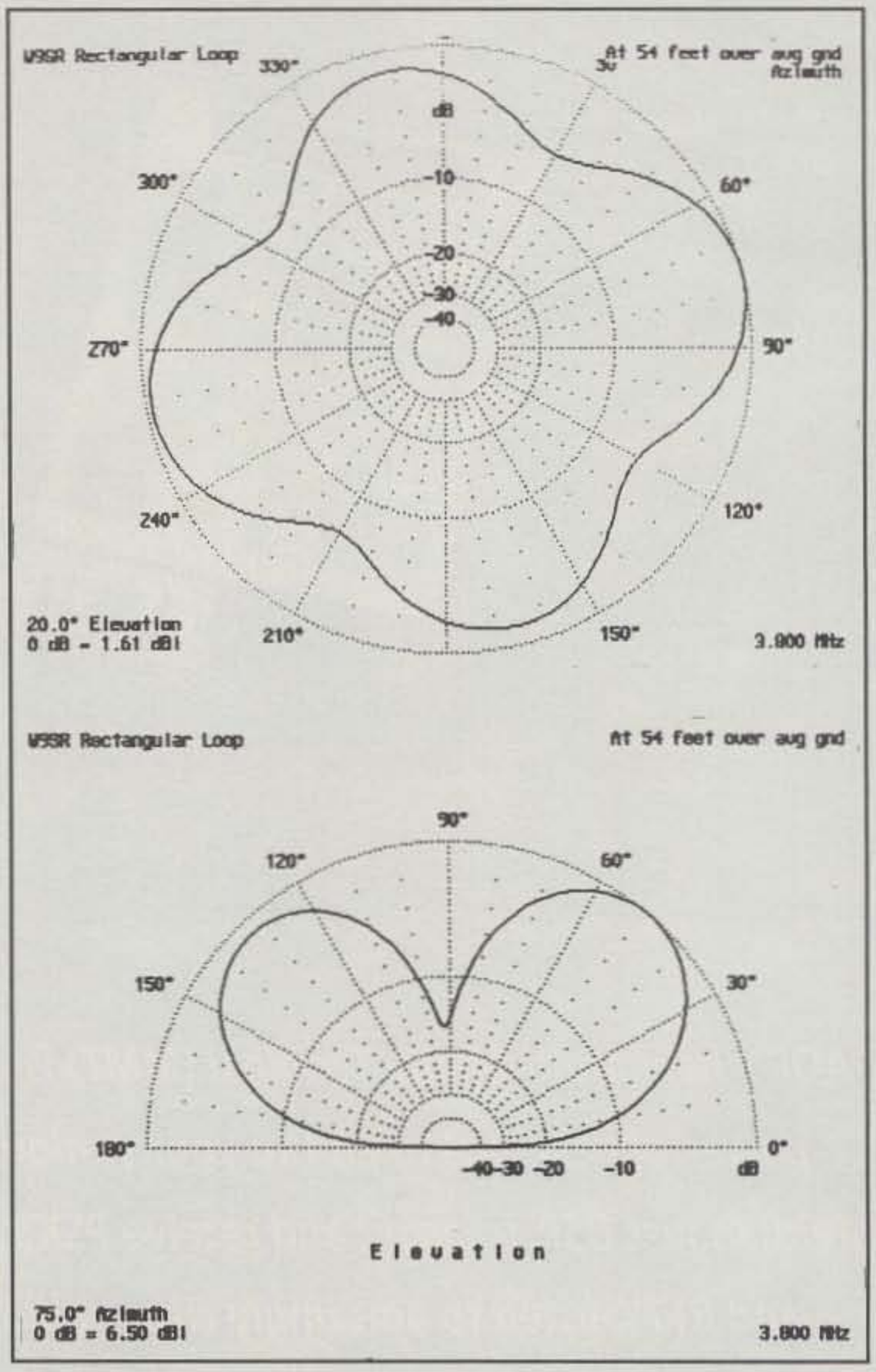
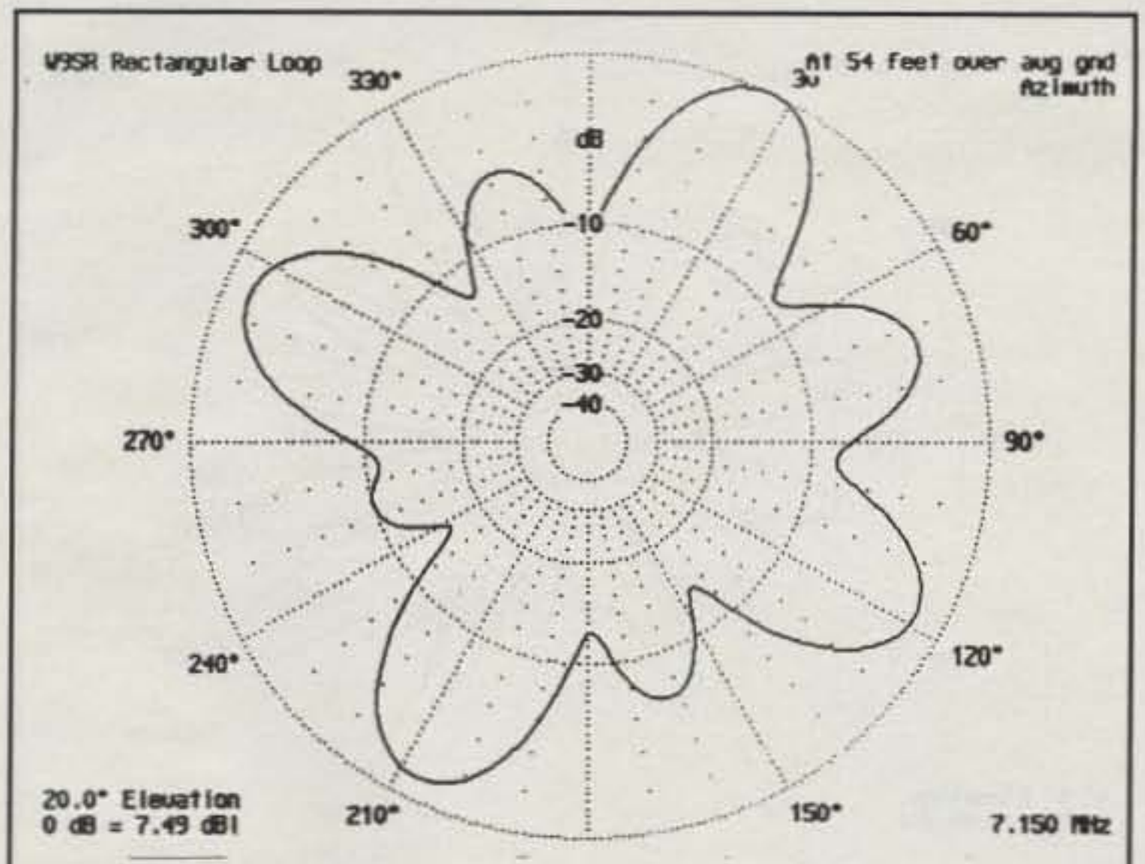


Fig. 1(B)– Horizontal and vertical radiation patterns on 80 meters.



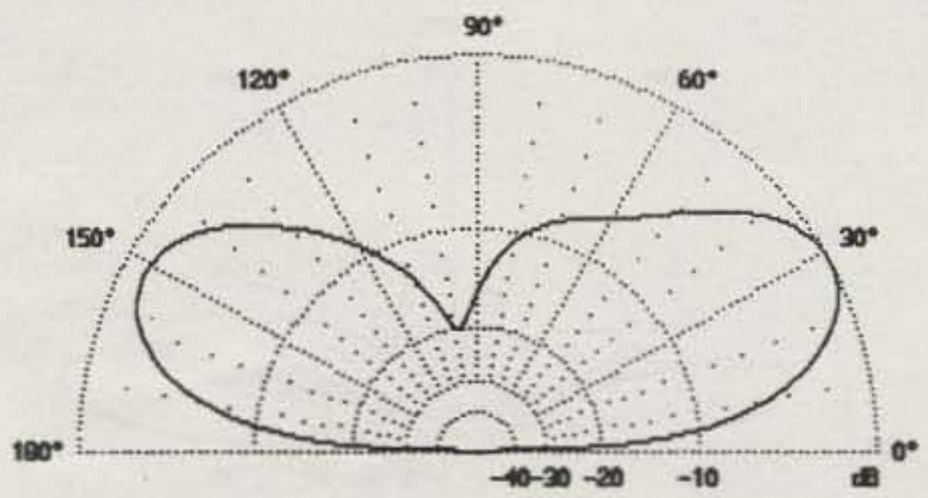
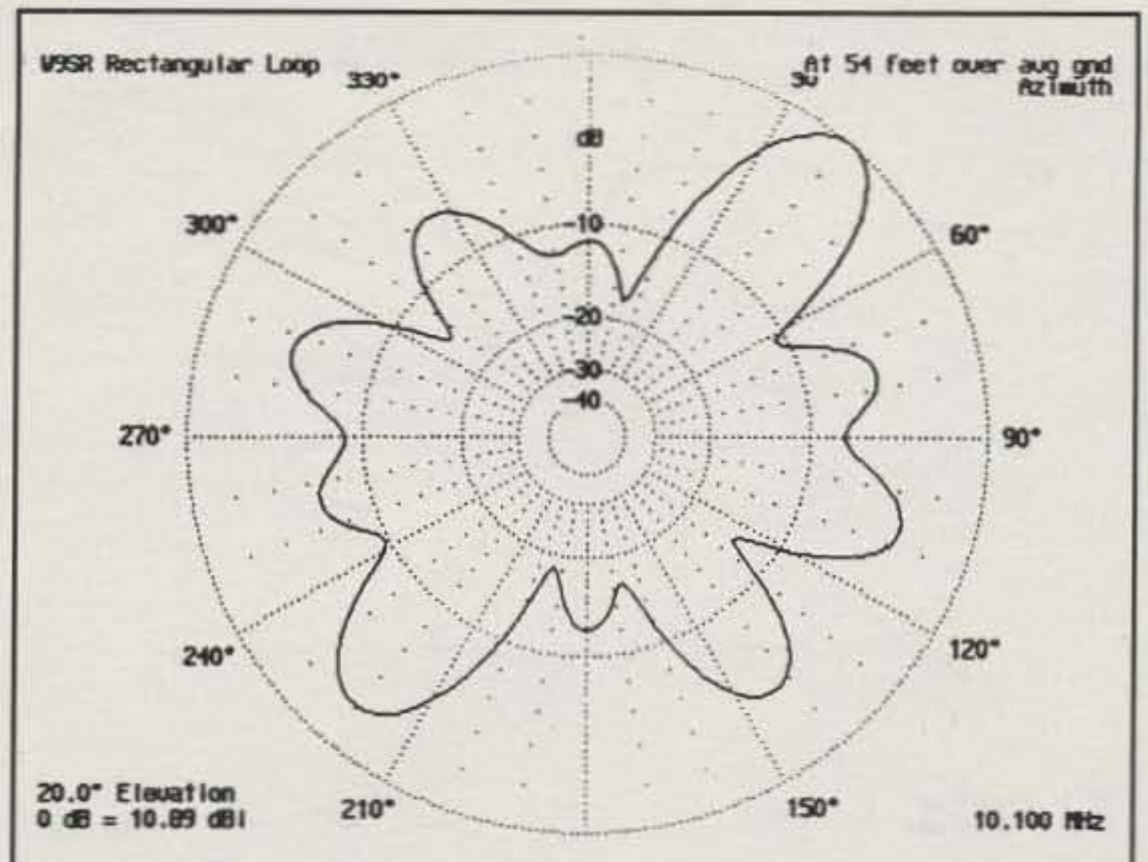


Fig. 1(C)– Horizontal and vertical radiation patterns on 40 meters.



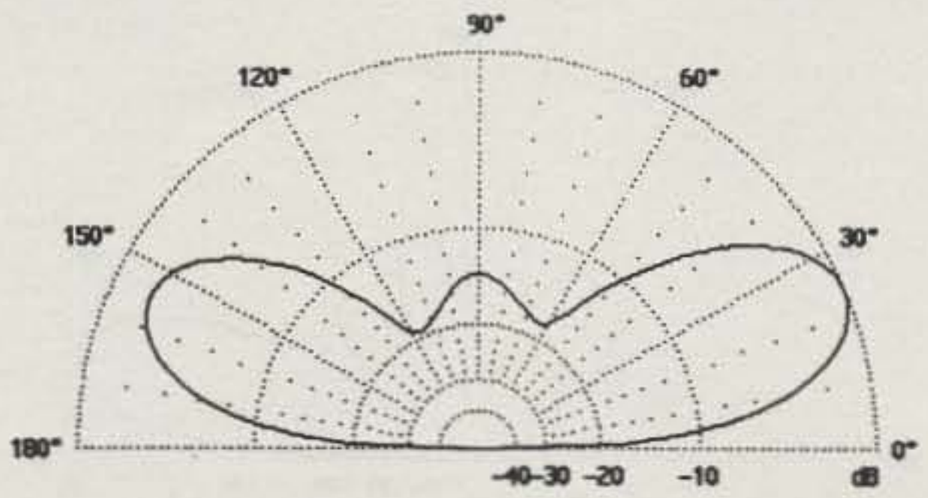


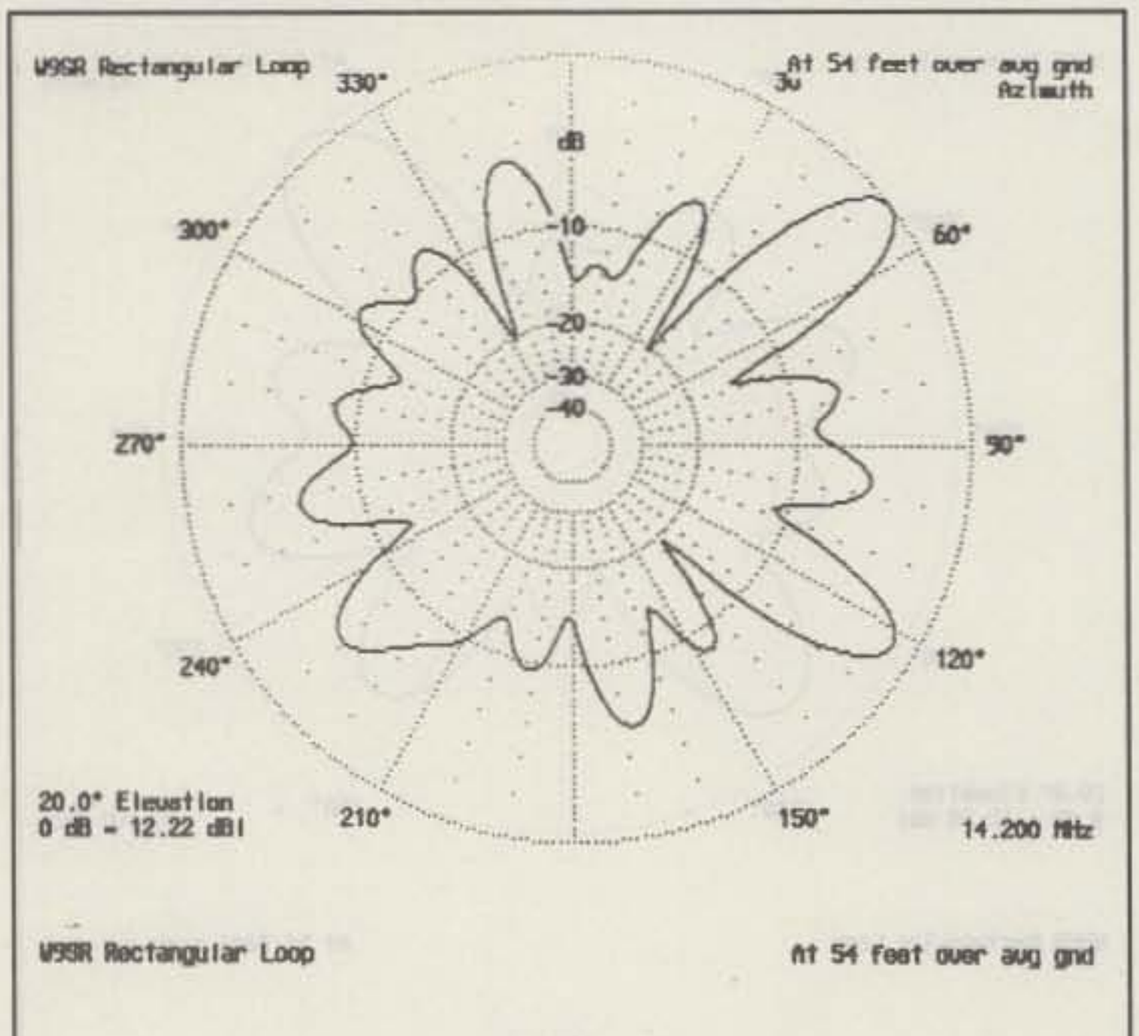
Fig. 1(D)– Horizontal and vertical radiation patterns on 30 meters.

160 Meter Square Loop Feedpoint Impedance on Various Ham Bands

MHz	Impedance
1.850	75 –*j*10
3.800	189 +*j*213
7.150	331 –*j*413
10.100	2395 –*j*330
14.200	550 –*j*696
21.300	829 –*j*852
28.500	1079 –*j*691
50.100	1163 –*j*194

*Table I– Feedpoint impedance of the 160 meter square loop on various ham bands, expressed using the standard formula for calculating impedance of R +/–j*X*, in which R is the resistance, +j*X* is inductive reactance and –j*X* is capacitive reactance (see* ARRL Handbook *for additional explanation).*

Three of the four poles forming the corners of the loop antenna. The fourth pole location required some tree-trimming. (Photos by the author)



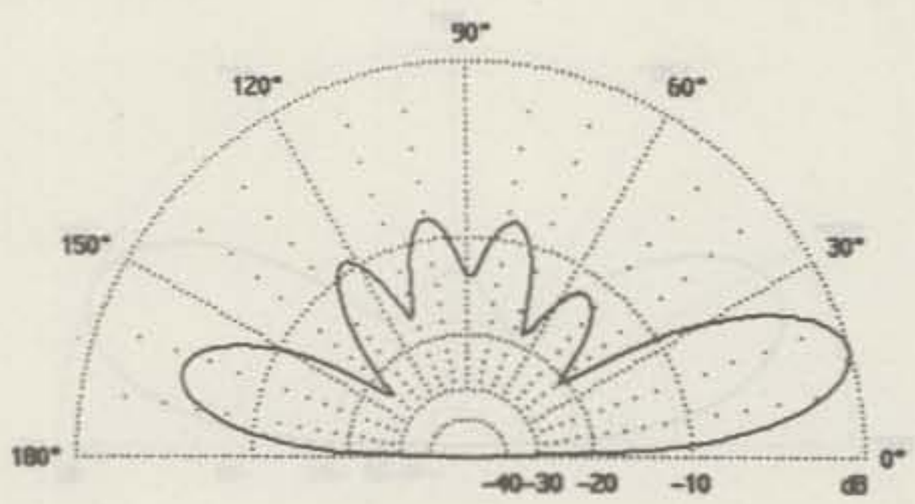
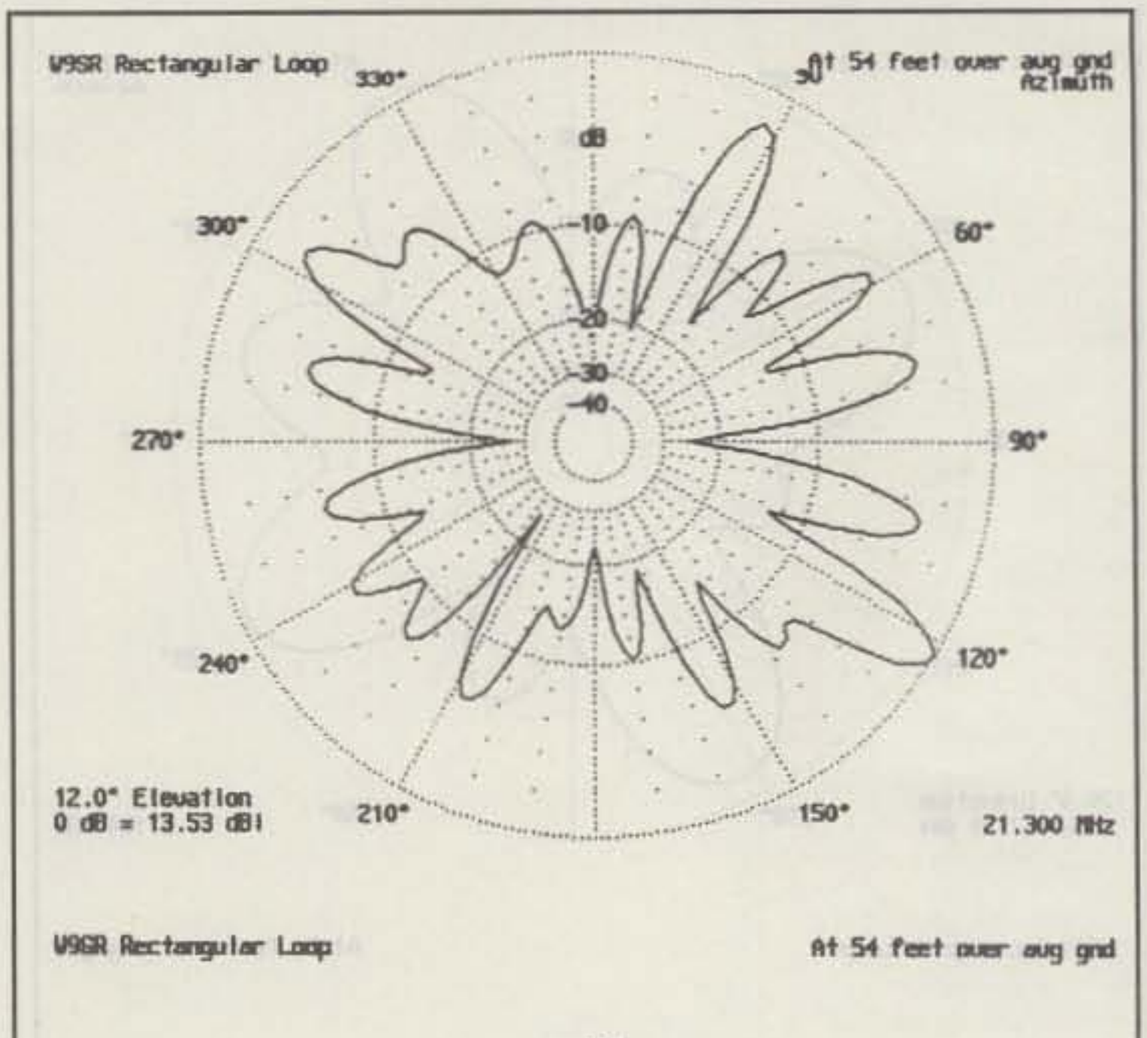


Fig. 1(E)– Horizontal and vertical radiation patterns on 20 meters.



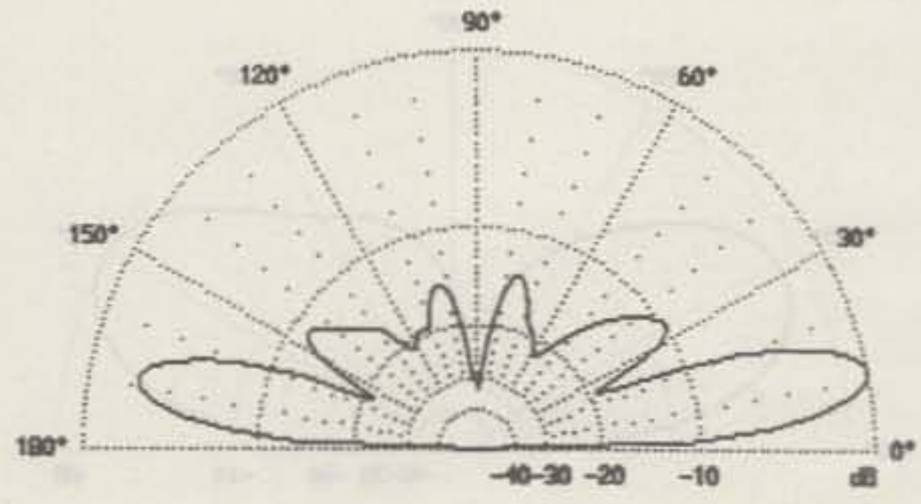


Fig. 1(F)– Horizontal and vertical radiation patterns on 15 meters.

currents through the entire closed system for de-icing in case of a winter catastrophe. Pulleys (National 3213) were attached with eyescrews near the top of the poles, and 1/4 inch Dacron® rope was used to pull the antenna into position. The rope was wrapped once around the poles over the length of them to prevent wind whipping and was anchored to tie points placed about 8 ft. above ground. (Don't cut the rope so short that you can't lower the antenna back to ground!) The rope stretched slightly over the first month but has not been tightened since.

A No. 4 solid, soft copper wire was twisted and extended about 2 ft. above the top of each pole to act as a lightning rod. This wire was stapled down the length of the pole to an 8 ft. ground rod buried below ground level.

The open-wire line was built by cutting lengths of 1/4 inch diameter Teflon® rod (available from The Wireman) into 3 inch lengths and drilling holes on 2 3/8 inch centers such that the No. 14 wire could just be forced through and the spacer slid down the line. The line was stretched between trees to make construction easier. The spacers were placed at 14 1/2 inch intervals on the line. When wire oxidizes, the spacers are locked firmly in place, so the completed line was stretched out for a few days. Nearly two years after assembling the line, the spacers have not moved. Built to these dimensions the line impedance is roughly 500 ohms.

Fig. 1(A–H) shows the vertical and horizontal patterns of the antenna and also the major lobe gains for the various bands. Table I shows the feedpoint impedance, and fig. 2 shows the dimensions and layout of the antenna. As can be seen, the impedance varies widely, and it is obvious a tuner is needed to match a 50 ohm unbalanced line to the various balanced load impedances.

It was decided to construct a weatherproof tuner which could be placed directly below the feedpoint and tuned from the shack. This resulted in the unit shown in the photographs. The schematic diagram of the tuner and control units is shown in figs. 3 and 4. The tuner is a balanced L network where the inductance is preset and selected by rotating a high-voltage switch driven by a DC motor. Another motor drives a vacuum-variable capacitor for a null in SWR. An indicator LED shows when either of the motors is in operation. The tuning can be done locally at the tuner box or remotely from the shack. An internal coaxial balun converts the 50 ohm unbalanced coax to a balanced 50 ohms to feed the LC network.

The tuner was built in a 16" × 16" × 8" deep weatherproof electrical box from

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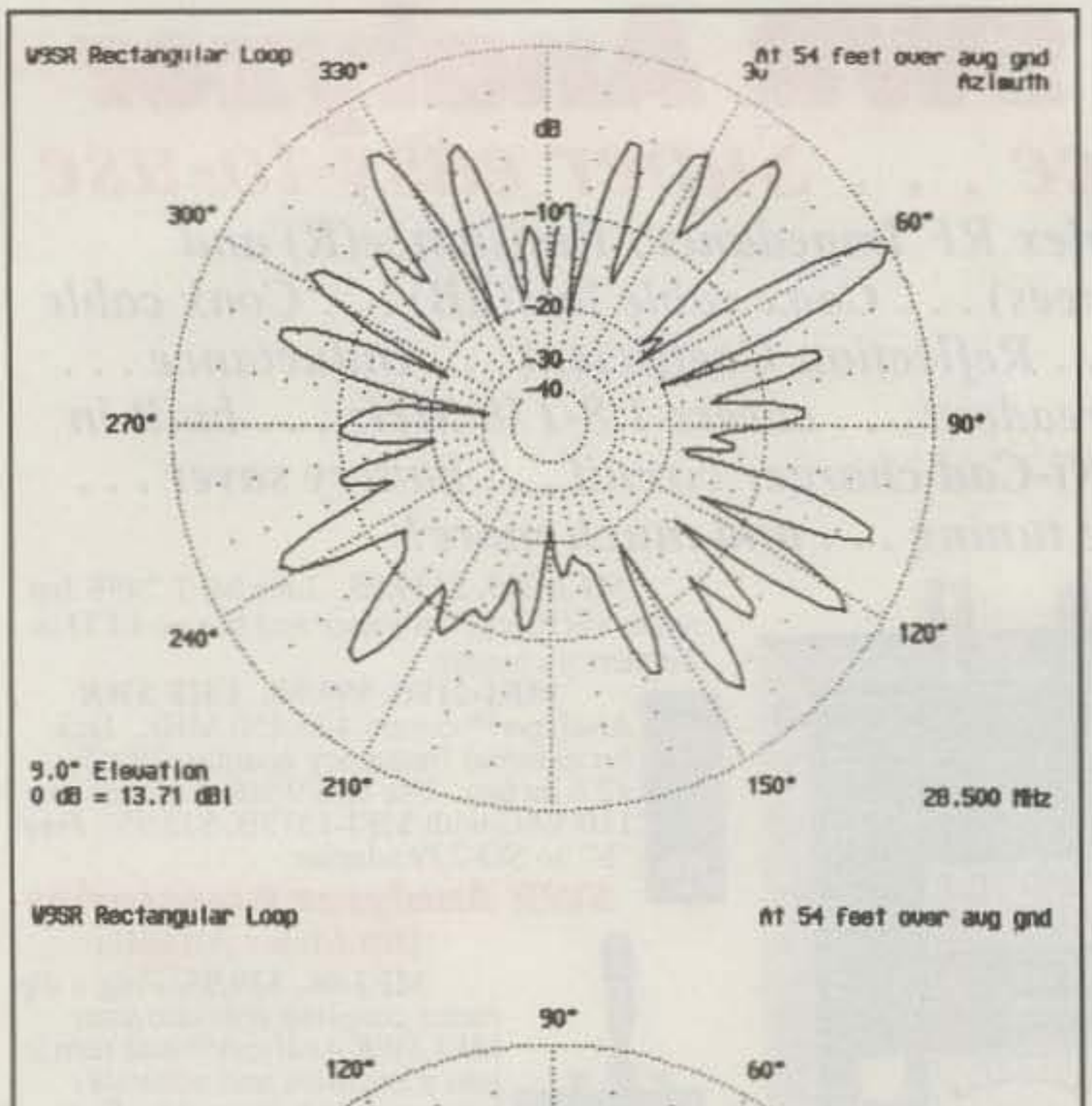

Fig. 1(G)– Horizontal and vertical radiation patterns on 10 meters.

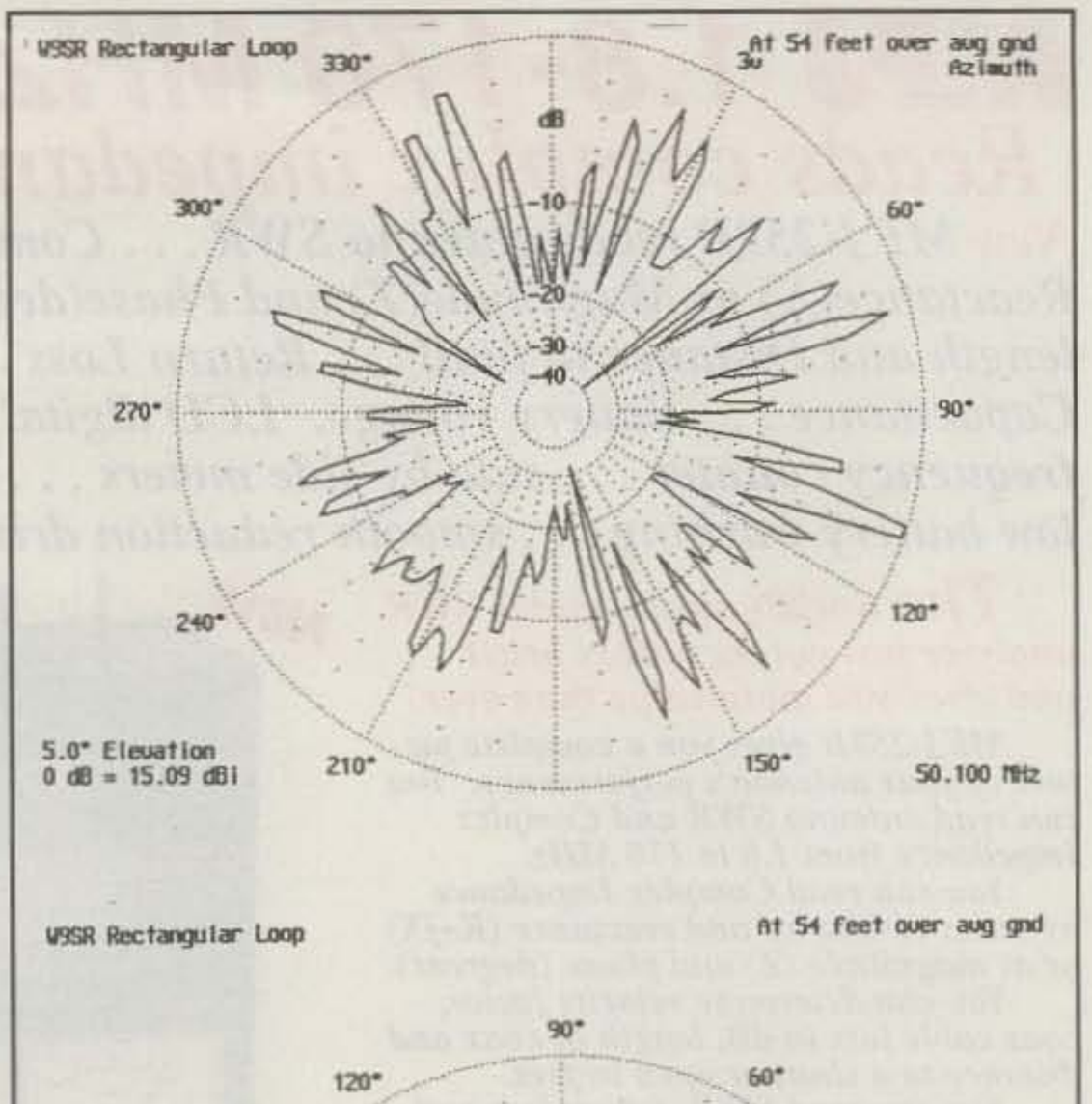

Fig. 1(H)– Horizontal and vertical radiation patterns on 6 meters.

Hoffman Engineering Co., catalog number A-161608LP[1] *(all footnotes are referenced in the parts list—ed.)*. The power and DC switch circuits and local control switches and meter were mounted on an aluminum sub-chassis, which also shields it from the RF fields. The power transformer was mounted directly to the case behind the sub-chassis. A .090 thick aluminum plate was used for mounting the large coils, RF switch, and switch drive gearhead.[2] This was then bolted to the rear of the box as an assembly.

The motor gearbox is rated at 6 RPM at 24 volts but turns about 4 RPM with 14 volts applied and has plenty of torque. The gearbox has an output shaft and also a 1/4–20 female thread. I used a 3 inch stainles-steel bolt which was cut to the length needed and threaded into the gearbox. The vacuum variable capacitor was mounted on a Teflon® block and rotated through a high voltage insulated coupling. Through the gearing, the capacitor rotates 20 turns while the potentiometer turns 10 turns. Normally-closed microswitches are activated to limit the travel at each end of rotation and diodes across these switches permit reversing rotation. A center-off momentary switch is used to select either up or down capacitor rotation. The bandswitch drive motor stops when the base of Q1 is grounded through the switch selection.

A .090 aluminum bracket was formed and bolted to the rear of the case to support the capacitor motor, potentiometer, and gears to operate the microswitch end stops (see fig. 5 for layout). Pulleys, plastic gears, and the timing belt were purchased from Small Parts, Inc.[3]

Shielded wire was used throughout the RF assembly to prevent pickup from the high voltages present. Also, motor leads and the potentiometer were bypassed with ceramic capacitors. A 10 volt meter was used to show a capacitance reference point, and a chart was made from this for adjusting the capacitor to each band.

Connections from the coils to the RF switch terminals were made with No. 14 insulated stranded wire which was then sleeved with Teflon® sleeving to avoid high-voltage breakdown. To initially set up the tap points I used an MFJ-259 analyzer. The tap points are critical and will depend on your particular installation. The taps I used are shown on the schematic diagram; these could be used as a starting point. A 1:1 SWR can be found at any HF frequency. Rotate the vacuum variable to minimum capacity and temporarily add a 400–500 pF (total) variable capacitor across the antenna terminals. This then can quickly be adjusted for minimum SWR as the proper tap point is determined and installed. For 160 meters a 470

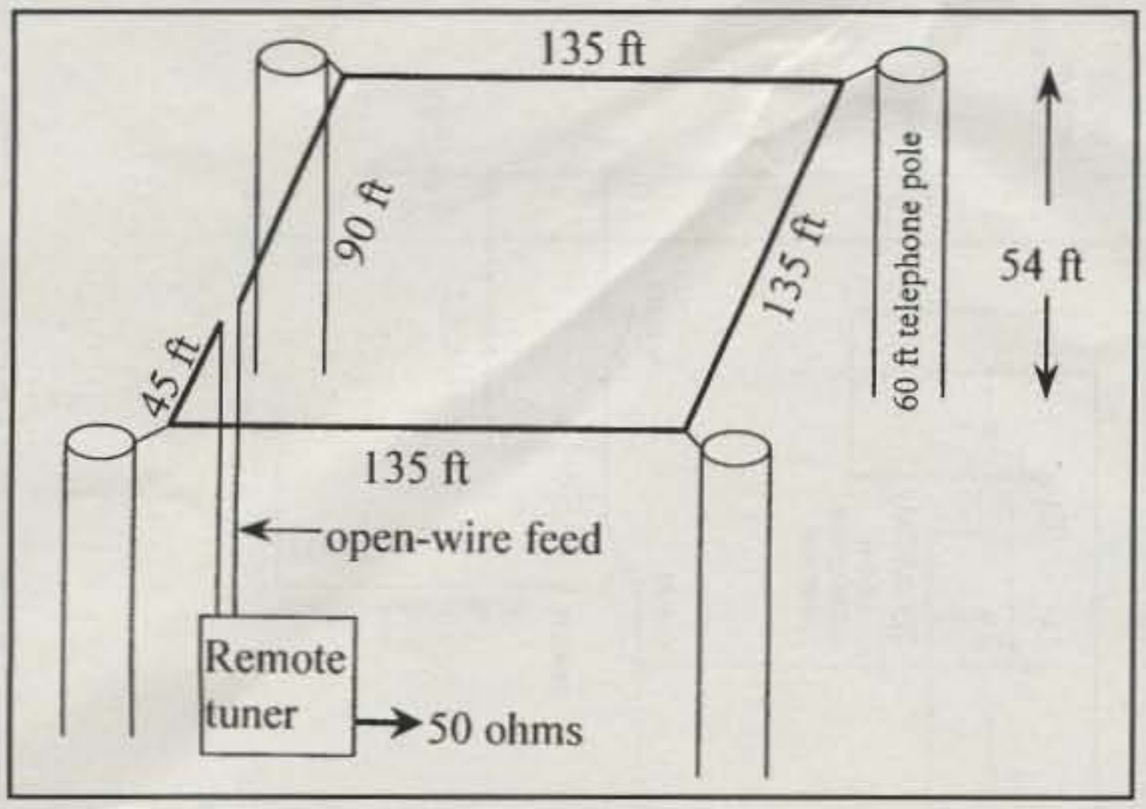

Fig. 2– Dimensions and layout of the tuned loop antenna.

2:1 System Bandwidth (without retuning)

Band	Frequency (MHz)	Bandwidth (kHz)
160 Low	1.825	56
160 High	1.900	77
80	3.600	128
75	3.900	132
40 Low	7.100	171
40 High	7.250	225
30	10.125	>50
20 Low	14.100	145
20 High	14.300	225
17	18.100	>100
15	21.100	235
12	24.930	>100
10	28.500	31

Table II– Bandwidth of the loop at various amateur frequencies with SWR of 2:1 or less. Extending beyond these ranges requires retuning of your antenna tuner.

pF fixed capacitor was also installed across the variable capacitor. After the tap points are located, remove the temporary capacitors and the vacuum variable can then be driven to the capacity required for minimum SWR on each band.

The coaxial balun was made of 35 turns of RG-303 Teflon® cable which was close-wound on a $7\frac{3}{4}$ inch long and $2\frac{3}{8}$ inch OD ABS plastic pipe form. The completed balun measures 27.8 µH.

A surplus 28-conductor rubber-coated cable was used for the run to the ham shack. A 37-pin connector pair (Amphenol 28-21S) was used for connection to the tuner box. The box was bolted to a wood frame post for support at eye level, and an AC outlet was installed on the post to supply power.

Grounding of the antenna is done automatically by a surplus relay, RY 1, which connects the loop either to case ground when the AC is off, or to the active circuit with power applied. The case is grounded, via heavy copper wire, to dual 8 ft. ground rods at the base of the support post. Also, large grounding clips are physically connected to the feed-through insulator bolts if a storm is imminent or we will be away for a while.

The 2:1 SWR bandwidth of the system is shown in Table II. Once tuned to an operating band, it is not necessary to

How do you put up poles like these? Well, you don't do it alone, that's for sure! Some mechanized help is a good idea, too. For ease of later construction, the pulleys were attached to the eyebolts before the poles were installed.

Interior view of the tuner box. Note that the tuner is outside, at the antenna feedpoint, so a weatherproof box must be used, along with grounding precautions.

Fig. 3– Schematic diagram of the tuner circuitry.

NOTE: L2, L3 tap points

BAND	TURNS (from C1 end)
160L	18
160H	14
80	9
75	7
40L	5 1/2
40H	5
30	3 1/2
20L	2
29H	1 3/4
15-17	1 1/2
10	3/8

L2, L3, L1 coax balun, RF in/out 50Ω, External band control (12), S6(A), S6(B), S6(C), MO1 SWITCH MOTOR, (see note), R1 METER POTENTIOMETER (10T), 2:1, MO2 CAPACITOR MOTOR, C1 10-1000, A1, A2, K1, R1 5K, .022, 1K, 1K, 1K, LED ON, 1N4739 9V., 1N4004, 1N4004, +14V, M1 0-10V. LOCAL "C" INDICATOR, LOCAL, REMOTE, S1(B), S1(C), S4 CW LIMIT, 1N4002, MO2 MOTOR CAPACITOR, 1N4004, (A), (B), S3 (MOM) LOCAL CAPACITOR SWITCH, ORANGE, 10 10W., 390, MO1 MOTOR SWITCH, ORANGE/WHITE, 1K, LED TUNE, Q2 2N3442 HEAT SINK, S5 CCW LIMIT, LOCAL, REMOTE, S1(D), 1N4002, .022, 3A, T1, D1-D4, .022, S8 AC ON, .022, 5000µF 40V., 10K, Q1 2N2905, 1N4004, .022, 120, REMOTE, S1A, LOCAL, RUN, STOP, S2, BAND, .022, WHITE TB-1, BLACK TB-2, GRAY, RED/WHITE TB-3, ORANGE, ORANGE/WHITE, WHITE/BROWN/GREEN, WHITE/ORANGE/BLUE, RED

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SS-12	10	12	1⅜ x 6 x 9	3.4
SS-18	15	18	1⅜ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9¾	4.2
SS-30M*	25	30	3¾ x 7 x 9¾	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
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ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
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SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

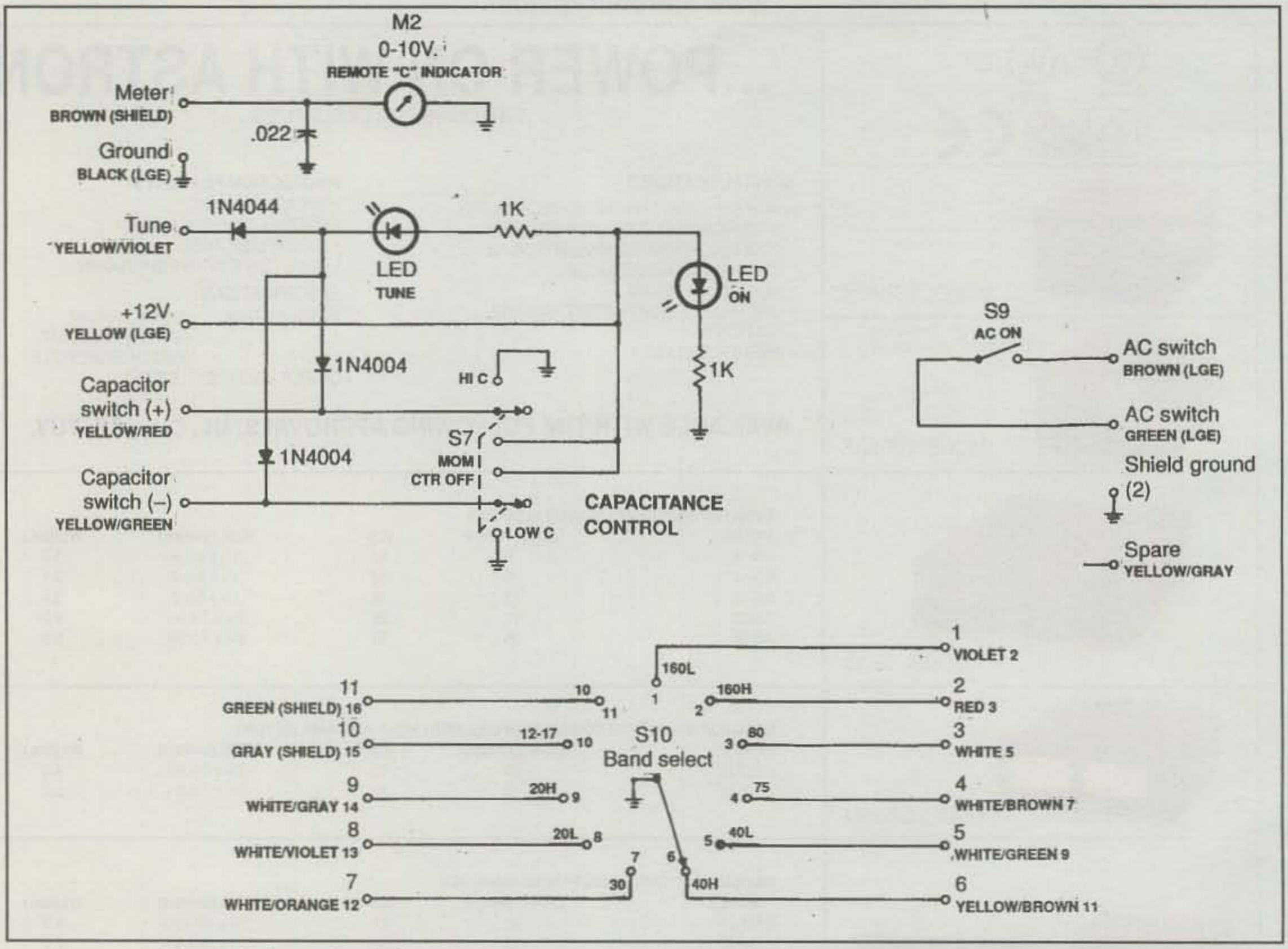


Fig. 4– Schematic of the remote-control circuit for operating thetuner from inside the shack.

Parts List—Remote Tuner

C1	Vacuum variable capacitor, 10–100 pF, 5 KV USCL 1000 (SMC-500497)
D1-4	Quad diode assembly, 6A, 400V; MCM part # 28-1350[4]
K1	Double-pole, double-throw 12V relay, 30 amp contacts, high-voltage insulation
L1	Coaxial balun (see text)
L2, 3	#12 wire, 3 in. diameter, 6 turns/inch, 29 turns total, 33 µH
M1, 2	0–10 volt panel meter, Simpson 1722
MO1, 2	Motor gearhead, rated 6 RPM @ 24V; Surplus Center part # M5-1164[2]
S1	4-pole, double-throw toggle switch
S2	Double-pole, double-throw toggle switch
S3, 7	Double-pole, double-throw, momentary, center-off toggle switch
S4, 5	Single-pole, single-throw, normally-closed microswitch, 3A
S6	11-position, 4-section ceramic rotary switch; Centralab JV-9021
S8, 9	Single-pole, single-throw toggle switch, 3A
S10	11-position, single-section rotary switch
T1	Power transformer, 115v primary / 12V, 4A secondary
R1	5k, 10-turn, 1% lin., Borg code M

Notes:
1) Equivalent parts may be used.
2) Unless marked otherwise, resistors are 1/2 watt, 5%, and capacitors are .022µF, 1KV disc ceramic, MCM part # 31-1615.[4]

Parts Sources (as referenced in text and parts list)
1. Hoffman Engineering Co., Anoka, MN 55303
2. Surplus Center, 1015 W. "O" St., Lincoln, NE 68501-2209
3. Small Parts, Inc., 13980 NW 58th Ct., PO Box 4650, Miami Lakes, FL 33014-0650
4. MCM Electronics, 650 Congress Park Dr., Dayton, OH 45459-9955

retune unless major changes are made on the wider bands. The tuner will easily handle full amateur power, but I find I seldom need to run more than 100 watts. An MFJ-212 "Matchmaker" can be used at the output of a transceiver to aid in tuning. This battery-operated unit, when turned on, emits an RF pulse heard in the receiver that can be nulled with the tuner for minimum SWR without radiating a signal.

Experience agrees with what the computer modeling shows. Very little DX has been worked on 160 meters, but stateside QSOs are outstanding. On 80 meters several DX stations have been worked when the band is right and it is a good all-around radiator. On 40 meters and above DX is routine, and it is not unusual to "open" the bands. After the loop was used for a few months, I took down a triband beam which was always outperformed on long-haul DX. I still maintain a 40 meter inverted-Vee for higher angle work.

The horizontal pattern can be skewed by moving the feed point. For example,

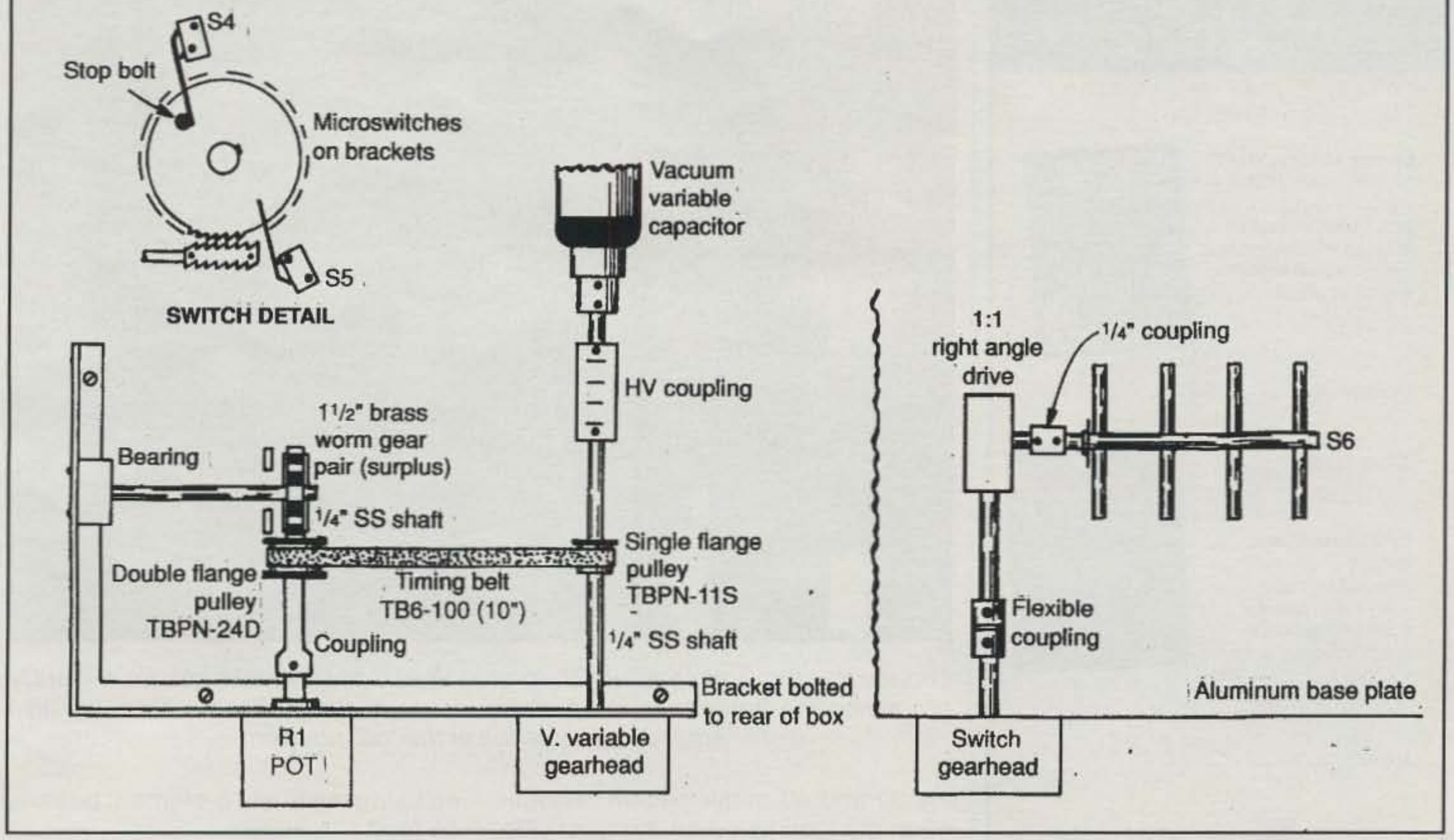
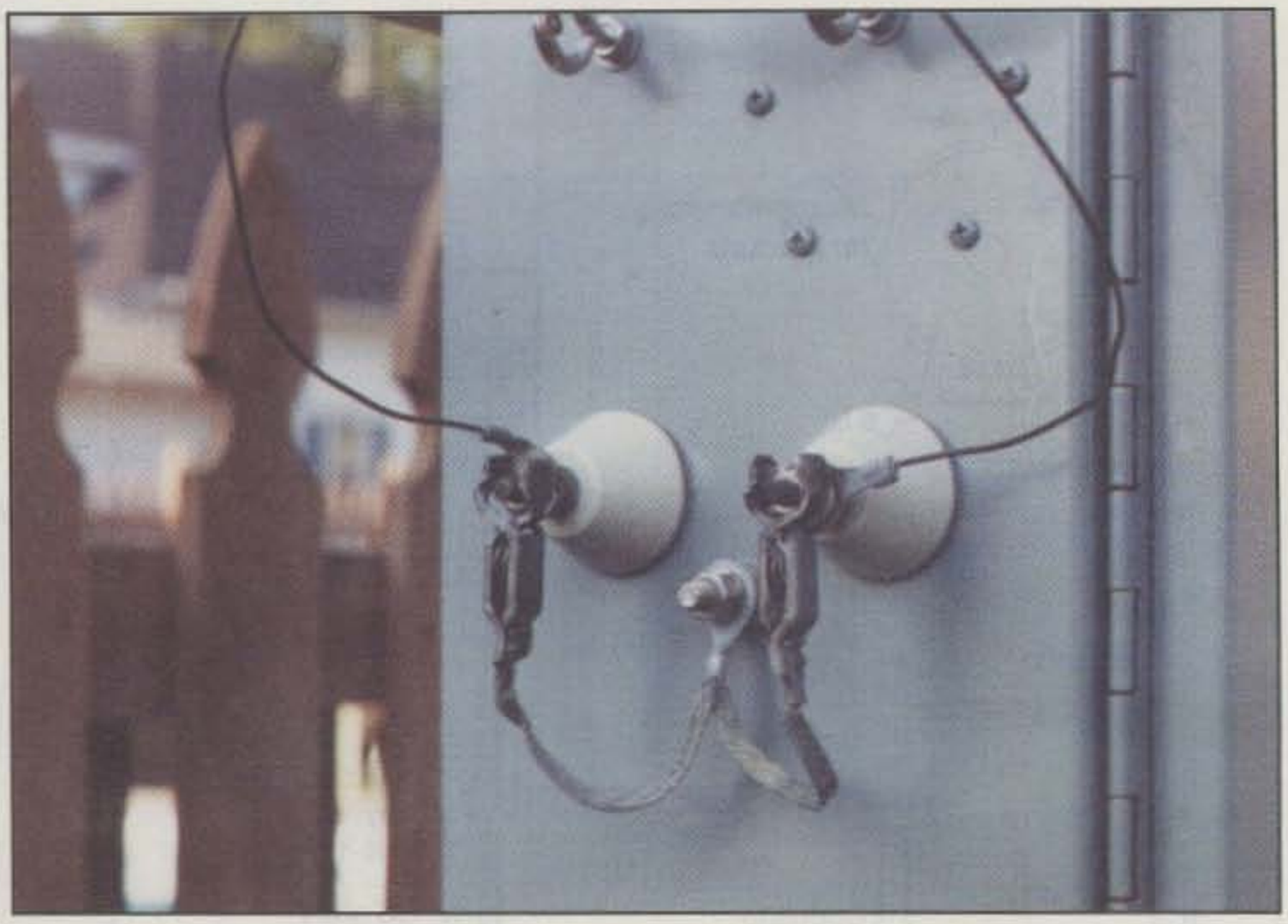


Fig. 5– Mechanical configuration of the tuner drive system.



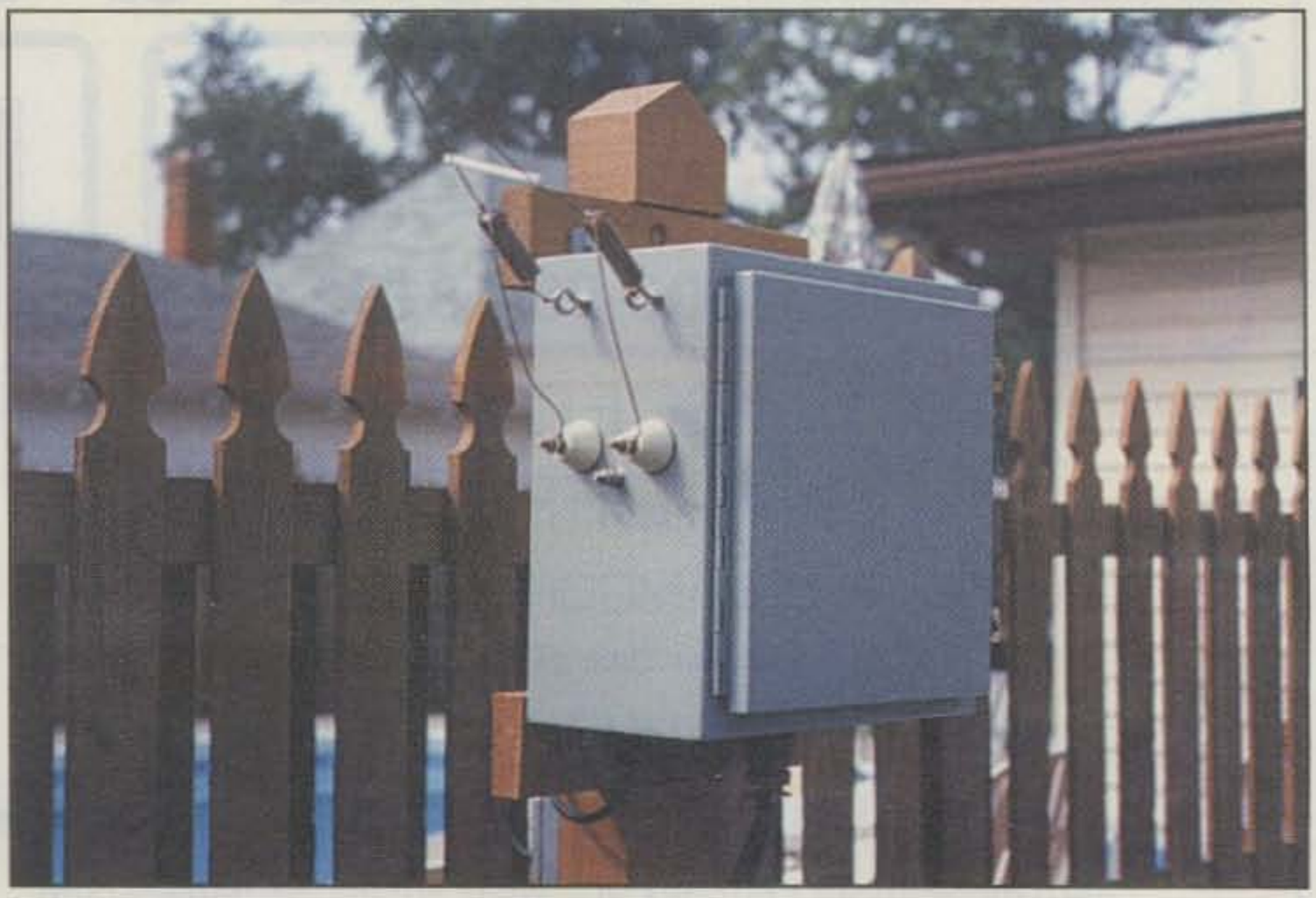
Grounding clips and strap attach to ground wire inside tuner box for manually grounding the antenna when a storm is approaching. An internal relay also grounds the antenna in the "off" position.

the 30 and 40 meter pattern changes when the loop is fed on the west side, 31 feet from the south corner instead of 45 feet as used in the final configuration. The final feed point was that which favored lobes into Europe and the Pacific on most bands.

I recently built a separate, but similar tuner for 6 meters and found the loop operates well there with extremely low radiation angles. The first contact (using 5 watts) was with WP4O in Puerto Rico. He could not be detected using my trusty 5-element beam at 45 feet!

One of the finer points of the loop is the very low residual noise level, and I very seldom find a band is completely dead. The system has been in operation for two years with no failures or maintenance. Performance has been very rewarding and has opened up a new world of DXing.

My thanks to Carl, K9LA, for the computer modeling and for his other help along the way. ■



Tuner box set up for operation. Grounding straps were removed for the photo.

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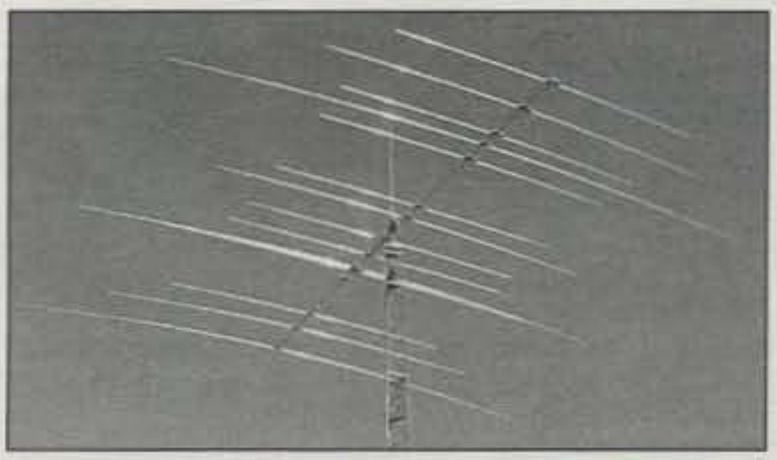

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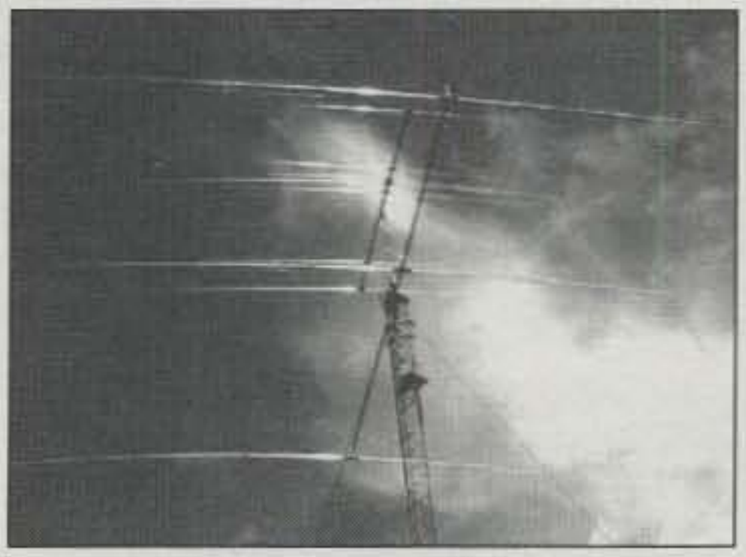

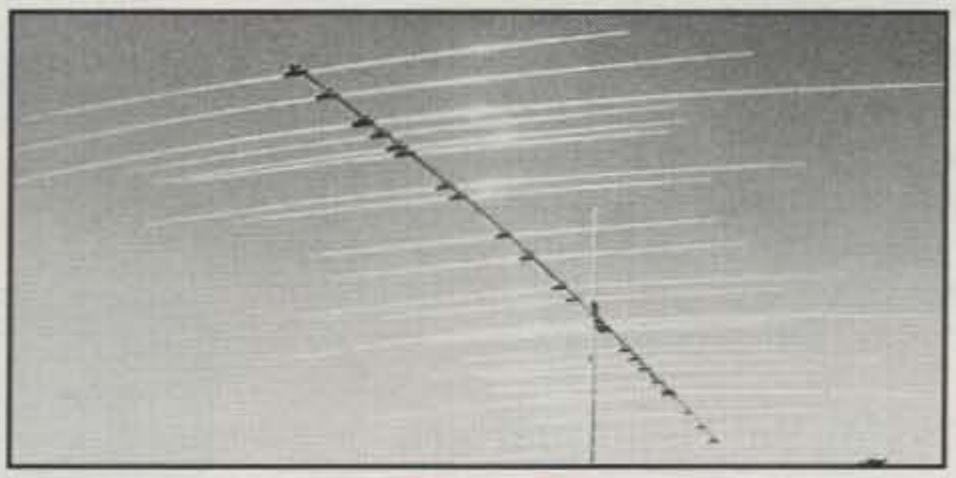

C-49XR

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World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Build Any Neat Crystal Sets Lately?

Your continued interest in and appreciation of crystal sets is both amazing and commendable. Indeed, last year's return visit with these famous "bare bones" receivers of the past only rekindled, rather than satisfied, your hunger to read more about them! We thus are proud to present yet another lighthearted study of crystal sets in this month's column and also add special encouragement to build one yourself just for fun!

Why are crystal sets so popular? Opinions vary widely here, but everyone seems to agree they are historically significant, always useful for emergency/survival communications, good introductory items for amateur radio, and dandy science-fair projects.

Crystal sets were the first radio receivers, and their concept of signal selection, detection, and audio reproduction still forms the basis of modern designs. Like many large ships of yesteryear, the *Titanic* was equipped with a crystal-set receiver and a rotary spark-gap transmitter for wireless communications. Early amateur radio pioneers also used crystal sets and spark-gap transmitters. Yes, friends, and crystal sets are not limited to receiving only AM broadcast-band signals; if their tuning circuits are resonated on HF ranges, they also receive international shortwave broadcast stations quite well.

Crystal sets are easy to build, rather forgiving of minor wiring errors, do not require external power, and "play" forever. Want to enjoy some low-cost radio fun? Build a crystal set—or two. Read on and I will explain how.

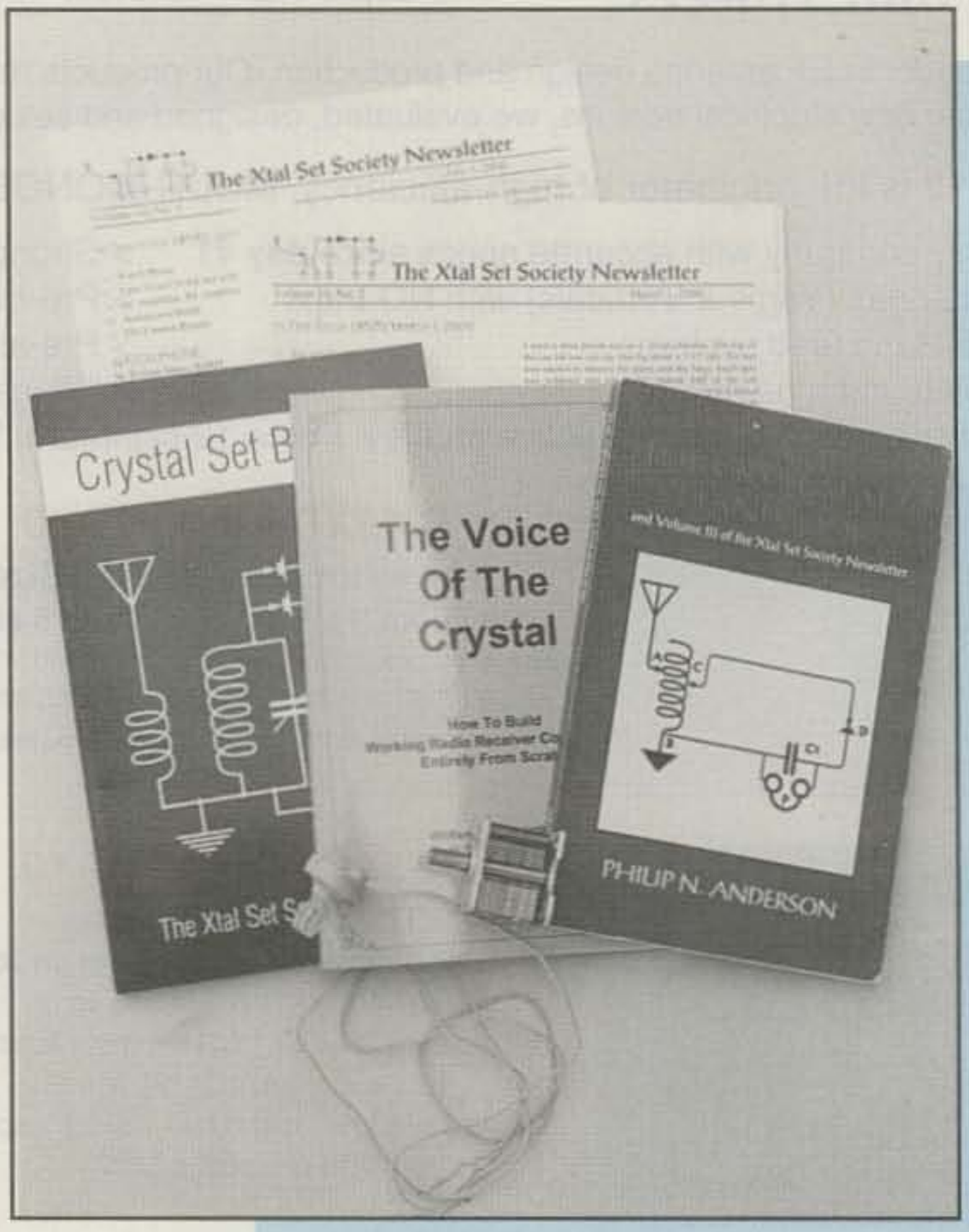

Photo A– The Crystal Set Society is a major focal point for everyone interested in crystal radios. Their bi-monthly newsletter is always filled with captivating projects such as the Levinson Set featured in this month's column. The society also sells books, kits, and parts for building all types of crystal sets. (Details in text.)

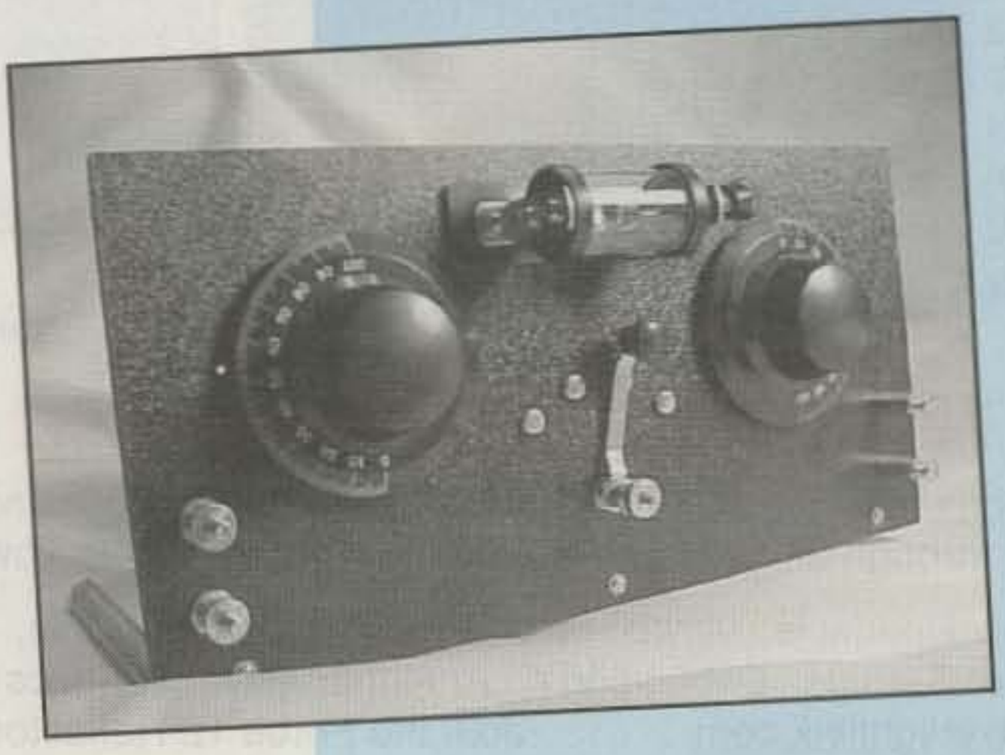

Photo B– This attractive reproduction of a vintage Levinson Radio Crystal Set from Australia was made by Dan Petersen, WA6OIL, and its authentic-era glamour is remarkable. Unit sports classic National "Velvet Vernier" knobs, cartridge-type crystal, and assembled-from-scratch antenna switch. Our special thanks to Dan, WA6OIL, and Rebecca Hewes of The Crystal Set Society for permission to highlight their "Levinson Repro Info" here in CQ.

Crystal-Set Headquarters

If you are interested in crystal sets and wish to expand your knowledge of these gems, consider joining The Crystal Set Society. This noteworthy organization is dedicated to experimenting and learning more about crystal radios and electronics in general. Rebecca Hewes and her assistants produce a fantastic bi-monthly society newsletter loaded

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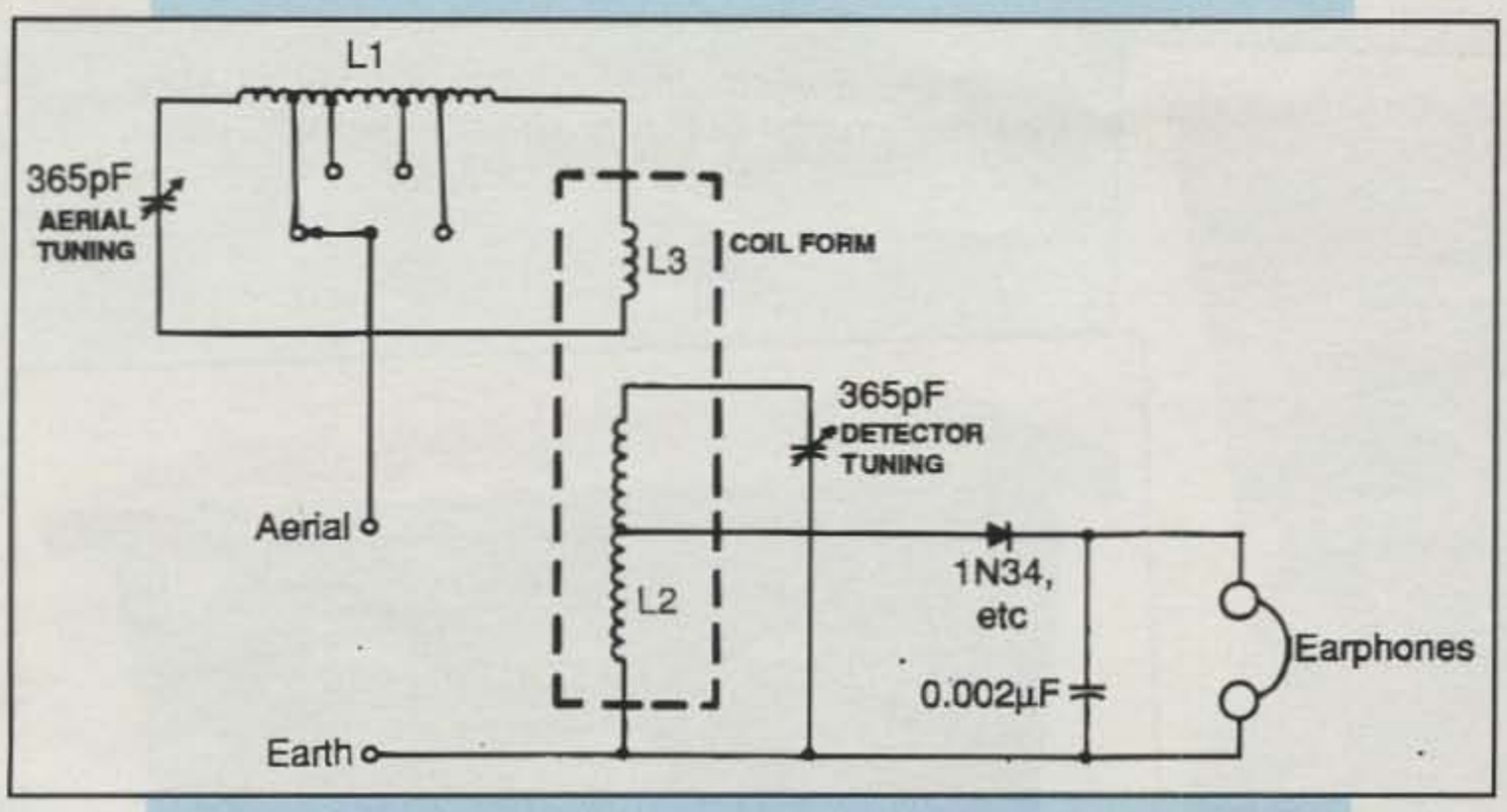

Fig. 1– Circuit diagram of the Levinson Crystal Radio Set produced in kit form in Australia in the past. As shown, the receiver tunes the AM broadcast band. Subtract a few turns from each of its coils and it should also cover some of the lower shortwave bands. (Figure courtesy The Crystal Set Society)

with great dink projects. As shown in photo A, the "XSS" also produces and sells a wide variety of "how to" books, kits, and parts to build crystal sets, amplifiers, vacuum-tube receivers, and more. Check them out by ordering a year's membership and newsletter from The Crystal Set Society, P.O. Box 3026, St. Louis, MO 63130 (1-800-927-1771, <xtalset@midnightscience.com>, or on the web <www.midnightscience.com>. You will be glad you did. Life is always more exciting when you are learning and expanding your horizons.

Crystal Set from "Down Under"

As previously mentioned, the Crystal Set Society is heavily involved in researching, documenting, and reproducing details on classic crystal sets of all types. One of their recently "rediscovered" delights that is simply too dazzling for words is shown in photos B, C, D, E, F, and fig. 1. The sets look different physically, true, but rest assured they all are identical electrically and also exemplify what folks/homebrewers can do with a creative imagination.

This big-time crystal radio receiver originally was produced as a kit by Levinson's Radio Company in Sydney, Australia in times past, and home-brewed copies still perform admirably today. What a magnificent project it makes, with a glazed wood base or cabinet, large National-brand knobs, and vintage "capsule" diode detector. Now

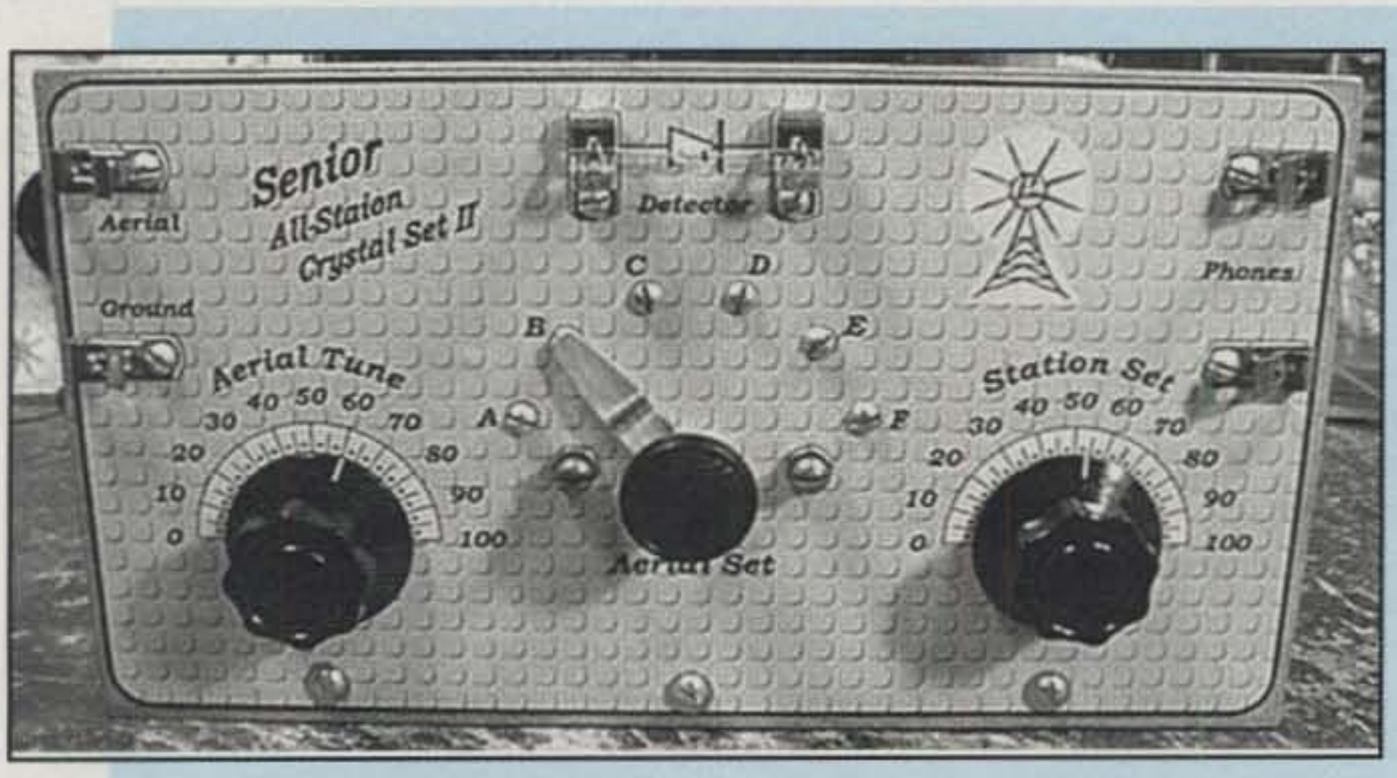

Photo C– Mike Peebles, the Crystal Set Society's leading homebrewer, assembled this classy version of the Levinson Crystal Set, and it is a beauty! The little gem's attractions include professional-looking decal and logo work plus finely calibrated dials. (Photo courtesy Mike Peebles and The Crystal Set Society)

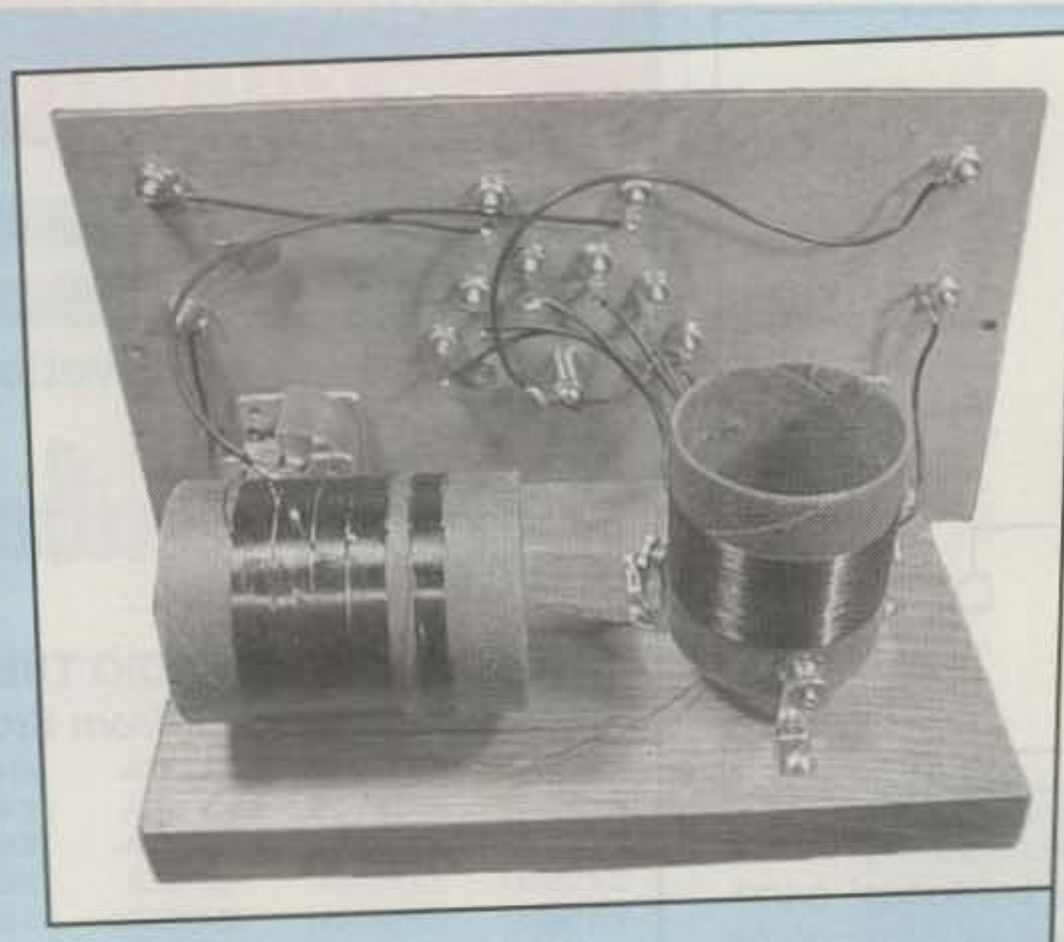

Photo D– Behind- the-front-panel view of Mike Peebles' crystal set. It is sheer artwork in elec–tronic form for sure!

Photo E– Absolutely magnificent is the only way to describe this Great Gatsby-looking replica of the Levinson Crystal Set built by David Walshaw in Australia. Notice the immaculate pinstriping and detail-ing, and the set works as well as it looks! (Photo courtesy Dave Walshaw and The Crystal Set Society)

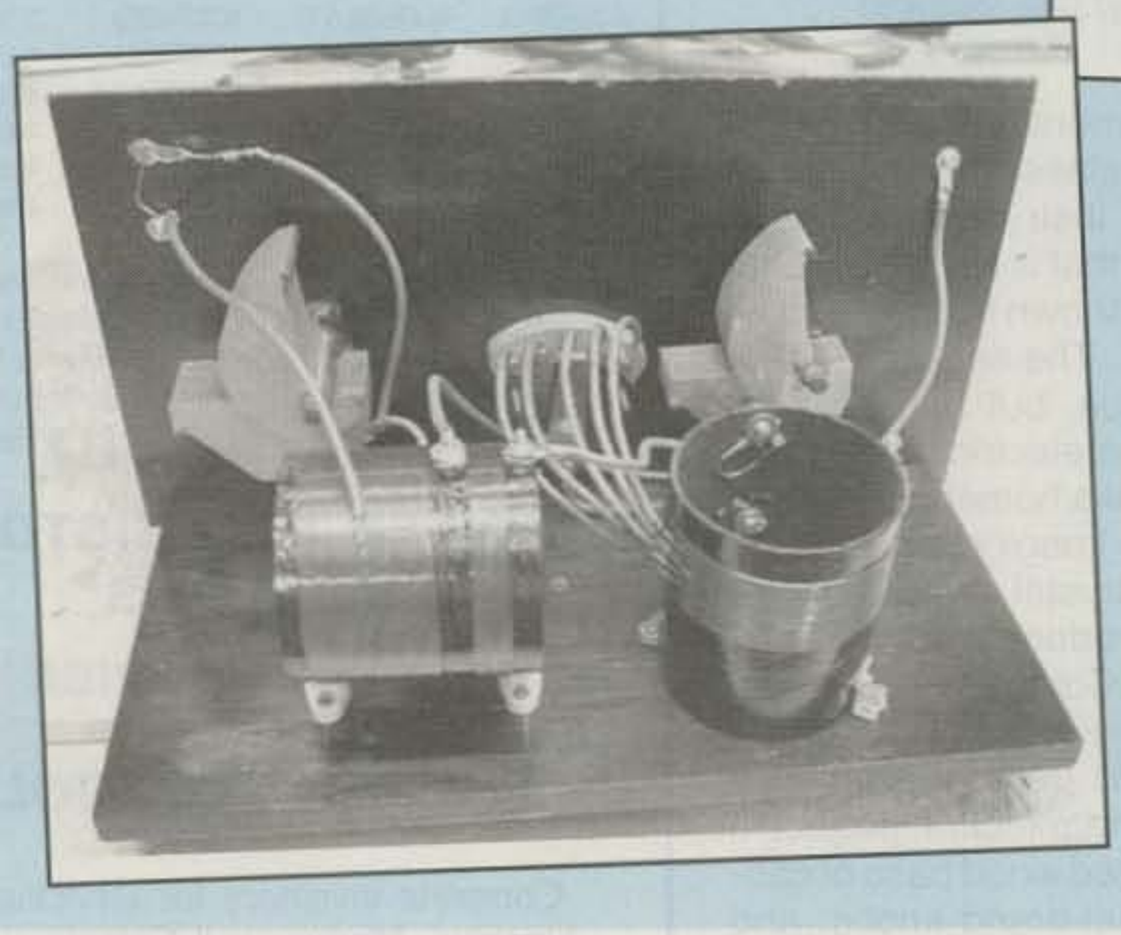

Photo F– Interior view of the Levinson Replica Set built by David Walshaw. Layout is elegant and clean with antenna coil mounted vertically and combo detector/coupling coil positioned horizontally. (Photo courtesy David Walshaw and The Crystal Set Society)

who honestly could resist building his or her own replica of this masterpiece and displaying it in a den or office?! Let's briefly discuss the three receivers and their circuitry.

The first set, shown in photo B, was built by Dan Petersen, WA6OIL, and sports a classic snap-in crystal taste-fully positioned between two famous National "Velvet Vernier" dials. The four-position antenna switch is fabricat-ed from a brass strip 1/4 inch wide and 1/16 inch thick; it is fitted with paneled-insulating washers, nuts, a hold-down spring and a knurled securing nut at its pivot point. Each of the four contacts is a washer-insulated, 8-32 flathead brass screw like those used to fasten glass covers on ceiling light fixtures. Antenna and ground posts are mounted on the panel's left side, and earphone con-nections are on the panel's right side. The sheer beauty of this gem truly reflects Dan's appreciation for crystal sets. If you have questions or com-ments on the radio, you can e-mail Dan at <petersen@worldaccessnet.com>.

The second set, shown in photos C3 and D, was made by Mike Peebles, one of The Crystal Set Society's top home-brewers and a frequent contributor to their newsletter. As you can see, Mike went all out with a marvelously detailed front panel complete with Radio Tower logo, scroll work, and fine-marked dials. He also expanded the antenna coil with six taps plus Fahnstock clips for trying various types of diode detectors. Mike also built a second version with a dual 365 pFd variable capacitor for single-knob tuning. It works well, but the "two-knob version" still has the advantage.

The third set, shown in photo E, was made by David Walshaw "down under" in Australia where the kits were origi-nally produced. Like the other two ra-dios (and the original Levinson Re-ceiver), it is built on a 6" × 12" piece of three-quarter inch pine wood. The wrap-around case is also pine, with a similar-size front panel of black bakelite and some of the most impressive label-ing and pinstriping we have seen in many moons. What a historically signif-icant showpiece!

Looking inside this set (photo F), we see authentic-era, Australian-made 365 pFd tuning capacitors and an eas-ier-to-handle commercially-made (ra-ther than homebrewed) antenna switch. Another very important point in assem-bly is also apparent: The antenna coil (L1) is mounted vertically and the detec-tor coil (L2) is mounted horizontally. As we will discuss later, positioning the two coils at right angles is most important,

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because they must not inductively couple to each other.

Dan, Mike, and David all report very good AM band 530–1650 kHz reception with their Levinson Radio replicas. Dan lives in Oregon and receives KGO in San Francisco, KFBK in Sacramento, and XEPRS in Mexico while using a 200 foot longwire antenna 30 feet above ground. Mike picks up around a dozen stations across the band and reports the receiver does a fairly good job of separating them—a major challenge for crystal sets. David lives in south Australia, uses a 100 foot longwire antenna, and receives AM band stations up to 400 miles away. Overall, those are some very good statistics for a simple crystal set!

The circuit diagram of this Levinson Radio Kit (which incidentally was featured in The Crystal Set Society's March 2001 newsletter) is shown in fig. 1. Both the antenna and detector coils are tuned with regular single-section 365 pFd variable capacitors. Genuine oldies will give the radio an authentic look (if you can find them), or the radio will work just as well with a smaller size pair from The Crystal Set Society. A popular 1N34 diode, a classic "capsule" or snap-in diode, or a catwhisker-and-stand type

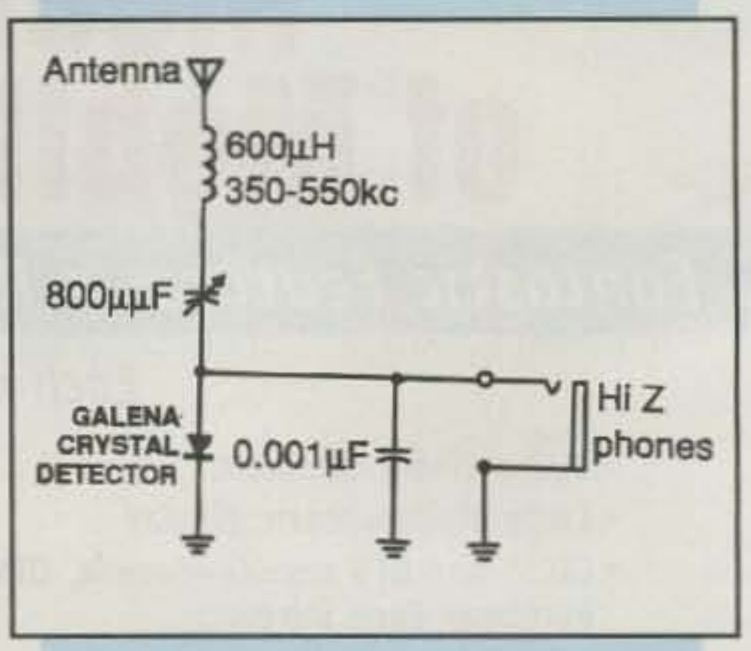

Fig. 2– Unusual circuit diagram of the RCA Type "C" as was used for emergency monitoring and communications aboard sea-going ships. Notice the earphones connect in parallel with the crystal detector. (Circuit courtesy Henry Johnson, K4IPY)

detector can be used as desired. The earphone(s) are 2000 ohm crystal types, and again, a modern "earplug version" is available from the society.

All three coils in the receiver are wound with No. 20 enamel-coated copper wire. Antenna coil L1 is 42 turns wound on a home-fabricated 2 3/4 inch diameter form 3 inches in length. It is tapped at approximately 10, 18, 24, and 32 turns. Detector coil L2 is 67 turns wound on another (home fabricated) 2 3/4 inch diameter form that is 4 inches in length. It is tapped at 35 turns. Coupling coil L3 (which inductively couples signals from the antenna circuit to the detector circuit) is 15 turns wound on L2's form and spaced 1/4 inch from L2. As previously mentioned, the two coil forms should be mounted at right angles to each other to avoid interac-

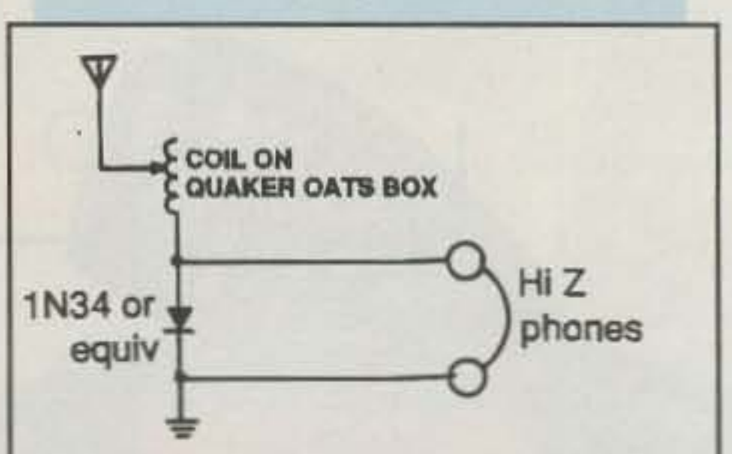

Fig. 3– A similarly wired crystal receiver circuit is one of The Crystal Set Society's logos. The configuration produces surprisingly good results!

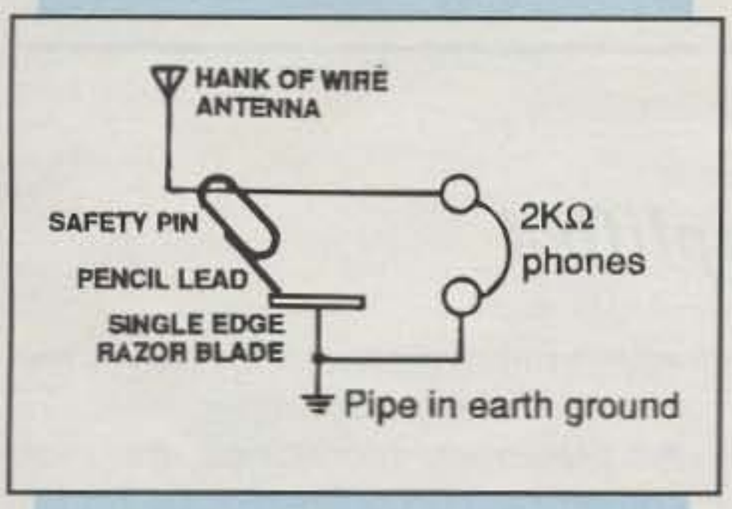

Fig. 4–How simple can you get! This stripped-down Foxhole Radio lacks a tuning coil and capacitor, but still works and picks up two or three stations!

tion. The only coupling here should be via L3 to L2.

The complete radio is built on a 6" × 12" piece of 3/4 inch pine board. The choice of a front panel, switch, knobs, connectors, diode, and earphones is left up to you. Enjoy building one soon and remember to share your views of it with us and The Crystal Set Society.

RCA's Unusual Type "C" Receiver

From our good friend and crystal set aficionado Henry Johnson, K4IPY, comes brief details of yet another crystal receiver used in commercial marine service of the past—the RCA type "C" shown in fig. 2. As you may recall, Henry shared views of his wall-mounted MacKay Emergency Receiver in the August 2000 crystal-set column. Like the MacKay, this RCA unit formed the "receive end" of an alternative or survival communications system required aboard all ships traveling the high seas during and after the WW II era. It employs a large 600 microHenry coil and 800 mmf (that's pFd for you younger hams) tuning capacitor to cover the long-wave/emergency band of 350 to 550 kHz.

Particularly interesting is that the type "C"'s circuit employs earphones connected in parallel with the crystal detector, a most unusual configuration also used as a logo by the Crystal Set Society (fig. 3). Truthfully speaking, I had doubts that such an arrangement actually works until I tried it, first at home and again while mobile. I found that it not only works quite well, it is easy to assemble quickly with clip leads. Furthermore, it should work for copying nearby AM, CB, and possibly airport control towers with a small coil and capacitor resonating it on 28 and 118 MHz, respectively.

There are endless opportunities for experimenting here, so grab a handful of parts and have a dinking good time building one!

Empty Foxhole

After highlighting the "Foxhole" crystal set in our previous column, details on an even more basic and simple version surfaced (fig. 4). I remember trying this "Razor Blade Radio" as a kid and actually hearing two different stations at different pencil-point settings on the single-edge, blue-blade razor. If you can find a similar single-edge, non-stainless-steel type blade today (maybe a "Pal" brand?), give it a go. Just be careful to avoid cut fingers!

Assembly notes? Just clean any coating off the blade, mount it on a board with thumbtacks, and then bend a safety pen so it too can be secured to the board with another thumbtack. Wire wrap the lead taken from a wooden pencil to the safety pen's tip to simulate a catwhisker; connect an antenna, ground, and high-impedance phones; and then move the pencil-lead tip around on the razor blade to tune-in/receive stations. Finally, remember this month's discussion of "free play radios built from scratch" and watch for announcement of a unique survival-radio challenge coming next month in this column.

There is more fun awaiting you than there is room to describe it, so stay tuned, keep on reading, and for goodness sake get on the air and make at least two contacts every day. The bands are booming with good DX and you should be enjoying the fun. I will be listening for you weeknights on 30 meters and Saturday/Sunday afternoons around 14.200 to 14.235 MHz.

73, Dave, K4TWJ

How It Works

BY DAVE INGRAM, K4TWJ

Theory 'n Practice

Automatic Antenna Tuners Simplified

As you will recall, our previous "How It Works" column discussed the concept of evaluating SWR curves and fine-tuning antennas for your preferred band segments. It also considered the classic question why adjust or change an antenna element's length if it works "as is" and promised to explain how automatic antenna tuners work in a following column. Well, friends, that is our highlighted topic of discussion this time, and it includes some always-useful information on automatic and manual tuners alike. We have quite a bit of ground to cover, so let's get started!

Types of Antenna Tuners

Let's begin with a brief look at various types of tuners and their basic circuit configurations. First, antenna tuners are available in both small/low-power and large/high-power versions; manually and automatically adjusted varieties, in or at-rig types and at-antenna types (the latter types are also referred to as couplers, and will be discussed later). Most tuners have unbalanced outputs or SO239 sockets for connecting coax cables. Some also include a balanced output with dual binding posts for connecting twin-lead feedlines and doublet antennas. A secondary classification also relates to a tuner's circuit configuration with L, Pi, and T types highest in popularity.

Small automatic tuners have become today's most favored transceiver accessory or "frill," and with good reason—ease of use. You just punch the tuner "on" and bingo: You get a low SWR and a cool-running transceiver. Nice! Larger "legal limit" manual tuners such as the MFJ-986 shown in photo A still have the advantage in overall station flexibility, however. That is because larger manual tuners are designed to match a wide range of antennas plus work with both transceivers and linear amplifiers. An in-transceiver tuner is fine if you only use a "barefoot" transceiver, but a higher power tuner connected between your linear amplifier and antenna is necessary for "big station" antenna tuning. A few high-power automatic tuners are presently available, but they are rather pricey and their matching range is limited.

Adjustment of any type tuner involves first switching coil taps or selecting coil turns and rough-setting input/output capacitors to peak incoming signals in a desired operating range. In the case of a manual tuner, you then transmit a brief CW or "keydown" signal (at reduced power) and fine-tune the input/output capacitor(s) for the lowest-at-rig SWR. Automatic tuners work in the same basic manner, except they utilize a microprocessor that monitors inputs from SWR and phase sensors and produces output voltage for driving motors or relays rather than relying on eyes and hands to make adjustments.

As previously mentioned, the most common circuit configurations for antenna tuners are L, Pi, and T types as illustrated in fig. 1. The single coil and capacitor arrangement is particularly useful for single longwire or random-length wire antennas, which usually exhibit an impedance higher than 50 ohms. The L circuit's coil may be tapped or continuously adjustable for selecting a desired amount of tuning inductance. The Pi and T configurations are more versatile and work with dipoles, beams, verticals, loops, and almost any other type of antenna the mind can conjure up. How so? If either capacitor in a Pi circuit is set near minimum and the

Photo A– An automatic antenna tuner is ideal for ensuring your transceiver runs cool and delivers full output power when an SWR is uncomfortably high. A "legal limit" and manually-operated tuner such as this MFJ-986, however, is usually preferred in high-power stations utilizing linear amplifiers.

Photo B– ICOM's in-rig and automatic antenna tuners are analog-based with motors adjusting variable capacitors. They work like champs.

4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

other capacitor is set near maximum, it becomes an L-type tuner. One arrangement makes a capacitor-input tuner; the other produces a coil or inductor-input tuner. If the coil is shorted or "jumped" with switch-selected taps, the two capacitors become connected in parallel to produce one large capacitor. If the two capacitors are set near minimum and most of the coil is left in use, the tuner becomes a large inductor.

The T circuit is also popular in tuners, and it works like a Pi circuit except its matching range is slightly wider, and some inductance must always be included to avoid a direct-to-ground short. Several more variations of these basic circuits may be found in tuners, but they all work on the same concept of manually or automatically introducing a particular amount of capacitance and/or inductance to lower an antenna system's rig-sensed SWR.

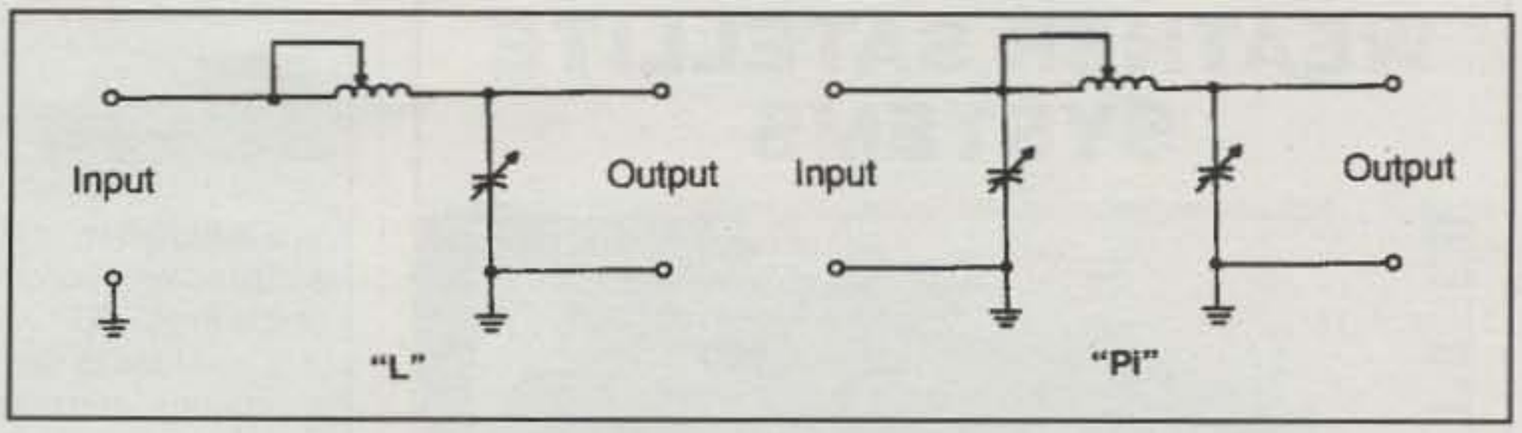

Fig. 1– Popular circuit configurations for both manual and automatic antenna tuners. (Discussion in text.)

More on SWR

Every antenna system (that is the antenna, its ground, and its feedline) differs in type, location, proximity to nearby objects, and ground conductivity. As a result, each one exhibits different amounts of capacitive reactance and inductive reactance, which alters an antenna system's in-shack impedance. If that impedance is 50 ohms, the rig-sensed SWR is ideal, or 1:1. If the impedance is 75 or 37 ohms, the SWR is 1.5:1. If the impedance is 100 or 25 ohms, the SWR is 2:1, etc. An SWR above 2:1 is generally considered excessive. However, many folks (and some transceivers) prefer a greater margin of safety and consider 1.6 or 1.7:1 as the top limit.

High SWR can cause RF feedback, RFI, and distortion of an antenna's signal radiation pattern (like reduction of a beam's front-to-back ratio and forward gain). RF feedback may produce a hot-to-the-touch metal rig case or key (ouch!); erraticly operating VOX, keyer, power supply, or antenna tuner; or distorted audio. RFI can cause telephone and/or television interference. A high SWR can also cause modern solid-state equipment to reduce its output to minimize component stress and overheating. An in-shack or in-rig tuner does not reduce all the previously mentioned problems because it does not reduce an antenna system's overall SWR. It does, however, change the at-rig measured or sensed SWR so the rig can deliver its full output in a cool and efficient manner.

Automatic Antenna Tuners

Earlier in this column we explained that automatic tuners employ microprocessors with their inputs monitoring sensors and their output producing correc-

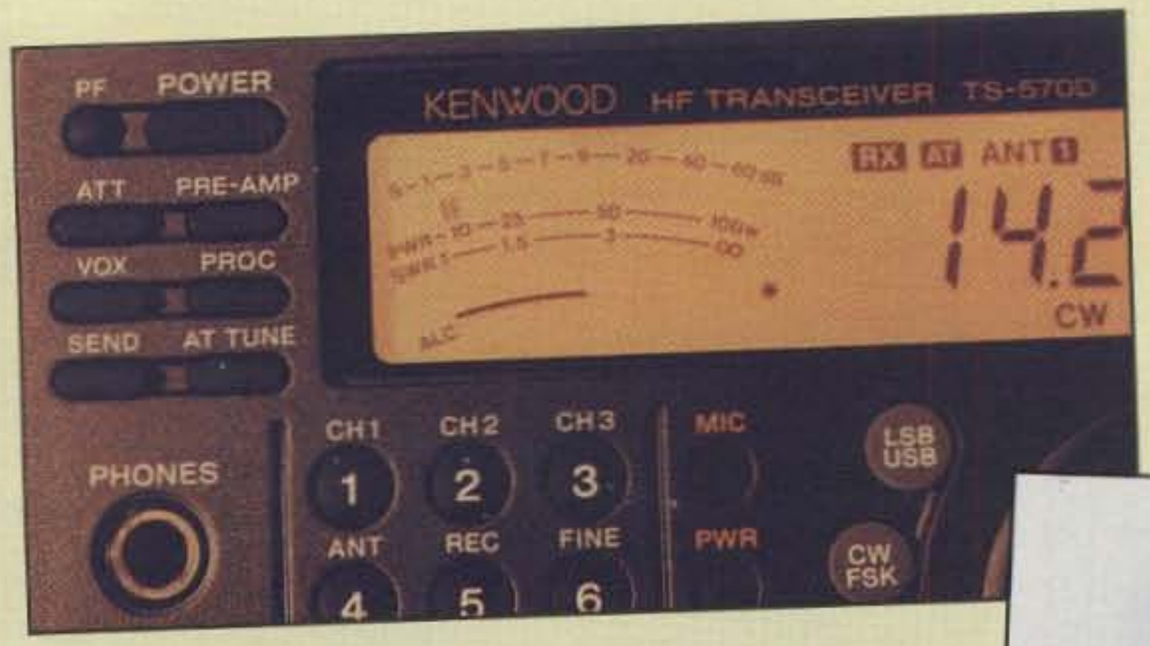

Photo C– Kenwood's automatic antenna tuners utilize relays selecting various combinations of fixed-value capacitors for tuning, and they too work great. Automatic antenna tuners are a blessing when SWR is high and the weather outside is horrendous.

Photo D– This LDG stand-alone automatic antenna tuner is one of several units produced to work with all types of transceivers, and it makes "hands free" operation a cinch. This particular unit also includes a built-in SWR bridge for convenience.

Your Guide to HF Fun

If you enjoy learning about antennas, tuners, rigs, and HF radio in general, check out my brand-new, self-published book *Your Guide to HF Fun.* The book was written especially for new or renewed HFers. It is akin to a helping Elmer in printed form, and it is loaded with hard-to-find information for big-time hamming. *Your Guide to HF Fun* explains rig specs and features in simple terms, tells you how to select "best value" equipment and antennas to fit your needs, and presents several cable-by-cable guides for superb station assembly. It also describes present-day activities on each HF band, how to DX and contest like a pro, how to go HF mobile with high class and low cash, plus much more.

First copies are $16 plus postage ($1.75 book rate or $3.50 Priority Mail) and are available directly from my QTH (Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210) to yours.

Our HF bands have never been more exciting, enticing, and wide open for worldwide DXing than they are today. Whether or not you read *Your Guide to HF Fun* and regardless of your rig's power, I sincerely urge you to get on our famous "low bands" and enjoy the action at least a few minutes every day. That, dear friends, is the real thrill of amateur radio!

tion voltage for motors or relays. Now let's take a closer look at that situation.

First understand that all "auto tuners" are not identical. Some use a Pi circuit configuration, some use a T configuration, some sense both SWR plus phase of antenna reactance (capacitive or inductive reactance), and some only sense SWR. Ultimately, however, they all produce the same results of convenient "punch on and enjoy" operation—a real asset that is always appreciated, especially during inclement weather or when hamming time is limited.

Functionally speaking, we can separate automatic tuners into two types— analog and digital. ICOM's automatic tuners are good examples of the analog type (photo B). When first

Photo E– Automatic antenna couplers such as this compact SGC Model 237 installed at the feedpoint or base of an antenna, match impedance and reduce SWR at the antenna's base. The concept has the special advantage of minimizing radiation/signal pickup from coax cable and is often preferred for low-profile operations.

punched "on" or when changing bands, a click is noticed as the appropriate coil tap is selected. Then during your first transmission, you hear motors adjusting variable capacitors in the tuner to reduce SWR to near 1:1. Resultant tuning data (coil and capacitor settings) is then stored in the tuner's memory and automatically recalled during later on-the-air operations or band changes. In some cases an occasional mild readjustment, or "tweaking," of capacitor settings will be noticed when compensating for slight changes in SWR. All of the ICOM tuners I checked while writing this column utilized T-circuit configurations. Possibly that explains why their specs list such a wide matching range. ICOM's IC-PW1 and IC-4KL kilowatt linear amplifiers, incidentally, include built-in KW auto tuners that make multiband operations delightful.

Kenwood's automatic tuners are a quite familiar and most effective example of digital tuners (photo C). When punched on or left in use when changing bands, they too produce a single click when selecting an appropriate coil tap. When you then hold the "tune" button depressed for transmitting a tune-up signal, you hear relays chattering in rapid succession. The relays switch in/out various combinations of fixed-value capacitors to produce a near 1:1 SWR. The resultant data is also stored in the tuner's memory and automatically recalled during later operations and band changes. I might add an additional note for new HFers or new Kenwood owners here. That "unusual noise" or "arcing-type sound" you hear when activating the tuner is not a defect. Watch your SWR meter and you will see it dropping the SWR.

Standalone automatic tuners such as the LDG unit shown in photo D also warrant favorable mention at this point. These units also seek a low SWR when you transmit a low-power signal, but since they do not acquire band-selection voltage from a transceiver, they do not store preset tuning data in memory like in-rig tuners. The LDG tuner shown uses a Pi circuit configuration, with relays bypassing or series-connecting coil sections plus selecting various fixed-value capacitors. Overall, the concept is quite effective.

Automatic Antenna Couplers

Another item many amateurs use to match antennas and/or lower SWR is an automatic coupler such as the SGC model 237 shown in photo E. This gem is referred to as a coupler rather than a tuner because it installs at an antenna's base or feedpoint rather than in the shack or at the rig. It thus matches impedance or lowers SWR right at the antenna's feedpoint. This is usually considered a more efficient and effective approach to tuning, as a high SWR is not present on the antenna's feedline and undesired radiation plus RF feedback are minimized.

Automatic couplers mainly are used with non-resonant whips for quick and easy multiband mobile operations. As SGC points out, however, they also work fine at feedpoints of dipoles, verticals, and longwires for home stations and make good stealth-antenna setups. If you have special antenna needs, SGC couplers are worthy of your consideration.

Conclusion

We could continue discussing automatic antenna tuners for many more pages, but the closing wire again approaches and we must sign off for another month. In doing so, I encourage everyone with a valid amateur radio license to exercise your operating privileges. Get on the air at least a few minutes every day and have a ball while sunspots are high and the bands are alive with great DX. Do it, and may the force of good signals be with you.

73, Dave, K4TWJ

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

Waterproofing Your Feedline Connectors

Recently, Joe Taylor, K1JT, polled the internet with the above title in the form of a question. He received a number of responses that he published in "Cheese Bits," the newsletter of the Packrats, the Mt. Airy VHF Radio Club, Inc. I believe that these tidbits need a much wider distribution, so with the kind permission of the Packrats, I am reprinting Joe's e-mail compilation here. Please note that the opinions expressed are those of the writers, not of *CQ*.

A hearty thanks to all who responded to my recent e-mail posting asking for advice on protecting coax lines and antenna parts against the effects of water and ice. A large number of thoughtful comments were received, and I thought that a summary digest of them might be worthwhile. Here it is, with some minor editing and, I hope, accurate attribution of all suggestions.

My original questions were the following:

1. What seems to work best toward waterproofing a type-N male connector joined to the type-N females on power dividers or Yagi driven elements?

2. Can anything be done to improve the bad-weather performance of Yagi and loop Yagi driven elements? I'm thinking of the water (or worse, ice) that can build up right around the points of connection to the feedline or balun.

3. Are mast-mounted preamps such as the ones sold by SSB Electronics reasonably weatherproof when mounted in the proper orientation with all cables plugged into the bottom? Should one put a shrink-wrap "boot," or at least tape, over the coax connections, or do they do okay without any special treatment?

The responses were as follows:

Bob Dodson, WB5APD: I wrap all my connectors with electrical tape, then cover the tape with Coax Seal®. I use the electrical tape because removing the Coax Seal® is a mess unless you have the electrical tape under it. I wrap and cover 100% of the connectors and all the way over the feed line about 1 inch. If you have lots of ice, forget using the antenna. The SWR will go up and the driven element is not the only thing that will cause it. If you get ice on all the elements, it's best not to try to use the antenna. SSB preamps are fine as is, but you need to do something to their feed-line connectors and to all the other connectors on the power divider and antenna itself. I have had lots of ice here at times, and tons of rain and high humidity—zero troubles, except I gave up trying to use iced-up antennas. If you get that much ice, you can expect to see your SWR go up, and also the rotor will ice up. You could damage the rotor when it is all iced up and you try to turn it.

PS: I forgot to mention . . . All heliax connectors come with a special rubber sleeve. It is not just heat shrink. It has special goo in it that melts when you heat it to install it. Trouble is, it does not completely cover the connector. I always cover all connectors—even Heliax connectors, which Andrew says are already water proof—100% with the tape and Coax Seal®. My advice is to seal the heck out of everything!

Shelby Ennis, W8WN: The *only* thing I've found to work—most of the time—is silicon rubber. I know; others swear by other things, most of which I've tried—and dumped. And they talk about the damage the acetic acid is supposed to cause. And a properly installed N-connector is itself waterproof. Again, however, the *only* thing I've found to work—most of the time—is silicon rubber. I've never used an SSB preamp, or the like, but if I did, I'd put it under a protective cover, at least. (My non-waterproof Dow Key relays and the preamp are in an electrical box, which is made to mount outside. All cables come through the knockouts in the bottom, which are then plugged with plastic bags to keep out the insects. A couple more plastic sacks are put upside down over the relay and preamp. Has worked great for 10 years down here; a similar arrangement worked for nearly 20 years in Michigan.)

From Jim Shaffer, WB9UWA: I use a layer of rubber tape. Follow this with a good layer of vinyl tape. It is clean and easy to remove. Rubber tape degrades in sunlight, so the vinyl tape is a must. Vinyl tape will not keep out water. Yagis should be designed slightly high in frequency so some water will tune it to resonance. An antenna that is on the mark (director-tuning) will degrade more severely because of the high-pass filter characteristics.

Find a second hobby to pursue when your antenna is ice covered! I put the outdoor electronics for my EME array in a box. A hole is always provided in the bottom to let the water out. Water will get in even with a perfect seal, so it must be let out. When the connections are inside the box, the connections do not need any attention.

Jerry Johnson, KØCQ: M² claims to create a matching connection that hides your feedline from water and ice. Steve Powlishen, K1FO, worked a lot on making his designs handle water, but they never could handle ice. The dielectric constant of ice gets too high to keep things matched. My M² 2M5WL quit working on a long packet path last month while covered with ice, but it was also tilted down to point at the ground (vertically polarized, so the clamps slipped on the horizontal mast). Shrink tubing with the inside that melts should waterproof most any connector. A combination of Scotchkote® and #33 (or #88 for cold weather application) tape (don't accept substitutes, they are *not* the same!) in several layers is effective in waterproofing all kinds of electrical connections, even those being buried underground. I have connections outside, sometimes buried in snow, that have been working fine for decades, bare brass connectors on aluminum CATV coax with just Scotch® #88 for protection. Scotchkote® is becoming hard to buy. Coax Seal® as sold at RadioShack is not useful for anything in the sun but making a mess. It does not maintain a closed cover. It dries up and cracks.

Carl Huether, KM1H: I've tried everything from a sealant used by the military to CATV sealants/shrinks. Most of them work fine, but its darn near impossible to get things apart if needed. A double layer of Scotch® #88 or its related (and somewhat improved) cousins works fine for me up in New Hampshire. I've had cables that I put up in 1989–90, during my contest mania days, that I stripped last fall and still look like new after removing the tape. I'm talking about *real* Scotch® brand, not fleamarket or discount-store import junk!

Ice, snow, and water will detune all elements, and the amount depends upon the antenna design. For UHF the K1FO designs are quite forgiving. During severe icing the usual solution is to wait for the sun. It sometimes helps to have an amplifier that can tune into a moderately high VSWR as long as its not enough to puncture the coax or connector—been there, done that during a contest and still have the evidence to show visitors!

If you are designing your own antennas, it helps to put dry-weather resonance and best F/R a bit higher than the operating frequency. Moderate rain, snow, etc., will then move everything a bit below the operating frequency but still keep the rig happy. At least that works for me where it usually seems to be doing some form of precipitation whenever I want to work something exciting. I haven't a clue about the SSBs; I don't use commercial preamps. I don't

VHF Plus Calendar

July 1	Poor EME conditions
July 5	Full Moon and lowest Moon declination
July 8	Moon apogee; poor EME conditions
July 13	Last quarter Moon
July 14–15	CQ WW VHF Contest
July 15	Poor EME conditions
July 19	Highest Moon declination
July 20	New Moon
July 21	Moon perigee
July ??	Excellent EME conditions but near New Moon
July 26-29	CSVHF Society Conference (See text for details.)
July 27	First quarter Moon
July 28	*delta-Aquarids* meteor shower predicted peak
July 29	Poor EME conditions

—EME conditions courtesy W5LUU

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like boots on connectors; they collect water unless you fill them with some goo, and I don't like using goo. Your mileage may vary.

PS: Almost forgot . . . When applying tape don't be cheap. Overlap at least 60% and the outside wrap should be oriented so that water runs off rather than sitting on the joint. If possible, the tape should go 2 inches either side of the connector. I buy Scotch® 88 by the case at fleamarkets, and it's worth every penny. Don't waste your money on Coax Seal®. Its adhesion is marginal even when it's warm. I used to sell that stuff—until I became a customer!

Stan Laine, WA1ECF: I use Scotch® #88 black electrical tape and the Scotch® putty tape. After the connectors are mechanically mated and snugged up, wrap the putty tape, stretched thin, over the metal connectors and at least 1 inch above and below the connectors. The putty tape is used to fill in voids and to make the joint smoother. Wrap the #88 tape around the joint starting in the middle, wrap to one side with a one-half overlap, then wrap to the other side, then back to the middle. Cut with a knife or scissors, with 2 inches remaining. Do not stretch out the last 2 inches. Just wrap it up. Cover the critical joint on your driven element or balun with a cover such as a bucket, milk container, etc., to prevent downward falling rain and snow from landing on that area. The SSB mast-mounted preamplifiers are reasonably weather-proofed when properly oriented. However, the I/O connectors are too close together to effectively weatherproof them with tape.

Ian White, G3SEK: I don't use the putty tape to fill in voids in in-line connectors, but do sometimes use the glue-lined heat-shrink sleeving to cover the joint between the connector and the cable. Sometimes I wrap it as well, sometimes not. I do use putty tape before wrapping over a connector that goes straight into a box-mounted socket. There is a small gap between the flange and the end of the connector ring, which prevents the tape from tightening down, so there is always a leakage path there. If you make a small "O-ring" of putty to fill in that gap, and then screw the connector ring down onto it, it gives the tape something solid to bear on and makes a totally watertight seal. But normally I don't use flange sockets in exposed positions at all, because it is never an easy shape to wrap effectively. It's far better to bring a short cable out of the box using a proper waterproof cable gland (which has rubber O-rings for both the cable and the box) and then put a line jack on the free end of the cable. The plug-to-jack connection is a much easier shape to wrap. Whatever the case, I never rely only on the waterproofing of the connector itself—not even for a single weekend. From a rainy England...

Adam Epstein, N2DHH: I like a layer of 3M® #23 (rubber splicing tape), followed by a layer of Skotchkote® (electrical sealer), followed by another layer of #23. Give the Skotchkote® 10 minutes or so to dry before you tape over it. The outer layer of tape protects the Skotchkote® from being degraded by ultraviolet. Don't get the Skotchkote® on yourself or your clothes. Don't substitute no-name brand tape (I've seen it dry out and disintegrate.). If your installation is on a tower, do as much waterproofing (pigtails, etc.) as you can on the ground.

Brad Pioveson, W9FX: Joe, please allow me to share some professional experience with you in regard to waterproofing connections that are to be exposed to a harsh environment. My working career was spent as an underground bituminous coal mine maintenance manager. For 17 of my 20 years, all of the equipment was powered electrically, either by trailing cables or batteries. Our insulating materials of choice for cable-jacket repairs included Scotch® 130C self-vulcanizing tape and Scotch® 33+. The 130C, if properly applied, will form a barrier impenetrable by water. By itself, however, it won't stand up to much abuse. Therefore, the outer jacket of the repair is made by applying the plastic 33+ material as an abrasion- resistant material. The method we used to insulate cables involved an initial double layer wrap of 33+ over the exposed connection. This prevents the 130C from becoming impossible to remove, should the need ever arise. Follow the initial layer with a double-wrap layer of 130C, making certain that (a) the "sticky" side is up when you apply it and, (b) stretching the tape at least 33% when applying it (it'll tolerate up to 50% of stretch). Finally, the outer coating is another double-wrap layer, also applied under tension, of 33+.

Splices and cable repairs made in this manner rarely yielded to the harsh underground environment. To easily form a double wrap of any tape, start the tape in the middle of the arm to

On the Cover

Well, this issue is an antenna special, so we looked for the most special antenna photo we could find, and it's going to be pretty hard to beat the antenna farm of noted contester and DXer Rush Drake, K7RM, of La Center, Washington. Rush has no less than six towers ... closest to the camera is a 120 foot tower supporting a 4-element quad on a 48 foot boom, plus (if you look closely) an 80 meter four-square.

Four other towers form a diamond. The tallest rises to 175 feet and holds three 5-element Yagis for 20 meters, one each at 50, 100, and 175 feet. Next lowest in height is the 165 foot north tower, with a full-size 3-element 40 meter Yagi on top, along with two 6-element 10 meter Yagis at 80 and 40 feet, respectively. Then there's a 142 foot tower which supports another 3-element Yagi on 40 meters—this one on an 80 foot boom (the other one's kinda tiny, on only a 42 foot boom), plus two 6-element Yagis on 15 meters fixed on the Caribbean. To point elsewhere on 15 meters, Rush uses his 130 foot tower which holds three rotatable 15 meter beams, each on 48 foot booms. Finally, closest to the house, is the "small" tower—only 70 feet high—with two more 10 meter beams, mounted at 70 and 35 feet.

Rush says he moved to this location in 1967 and started with a single 30 foot tower. When he saw how well it got out, he told us, things started to grow! One of Rush's main passions has been contesting, and he has hosted guest operators for many years.

Today, Rush, who's 83, says he doesn't do much operating himself anymore, except for a daily sked "with a bunch of old geezers ... we check up on each other to make sure we're still alive." But he continues to host guest operators, including one 14-year-old who comes to operate CW contests! That's one lucky kid! And amateur radio is lucky to have people like Rush Drake, K7RM, who share their knowledge and their stations with their fellow hams. (Cover photos by Larry Mulvehill, WB2ZPI)

be covered. Work toward one end. When you reach the end, simply continue taping in the other direction until you reach the far end. Then reverse directions again and continue applying tape until you again reach the middle. This method provides only one exposed tape end for Murphy—and the weather—to work on.

Federally-approved underground electrical -cable splice kits were mandated for use by all mines in the last several years of my career. Each product, while using less-expensive materials than the two I mention, provided similar materials—i.e., self-vulcanizing filler/insulating tape with an abrasion-resistant outer jacket—and were applied using identical techniques. The puncture voltage of the 130C tape is, I believe, 10 kilovolts. I have tested it with a 7 kilovolt DC power supply. It held up to the pressure just fine. I cannot say the same for 33+. It tends to break down at some point between 1000 and 1500 volts.

As for your other queries, having never had one of the devices, I cannot comment on the weather-resistant characteristics of commercial mast-mount preamps. I would be concerned, in any event, about diurnal pumping and the inevitable collection of moisture from condensation in a sealed box. Most of the technical journals I've read in this regard suggest that some form of venting to the atmosphere be provided for (a drain/weep hole drilled in the lower portion of the housing). My experience with explosion-proof enclosures used in the mine tells me that even in an enclosure where tolerances were held to less than .004 inch for all paths to the atmosphere, moisture will build up in the enclosure.

Rick Abbott, KBØLGB: I use the brush-on liquid electrical tape made by Star Brite, a tip from my Elmer. I have never had a water problem in my coax or connections. When I disassemble a connection, it is always as shiny and new looking as when it was joined, no corrosion or moisture to be found. The liquid tape comes off pretty easily too with little fuss. It comes in a small enough can to take up the tower in a tool pouch. Two coats with 30 minutes between applications will do it. I have also used just one coat because I wanted to get down from the tower in a hurry and it still worked fine. I think it is marketed toward marine applications, so it seems like a natural fit for the elements, hi—a little pun. I use a putty-like coax sealant only on cable entry holes into and out of the house.

Owen Wormser, K6LEW: Joe, many have tackled this subject in many ways. In my personal opinion there is *no* right way. Here's why: You will never keep all moisture out of your coax/coax connectors. The only way to do so is an expensive solution: pressurized line and connectors with a drying agent.

I know almost all of the techniques: Andrew sells a "goo" that makes connectors and joints almost water tight, Radio Shack sells a type of putty tape that is supposed to do the same, and then there is everything in between. Here's what I do, its called preventative maintenance. I use simple 3M® quality electrical tape. I use two layers with a fold-back tab at the end so I can get it off easily. Then, depending on the weather, I strip all my connectors at least once a quarter and inspect thoroughly, making sure the locking nut (Type N or Type SC, which is what I use Mil C 7-16) is secure and the cable is secure inside the body of the connector. I inspect the center pin, looking for any signs of moisture intrusion (a graying of a gold pin is a sure sign, tarnish on a silver pin). Then, if all is well, I apply two new layers of tape. This is the only sure way (even with PL 259s/UHF connectors). The atmospheric changes/barometric pressure will ensure you will have moisture intrusion into your feedlines, and there is *no* way around this. You can only keep out "major water intrusion" using all the various goos, putty tapes, sealants, etc., and even then you will still get moisture in your feedlines if they are outdoors. People just don't get this for the most part. There is no substitute for periodic, preventative maintenance for your feedlines.

The other thing to watch out for is coax contamination over time. The only way to find this is to open up your connectors up on the tower, vertical, whatever and inspect the actual coax center conductor and braid as well as the dielectric. Any discoloration is a sure sign of water/moisture contamination. Short of pressurizing your lines, there is no way to become watertight, Joe. Hope this helps and helps you save a bunch of money.

Jay Kesterson, KØGU: Everyone seems to have their own plan. I wrap the connection in Scotch® 33, spray Krylon clear coat over the tape and onto adjacent surfaces, let dry, add another layer of 33 and Krylon, let dry, then finish with another layer of tape. On a hot day I also include one beer each time the Krylon is drying.

Chris Patterson, W3CMP: I use Scotch® #33 tape and then put clear silicone aquarium seal ("silastic") over the tape, and overlap the coax. I've never seen water get into one of these. It's easy to remove the silastic and tape if you have to. Just cut through it carefully with a razor blade.

Fred Stefanik, N1DPM: I've often wondered if the antennas were black anodized (all but the driven element, as anodize is an insulator and connections would not work), then the black hard coating would weather well and "absorb" the sun's heat, melting the ice sooner than usual. I know anodizing isn't cheap, but I bet you could do a lot of 3/16 aluminum rod for a $100 lot plating cost.

Once again, many thanks to all who replied! I shall file all this away and reread it when antenna season arrives here in New Jersey. It can't be too long now. I look forward to working each of you again, or soon, using well-protected feed lines here. *—73, Joe, K1JT*

For Joe and the rest of us, I think that it is now time to work on our antennas. I hope the suggestions that Joe gleaned will be useful to all of you.

Why CW Forever

Last month's numerous aurora reports indicated that CW played a significant role in making contacts. However, not all of us on the weak-signal frequencies agree that CW is an important mode of communications. For example, Jim Shepherd, N7WVZ, took me to task for my extensive editorial on CW this past April. In his e-mail he chided me for taking up so much space with, in his terms, an antiquated mode. I think that it is important for me to clarify why I did so. Therefore, the following is part of what I said in response to Jim concerning, in my opinion, the extreme importance of CW in VHF weak-signal work.

Among the many uses of Morse code are the following: CW is used by EME operators as the primary mode of communications—in particular, the old General Class speed of Morse code, which is the best (or ideal) speed for communicating. Much slower and you run the risk of not copying enough data for a QSO, and much faster and you run the risk that the other person cannot copy your code speed. EME CW work covers mostly 144 MHz to 10 GHz.

In addition, the growing interest in HSMS attests to the continuing interest in CW. Granted, the major software (decoding program) out there makes it possible to not know Morse code in order to complete a QSO, but many operators do rely on their knowledge of the code for decoding the high-speed stream of data into enough information to make a QSO out of it. Most HSMS is carried out on 50–144 MHz, with a smattering of operation on 222–432 MHz.

All beacon stations use CW and transmit Morse code at speeds between 5 and 15 wpm. Beacon stations are presently active on all VHF+ bands up to 1296 MHz. Also, many beacons on 28 MHz are used as precursor indicators for possible openings on 50 MHz. A rudimentary knowledge of the code is necessary to decode the information being transmitted on CW.

My only LASER QSO was using MCW, the most reliable and easiest mode of modulating the LASER signal. Technically speaking, this is the highest VHF+ frequency we hams can use.

Almost all record-setting and record-breaking QSOs on the VHF+ ham bands have been made using Morse code. Records are set and broken across the VHF+ spectrum.

Regarding CW, for me personally, a vast majority of my WAS QSOs and many of my DX QSOs on 50 MHz were by way of CW.

Aurora communications is best accomplished via CW on the higher VHF+ bands because of the unintelligibility of SSB due to the Doppler shift problem.

Many, many cross-mode contacts are made because CW does get through when SSB does not. This is particularly important when a higher power station is being heard by a lower power station.

Therefore, while I am in general agreement with the lowering of the code speed for entry into the hobby, I am not in favor of doing away with the code as a requirement altogether. As I pointed out, a rudimentary knowledge of the code is necessary for many aspects of VHF+ operating.

I stated in April that learning Morse code is like learning a new language. I would not go to a foreign country that does not have English as its primary language and expect the nationals to freely converse with me in my native language of English. Neither would I expect EME operators and others who extensively use Morse code for their activities to make an exception for me and my lack of knowledge of the code. If I expect to converse—make contacts, that is—I had better know the language. In addition, Morse code is, at the very least, the unofficial language of many weak-signal activities.

CSVHF Society Conference

Have you made your summer plans yet? If you haven't, then the following is for you.

If you have, then you need to change them to include a trip to Fort Worth, Texas the last weekend in July for the Central States VHF Society Conference.

The year was 1965. A group of dedicated VHF plus operators gathered for an informal meeting in Sioux Falls, SD and Sand Springs, OK to exchange ideas related to their activities on the weak-signal bands. Realizing that they wanted to make it a bit more formal, two years later a group headed up by Larry Nichols, W5UGO, got together for a small conference at the Western Hills Lodge near Tulsa, OK. From that successful meeting came another one the following year. This one also was chaired by Larry, but was held at the Lake of the Ozarks. From that meeting it was decided that the Central States VHF Society would become an incorporated entity promoting educational activities in the weak-signal arena of ham radio.

As the society grew, so did its reputation for sponsoring the premier VHF conference. Often defying its name of Central States, hams would come from across the country—and even from foreign countries. Finally, going way beyond the meaning of its name, this past year the conference was hosted in Canada. Owing to the success of that conference, there is talk of again hosting it in Canada in a future year.

One of the more popular outcomes of the Society's conference is the *Proceedings*. First published in 1984, it has become a collector's item of sorts, containing a vast array of sublime to deeply technical articles related to the weak-signal bands. For many years now, the ARRL has published the *Proceedings*.

This year, as mentioned above, the society's conference will be held in Fort Worth, TX from July 26 through July 29 at the Dallas-Fort Worth Airport Marriott South (1-800-627-7468, 817-358-1700; make reservations by July 5 and mention the Central States VHF Society 2001 Conference to get the special rates). There will be technical programs, antenna-gain and noise-figure measurements, fleamarket beginning Friday evening, Saturday night banquet, breakfast meeting on Sunday, family programs, and more. Be sure to check the CSVHF Society web page at <www.csvhfs.org> for up-to-date news as the conference approaches. Also, you will find a printable application and registration form there, plus society membership information. The conference fee will again be $30 if you preregister. The cost at the conference will be $40.

The society also sponsors the Chambers and Wilson Awards. The John T. Chambers Award was instituted in 1970 at the suggestion of Bill Smith, KØCER. This award honors John Chambers, W6NLZ, for his many contributions to VHF, most notably his work with KH6UK proving the existence of the West Coast to Hawaii duct. The Wilson Award was instituted in 1982 in memory of long-time society member Melvin S. Wilson, W2BOC. It is given for outstanding and continuing service to the society or to VHF/UHF in general. Nominations may be sent to Kent Britain, WA5VJB.

Current Meteor Showers

This month there are a number of minor showers. The most intense, the *delta-Aquarids*, is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around 28–29 July.

The only northern latitude shower is the *alpha Cygnids*. It is supposed to peak around 20 July, but with a rate of only five meteors per hour.

Beginning around 17 July and lasting until approximately 14 August, you will see activity tied to the *Perseids* meteor shower. Its predicted peak is around 12 August. I will have more extensive coverage of this shower in next month's column.

Sylvia Stein Remembered

Sylvia Stein, widow of Harry Stein, W3CL, one of the founders of the Mt. Airy VHF Club, Inc., passed away this past spring. She was a friend to many of the members of the club and, along with her husband, will be sorely missed by them.

And Finally . . .

This is my 120th column. It hardly seems possible that I have been writing this column for ten years. It has been a lot of fun to write about your exploits here in this space that *CQ* magazine has graciously given me to brag about you!

While it has been fun, there is room for improvement. On the VHF e-mail reflector Bill Duvall, K5UGM, and others recently lamented the lack of VHF and weak-signal coverage in this magazine. While I take his criticism to heart, I also challenge him and others to submit material to me for publication in this column. This is your column. Technical discussions such as how to waterproof your coax connections belong right here! Send me your input about VHF and I will get it in this column.

I hope to see many of you at the Central States VHF Society Conference. I am still working out my days off so that I can attend. Hopefully, it will all come together so I can drive down for at least part of it. Even if I don't make it, though, I will still be here writing about your exploits on the wonderful world of weak-signal operations.

Until next month...

73, Joe, N6CL

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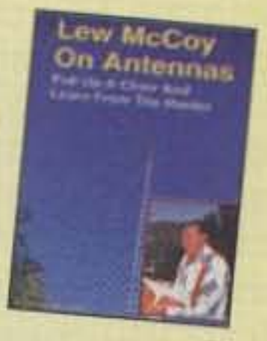

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Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

An Interesting RF AGC System

This month I would like to introduce you to an interesting circuit design, originally published by Analog Devices, that will have a multitude of applications in the various circuits you design. The circuit is for an automatic gain control (AGC) that operates well into the RF region. Such a circuit will accept an input that varies from 1 millivolt (.001 volt) to over 1 volt and deliver a substantially constant output of around 316 mV. If you wish, a simple, fixed-gain additional amplifier stage can then be added to produce whatever final level you desire. Furthermore, the output will remain constant from around 8 kHz up to at least 10 MHz. Such a circuit is ideal for receiver design (in the IF strip) and for stabilizing the output of a signal generator (within the circuit's range), to name but two applications.

The heart of the AGC system is the Analog Devices AD600 integrated circuit. This device is a dual low-noise amplifier with a unique built-in attenuator. Fig. 1 is a simplified block diagram of the internal "workings" of each section of the chip. As you can see, the input signal is applied to a resistive ladder network with an input impedance of 100 ohms. Each section of the ladder network increases the attenuation by 6.02 dB, resulting in an overall range of 0 to 42.14 dB (roughly 0 to X115) per section. The resulting attenuation is a function of the position of the "slider," which is determined electronically by the voltage difference between C1LO and C1HI. The output of the ladder attenuator is then applied to a fixed 41.07 dB amplifier stage.

Unlike typical variable gain amplifiers, this chip varies its input attenuation rather than its actual gain, but the final result is the same: An input signal is raised (or lowered as required) to produce a fixed 316 millivolt output. Because an attenuator scheme is used, the bandwidth and gain of the amplifier are fixed, not like a conventional voltage-controlled op-amp where the higher the gain, the lower the bandwidth.

Fig. 2 is a schematic diagram of the actual AGC stage. The first thing you probably will note is the strange values of the resistors. These are necessary to assure the proper bias, the proper centering of the signal in the pass-band, and the overall temperature stability of the circuit. These values are recommended by Analog Devices, by the way, and can be configured by various series-parallel combinations or by hand-selection of close values with an ohmmeter.

In operation, the signal is applied to pin 2, the input to the first amplifier in the chip. The output of this amplifier (pin 14) is then applied to the input of the second stage, pin 7, via the RC network. There is a loss of 50% here due to the 100 ohm coupling resistor and 100 ohm input impedance as well as a roll-off of about 32 MHz due to the RC combination. This roll-off is necessary for proper stabilization.

The output of the second stage, pin 11, is then applied to the emitter of the 2N3904 transistor while a constant current of about 300 microamperes is applied to the collector by means of an AD 590 constant current source. The difference between the two produces and error voltage at the collector that is applied to the attenuator control pins of both amplifiers (pins 9 and 16). This

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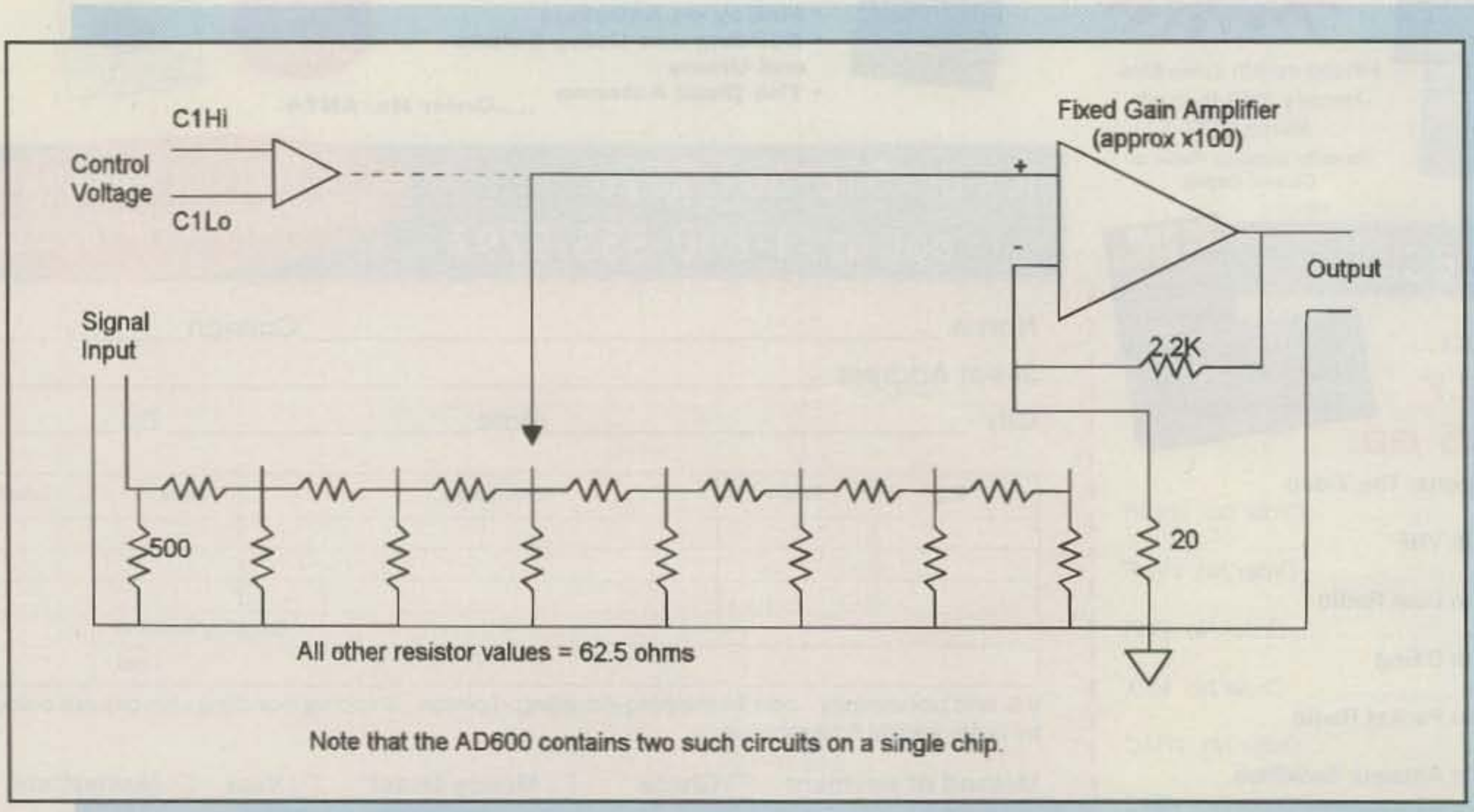

Fig. 1– Simplified block diagram of the AD600.

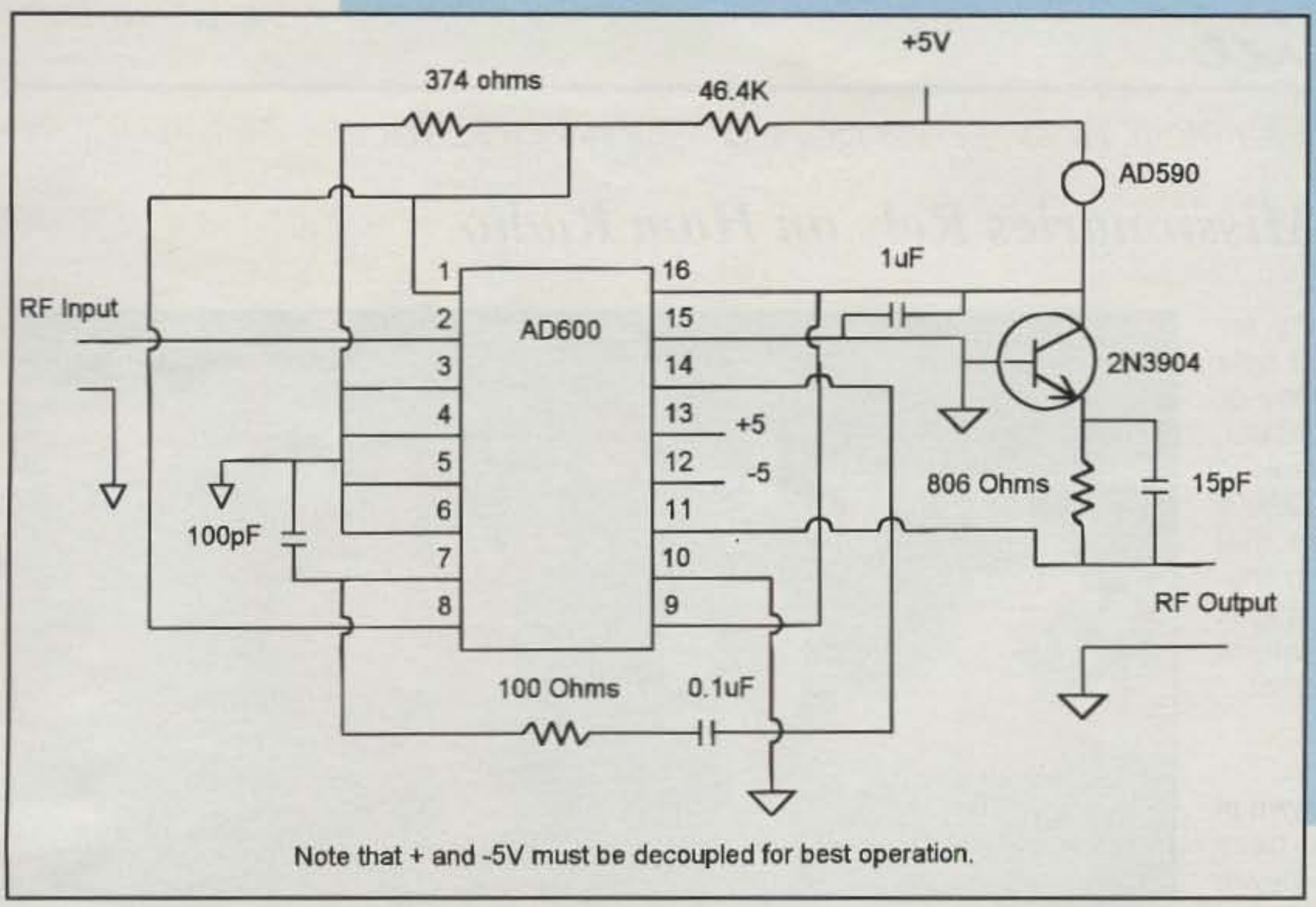

Fig. 2– Schematic diagram of he AGC amplifier.

error voltage controls the attenuation of both stages so that the output is maintained at 316 millivolts over the entire frequency range.

A more detailed explanation of the circuit is available from the data sheet, which may be downloaded from Analog Devices' website at <www.analog.com>, along with other applications for this chip.

While the actual function of the circuit is indeed unique, the cost is somewhat more than the casual experimenter might be used to paying. The AD600 costs $16.50 in quantities of 100 pieces, and the AD590, another $4.13. Single-quantity prices are probably 20% more. If you need this function, however, it is hard to imagine how you would accomplish it so simply for less.

73, Irwin, WA2NDM

Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

Missionaries Rely on Ham Radio

Most of us take our hobby for granted. Many of us right now are talking about Field Day or summer vacation. Yet for many people, amateur radio plays an important role in their daily lives. This month we take a look at one international group that relies on ham radio and doesn't go anywhere without it. We'll also take a look at some stateside operations where amateurs serve in the public interest.

The Bowers family—Jim, Roni, Corey, and Charity—at home on their boat. Roni and Charity were killed when their airplane was fired on. (Photo courtesy ABWE)

We've Been Shot!

A missionary aircraft was shot down in Peru this past April. You may have heard about the incident on the news, but you may not have heard that two of the passengers (including one of those killed) were hams. On board were the pilot, Kevin Donaldson, and the Bowers family—Veronica, "Roni" Bowers, KD4CKM; her husband Jim, KD4CKN; their son Cory; and infant daughter Charity. Roni, 35, and seven-month-old Charity were killed in the incident. All were members of the Pennsylvania-based Association of Baptists for World Evangelism (ABWE).

The Bowers, from Muskegon, Michigan, had been serving in Peru since July 1993. According to news reports, the Peruvian Air Force shot down the missionaries in the Amazon jungle in the apparent belief that the plane was carrying drugs. The Peruvian military said it opened fire after the pilot ignored warnings to land. That claim is being disputed. The Peruvian Ministry of Defense said the Air Force "deeply regrets the loss of human life" and said its actions were part of its anti-drug operations procedures. The three survivors escaped when the Cessna 185 float plane ditched in the Amazon River.

Disaster News via Ham Radio

Larry Hultquist, OA8ADM/KC7HRT, a fellow member of the ABWE, was with the Bowers as he made a six-hour sworn statement to Peruvian investigators. According to reports in the *Washington Post,* Hultquist monitored the plane on a standard VHF radio, communicating with the Iquitos tower as well as his ham equipment. Hultquist, who was in Iquitos at the time, said both radios are standard on all missionary flights. He has been in Peru for about 14 years, and he spoke with *CQ* about the incident.

Hultquist told the following to *CQ,* "We were frantic when the tower at the airport did not answer our phone calls! By then our plane had crashed in flames into the Amazon above Huanta and was upside down, floating back down river to the village."

"Jim got a tourniquet on Kevin's leg," Hultquist continued. "He spent the rest of the time making sure his family's bodies didn't float away." Villagers arrived

The Bowers' aircraft being pulled from the Amazon. Amateur radio provided many of the initial reports. (Photo courtesy ABWE)

c/o CQ magazine
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in canoes 30 minutes after the crash. They loaded Donaldson, who had been shot in both legs above the ankles, and the Bowers family into the canoes. Jim managed to get his dead wife Roni and daughter Charity out of the plane, along with his son Cory, who swam with them to the canoes."

When they arrived in Huanta, Hultquist said, "Jim used the village ham radio to call Iquitos and tell us of the disaster. Later using another ham frequency we were able to speak with the clinic which Kevin had been taken to for emergency treatment and blood."

Phone Lines Jammed! Cell Phone Dead!

Hultquist picks up the story:

"When the Bowers family arrived in Iquitos, all the phone lines were jammed with well wishers and press! We could not communicate with public communications. I was with Jim, and we did our communications via 2 meter contacts with several hams in the area. Using my base at the house, I could communicate with Carolyn, OA8ADN. She would do what was needed on another phone, which was not jammed up. Jerry, OA8AEK, a new ham in Peru, was another relay and leg person for us as we needed this or that brought, bought, hauled, or moved. In the 24 hours of the first day we were on the air almost the whole time.

"One rather funny point in the activities of government people from the US Embassy and Peruvian Air Force came when a General, a judge, and a Consul had batteries on their cell phones go dead or they could not function from inside the building we were in. They had me make calls for them via 2 meters and the outside line, or by direct contact with the handie on the other end.

"Without the HF units in the town of Huanta, Pevas, and Iquitos, we would have been many hours getting word of the deaths of two of the Bowers family. Without the 2 meter handie we could never have gotten done what we did in the time we did to get everyone out to the states for medical treatment and family. I am a missionary and I am a ham. I can truthfully say, 'Praise the Lord for Ham Radio!'"

Staying Safe...

Hultquist said all that ham gear was not there by accident. "We use 2 meters and an HF all the time here to stay safe as we travel, fly, and visit villages," he explained. "Many of the nets—21.390 Halo Net and the 14.300 Maritime

Kansas Amateur Named NOAA "Environmental Hero" For SKYWARN Service

Mike Albers, KØFJ, of Colby, Kansas, received a 2001 Environmental Hero award from the National Oceanic and Atmospheric Administration. Albers was recognized for his outstanding service to the National Weather Service—a NOAA agency—as the volunteer director of the Thomas County SKYWARN network. NWS Meteorologist Scott Mentzer, NØQE, presented a certificate and letter from Acting NOAA Administrator Scott Gudes to Albers during a special meeting of the Trojan Amateur Radio Club. Mentzer heads the National Weather Service office in Goodland, Kansas.

NOAA Environmental Hero awards go to approximately 25 Americans each year in support of Earth Day. SKYWARN volunteers relay real-time severe weather data to National Weather Service via Amateur Radio. Mentzer said the SKYWARN network in Thomas County "has become a key source of weather data" for his office. As examples of SKYWARN's contribution, Mentzer cited the July 21, 1996 Colby tornado and a severe weather outbreak on April 6, 2001.

Mobile Service Net—have been very helpful for years, allowing us to stay in touch with family. We have learned about our kids, engagements, grandbabies, etc., over the radio. We have also received word of death in the family which allowed us to be there in time for the funerals."

According to Hultquist, "We use ham radio on a daily basis here in OA8 land."

Missionary Work and Ham Radio

Missionaries have been using ham radio for years as a way to keep in touch with the outside world. In some cases ham radio becomes the lifeline. In June 1998 Florida resident Ed Petzolt, K1LNC, responded to an on-the-air emergency call on 20 meters. It was a life-threatening situation in Central America, where heavily armed gunmen had kidnapped four missionaries in northern Guatemala and held them for ransom. Desperate to save his family, missionary Elam Stolfus, TG7XQS, turned to ham radio as his only connection to the outside world. According to the ARRL, Petzolt phone-patched Stolfus to the US Embassy in Guatemala City to arrange for military and police assistance. He then remained at the radio for much of the next seven hours to provide communications and relay information that would contribute to the successful rescue of the hostages and the capture of the terrorists.

The stories seem to be endless: a missionary living in a thatched hut with no running water or electricity, a nurse in a war zone in Sudan, or a sail boat tracing the outline of Mexico. In each case they do not have a phone, but they do have e-mail—via ham radio.

Grady Williams, K6IXA, and Chuck Mancebo, W6GAM, of Atwater, California help missionaries, boaters, and others connect computers to their ham radio equipment. "The system is not very fast, but it's extremely reliable," Williams told the Modesto (CA) *Bee* newspaper. "The last six or seven years, use of radio e-mail has been steadily growing." Messages can be sent and replies can come back in a few hours instead of waiting for weeks. The Turlock (CA) Amateur Radio Club reported that Mancebo recently returned from Peru. While there he installed two radios, one out at an Indian village and the other in a longboat the missionaries use along the Amazon.

Williams, Mancebo, and others are using Pactor on HF and Winlink2000 software. Winlink2000 gives the user access to weather and location reports. This information is forwarded to an internet address that allows internet users to view three maps of the ham's location. The internet site is served by a central mailbox operation at N8PGR's QTH in Cleveland, Ohio. Each of the participating mailbox operations, such as K6IXA's gateway, retrieve incoming radio e-mail from the central mailbox. The mobile user is able to use one participating mailbox to receive and send mail to, or can have the e-mail sent to about 21 mailboxes worldwide and use the station with the best radio reception. See "HF Hookups With Winlink 2000" for more info on this increasingly popular HF digital software.

Ham Capabilities Impress Officials

Amateurs in the Santa Fe, New Mexico area participated in a drill held in conjunction with a fire exercise at a local ski area. Operators supported the

HF Hookups with WinLink 2000

Features of *WinLink 2000* include:

- Text-based e-mail with binary attachments such as DOC, RTF, XLS, JPG, TIF, GIF, BMP, etc.
- Position inquiry accessible from both the internet via the APRS, e-mail; or radio to track the mobile user.
- Graphic and text-based weather downloads from an extensive list of weather products.
- Pickup and delivery of e-mail regardless of the participating station accessed.
- End-user control of which services and file sizes are transmitted from the participating stations.
- The ability for each user to re-direct incoming e-mail messages to an alternate e-mail address.
- The ability to use the *AirMail* end-user program to contact *WinLink 2000* over the internet.
- The ability to use any web browser to pick up or deliver mail over *WinLink 2000*.

There are limitations on the type and model of modem or "terminal node controller" (TNC) used and current operations are limited to Pactor I and Pactor II.

For further information check out a website managed by Steve Waterman:. <www.winlink.org/k4cjx>.

Maritime mobile operation on the Amazon. The Bowers sported an R7000 vertical on their boat. (Photo courtesy Larry Hultquist, OA8ADM)

Santa Fe, Sandoval, and Rio Rancho EOCs. In addition, operators were at the Red Cross, National Weather Service, and Veterans Administration Hospital in Albuquerque.

Alden Oyer, AG5S, operated HF and VHF from the State EOC at Santa Fe and had a cross-band repeater running in the parking lot. This came in very handy for a direct link to the Sandia Ski Area. Tom Ellis, K5TEE, met personnel from the Red Cross, US Forest Service, and other fire agencies at the Ski Area. Ellis was able to work into the cross-band repeater from his own cross-band repeater located in the Ski Area parking lot on 220/450 MHz, which then was repeated from the cross-bander at Santa Fe into the 147.10 repeater in Rio Rancho. Ellis reported that many of the fire vehicles were in deep canyons or behind ridges making communication difficult. Others were having to relay their traffic from the command post to the in-town dispatch center and then out to the field. It seems that everyone Tom spoke to was properly impressed with the power of the two HTs he carried with him and whom he could talk to reliably from the Ski Area.

Kansas Hams Respond to Twister

Amateur Radio Emergency Service members in Kansas provided communications following an F4 tornado that ripped through the town of Hoisington in April. The surprise twister left one dead, dozens injured, and millions of dollars in damage. According to the ARRL, a weather-spotting ARES net active prior to the tornado touchdown had received reports of a funnel cloud at Hoisington, but the National Weather Service had issued no tornado warnings. At one point early on, Kansas District 5 Emergency Coordinator Bob Haneke said the only link parts of Hoisington had with the outside world was via amateur radio VHF to the emergency operations center in Great Bend. "The outgoing phone line trunk had been damaged," he said, "and cellular phones in the area were useless, as the system was grid-locked."

Amateurs assisted in several ways during the relief effort. Haneke says hams provided communication support to several responding agencies, including the American Red Cross, the Salvation Army, and Adventist Community Services. Hams also provided primary or back-up communication for hospital facilities and shelters and assisted the Red Cross with damage assessment. In addition, HF and VHF links were established to handle health-and-welfare traffic. The Golden Belt Amateur Radio Club dispatched its emergency communications bus.

Let's Hear From You....

How is your group serving in the public interest? Do you have an interesting Field Day story to tell? Fortunately, not all stories are as dramatic as some of the news events we report on. However, they all are important. Drop us a note about how you helped out in a public-service event, a drill, or an actual emergency. Would you like to see a particular topic covered in a future issue?

The stories in this issue were made possible by many amateurs, including OA8ADM, KI8EP, The Turlock Amateur Radio Club, New Mexico ARES, and the ARRL. Until next time . . .

73, Bob, WA3PZO

Washington Readout

BY FREDERICK O. MAIA, W5YI

Regulatory News In The World Of Amateur Radio

Eliminating the Confusion Surrounding the Vanity Call Sign Program

With a little help from a Texas radio amateur and Congress, the FCC began allowing ham operators to choose the numerals and letters in their station callsigns on May 31, 1996. The self-funding program was initially suggested in 1991 by an amateur to his Congressman, who managed to get a provision for "ham callsigns of choice" inserted into the Clinton administration's "1993 Deficit Reduction Act." Contrary to what you may have heard, neither the FCC nor the ARRL knew it was coming! President Clinton signed the measure into law on August 10, 1993.

It took the FCC two additional years to work out the guidelines (and computer programming) under which an amateur could select his callsign. Everyone, it seemed, had their own idea about how it should be done. The FCC tried as best it could to go along with a consensus. Unable to please everyone, the end result was a somewhat confusing set of instructions. To help demystify the process, we've created a set of frequently-asked questions that should explain just about everything you need to know.

Callsign Groupings for Mainland U.S.

Group
License Class
Station Callsign Format Qualified For:

Group A
Extra Class
1-by-2 call signs beginning with the prefix letter K, N, or W; 2-by-1 callsigns beginning with the prefix letters AA to AK, KA to KZ, NA to NZ, and WA to WZ; and 2-by-2 callsigns beginning with the prefix letters AA to AK.*

Group B
Advanced and Extra Class
2-by-2 callsigns beginning with the prefix letters KA to KZ, NA to NZ, and WA to WZ.*

Group C
Technician, Tech Plus, General, Advanced, and Extra Class
1-by-3 callsign formats beginning with K, N, or W.

Group D
All Classes
2-by-3 callsign formats beginning with KA to KZ and WA to WZ. (AA–AL-by-3 and NA–NZ-by-3 formats are not available for assignment.)*

**Certain two-letter prefixes are not available to mainland U.S. radio amateurs. (See Table II)*

Table I– The callsign groupings for stations with mailing addresses located in the 48 contiguous (mainland) U.S.

Q. What is a "vanity" callsign?

A. A "vanity" station callsign is like a "vanity" automobile license plate. It is an amateur callsign that, subject to availability, is personalized to the radio amateur's wishes. You must meet certain license-class criteria in selecting your callsign and list the exact prefix, numeral, and suffix for each selected callsign in order of preference. The FCC grants the first assignable callsign from your list.

Unlike sequentially issued callsigns, a vanity callsign is *not* free. The fee is set each year by the FCC. The current fee is $14 for a ten-year term. The FCC has proposed a slightly lower fee ($12) which will likely take effect this fall if it is approved after public comments are received.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443)
e-mail: <w5yi@cq-amateur-radio.com>

Q. Who is eligible to select a vanity station callsign?

A. Any individual amateur or club station which has already been issued a callsign may obtain a callsign of choice subject to certain restrictions. RACES and military recreation stations are not eligible for vanity callsigns. A vanity callsign may only be obtained in exchange for an existing call. Licensees cannot get a vanity callsign as their first callsign. With a few exceptions, individual and club vanity callsigns may only be in a format (based on license class) that is available to the amateur or club trustee making the request (see following questions).

Q. What are callsign "Groups" and how do they impact the Vanity Call Sign System?

A. Effective March 24, 1978 the FCC began issuing all amateur radio station callsigns "systematically"—that is, in strict alphabetical order within four format blocks called Groups A, B, C, and D. The shorter (and theoretically more desirable) callsigns, including 1-by-2 and 2-by-1 formats, were allocated to Group A; the longest (2-by-3 format) callsigns were allocated to Group D.

Table I indicates the callsign groupings for the various license classes for radio amateurs with continental U.S. (48 contiguous states) mailing addresses. You may choose any radio district numeral (Ø through 9) under the vanity callsign system.

Table II shows which callsigns are available to radio amateurs with mailing addresses outside of the 48 continental United States (but still within FCC jurisdiction). You need not actually reside in these areas to qualify for these special prefixes, as long as you have a valid mailing address there.

As a general rule (and there are exceptions), under the Vanity Call Sign System, Amateur Extra Class radio operators qualify for Group A, B, C, and D station callsign formats. Advanced Class operators qualify for Group B, C, and D formats. Technician, Tech Plus, and General Class operators qualify for Group C and D. Novice operators qualify only for a Group D callsign.

Callsign Groupings for Outside Mainland U.S.

Two-Letter Prefixes Reserved for:
Extra Class (Group A)
Advanced Class (Group B)
Technician, Tech Plus & General (Group C)
Novice Class (Group D)

AH, KH, NH, and WH
Pacific Area (includes Hawaii, Guam, and American Samoa)*
A: AH, KH, NH, WH-by-1 letter suffix
B: AH-by-2 letter suffix
C: KH, NH, WH-by-2 letter suffix
D: KH, WH-by-3 letter suffix (AH, NH-by-3 not assigned)

AL, KL, NL, and WL
State of Alaska (only)
A: AL, KL, NL, WL-by-1 letter suffix
B: AL-by-2 letter suffix
C: KL, NL, WL-by-2 letter suffix
D: KL, WL-by-3 letter suffix (AL, NL-by-3 not assigned.)

KP, NP, and WP
Atlantic area (includes U.S. Virgin Islands and Puerto Rico)*
A: KP, NP, WP-by-1 letter suffix
B: KP-by-2 letter suffix
C: NP, WP-by-2 letter suffix
D: KP, WP-by-3 letter suffix (NP-by-3 not assigned)

**And certain other small U.S. island possessions*

Table II– Certain two-letter prefixes are reserved for amateurs with mailing addresses outside of the 48 contiguous (mainland) states. These prefixes are NOT available to radio amateurs with mailing addresses in the continental U.S. Note that Group B, C, and D callsigns are also available to higher class licensees.

Q. What vanity callsigns may Novice operators choose?

A. A Novice operator may apply only for a "Group D" callsign format. A Group D callsign has two prefix letters followed by any numeral Ø through 9 and any available three suffix letters. (This is commonly known as a 2-by-3 callsign, for example KA1AAA). The prefix must be from the KA to KZ or the WA to WZ prefix blocks. *Important:* 2-by-3 callsigns beginning with AA to AL and NA to NZ are *not* available to any amateur radio station and may not be selected. There are some other exceptions.

Q. What vanity callsigns may Technician, Tech plus, or General Class operators (or club trustees) choose?

A. Technician, Tech plus, and General Class operators may apply for either a "Group C" (1-by-3) or "Group D" (2-by-3) vanity callsign format. A Group C callsign has one prefix letter followed by any single numeral and any three available suffix letters (e.g., K1AAA). Group C prefixes have a K, N, or W prefix followed by a regional numeral and three suffix letters. Most 1-by-3 callsigns beginning with N are already assigned. There are also a few limitations on which callsigns within these groups may be selected.

Q. What vanity callsigns may Advanced Class operators (or club trustees) choose?

A. Advanced Class operators may apply for a "Group B" (2-by-2), "Group C," or "Group D" callsign format. A Group B callsign has two prefix letters followed by any single numeral and any two available suffix letters. The prefix must be from the KA to KZ, NA to NZ, or the WA to WZ prefix blocks (e.g., KA1AA). The AA to AK prefix block, except as noted below, is part of "Group A" and reserved for Amateur Extra Class licensees.

The following two-letter prefixes are not available to radio amateurs with continental U.S. mailing addresses: AH, KH, NH, and WH (reserved for the Pacific area); AL, KL, NL, and WL (reserved for Alaska); and KP, NP, and WP (reserved for the Atlantic area). There are a few other callsigns that may not be selected as well.

Q. What vanity callsigns may Amateur Extra Class operators (or club trustees) choose?

A. Extra Class operators may apply

for any available callsign from "Group A" as well as Groups B, C, and D." Group A callsigns have either one or two prefix letters followed a numeral and any available one or two suffix letters. The callsigns in Group A include three different formats, including 1-by-2, 2-by-1, and certain 2-by-2 calls. Here's how they work:

1. A single prefix letter beginning with K, N, or W followed by a single numeral and any two available suffix letters (e.g., K1AA). Group A callsigns beginning with the single letter "A" are not available.

2. A two-letter prefix from the AA to AK, KA to KZ, NA to NZ, or WA to WZ blocks, followed by any single numeral and any one available suffix letter (e.g., AA1A).

3. A two-letter prefix from the AA to AK block followed by any single numeral and any two available suffix letters (e.g., AA1AA).

As with Group B callsigns, the two-letter prefixes reserved for certain geographic areas are not available to amateurs with continental U.S. mailing addresses.

Q. What callsigns are not available to the Vanity Call Sign System?

A. A few seemingly available callsigns are not available for assignment. They are:

1. KA2AA–KA9ZZ, KC4AAA–KC4AAF, KC4USA–KC4USZ, KG4AA–KG4ZZ, KC6AA–KC6ZZ, KL9KAA–KL9KHZ, and KX6AA–KX6ZZ, which are reserved either for specific offshore locations or special uses;

2. To eliminate confusion, any callsign having the letters SOS or QRA through QUZ as the suffix;

3. Any callsign having the letters AM–AZ as the prefix. These prefixes are assigned to other countries by the International Telecommunications Union (ITU);

4. Any 2-by-3 format callsign having the letter X as the first letter of the suffix. These are assigned to experimental (non-amateur) stations;

5. Any 2-by-3 format callsign having the letters AF, KF, NF, or WF as the prefix and the letters EMA as the suffix. These have been allocated to (U.S Government) Federal Emergency Management Agency (FEMA) stations for emergency use;

6. Any 2-by-3 format callsign with letters AA–AL or NA–NZ as the prefix;

7. Any 2-by-1, 2-by-2, or 2-by-3 format callsign having the letters AH, AL, KH, KL, KP, NH, NL, NP, WH, WL, or WP as the prefix unless your mailing address is outside of the 48 contiguous. U.S. states. These prefixes are available *only* to radio amateurs with mailing addresses in the states of Alaska and Hawaii and certain U.S. possessions, such as Guam, American Samoa, U.S. Virgin Islands, Puerto Rico, and other small island possessions. Your address must be within the region for which the prefix is reserved, meaning that an amateur in Puerto Rico (KP4/NP4) may not apply for a KH6 (Hawaii) callsign.

8. Any 1-by-1 format callsign. These are reserved by the Special Event callsign System (for example K1A). *Note:* 1-by-1 callsigns with an "X" suffix letter are not assignable.

Q. May I renew or change my name or address at the same time I apply for a vanity callsign?

A. No! You must hold an unexpired amateur operator/station license of the proper operator class, as described above, to request a vanity callsign for your station. To request a vanity callsign for a club station, you must hold an unexpired club station license showing you as the license trustee. Your name and mailing address as shown on your current licensing information in the FCC database must be correct. If your license has expired, or if your name or address has changed, you must first modify your station license so that it shows the correct information in the FCC database before you apply for a vanity callsign.

Q. How do I determine which specific vanity callsigns are available to me? What can I choose from?

A. This is by far the most common question. There are nearly 15 million possible callsign combinations in the Amateur Radio Service and there are strict eligibility and availability rules. As a general rule:

1. You (as an individual radio amateur or club trustee) must be eligible for a specific group callsign (see detailed explanations above).

2. Vanity callsign assignment is not limited to your callsign district. You may apply for a callsign with any radio district numeral, Ø through 9.

3. Refer to the FCC's Amateur Service licensee database to verify that the callsign you are requesting is not already assigned. This database is available at various sites on the World Wide Web including: ARRL <http://www.arrl.org/fcc/fcclook.php3>; Buckmaster <http://www.buck.com/cgi-bin/do_hamcall>; QRZ <http://www.qrz.com>, and WM7D <http://www.wm7d.net/fcc_uls/ulsquery.html>.

You can also directly query the FCC's ULS (Universal Licensing System) database on the web by accessing the application or license search utilities. These can be accessed at <http://www.fcc.gov/wtb/uls>. Click on the button labeled "Application Search" or "License Search" and use the "General Search" option. (Amateur radio information can be accessed by searching on radio service codes "HA"—sequentially assigned callsigns and "HV"—vanity callsigns. Both can be selected during the same search.)

4. A callsign is normally assignable two years following license expiration or death of the licensee. Licensees within the two-year "grace period" for renewal remain in the FCC database. Therefore, any callsign that is still in the FCC database of radio amateurs is not assignable as a vanity callsign.

5. Even if a licensee has been deceased for two years or longer, be certain that the callsign of the deceased is not still shown in the Amateur Service database. The FCC has no way of knowing if an amateur is deceased if it has not been notified. If a callsign you want is still in the database and you know the licensee is deceased, you must send a copy of the death certificate (or a obituary notice from a newspaper) to the FCC and request cancellation of the callsign from the FCC records prior to filing the application for a vanity callsign. Send to: FCC Amateur Section, 1270 Fairfield Road, Gettysburg, PA 17325-7245. A callsign *cannot* be held for you during the cancellation process.

6. Sometimes, a callsign that does not appear on the database still may not be available for assignment, including those which are not assignable to anyone for the reasons explained above.

7. A very good vanity callsign search resource is Michael Carroll's (N4MC) Vanity Callsign Headquarters at: <http://www.carroll-u.s.a.com/vanity>. This website lists immediately available and soon-to-be-available callsigns. The site also lists vanity callsigns that have been selected by and are in the process of being issued to others. *(A callsign on the selected list does not automatically mean it is unavailable to you. Each applicant may select up to 25 possible callsigns and will be assigned only one. —ed.)*

8. Finally, be aware that thousands of vanity callsigns are issued every year and someone else may also be requesting the same callsign you want. Pref-

erential callsigns, such as those with a 1-by-2 format, are particularly popular. All vanity callsigns are issued on a first-come, first-serve basis, with applications filed online handled *before* those filed in paper form.

Q. How do I get my old callsign back?

A. Under the Vanity Call Sign System you may request a currently unassigned callsign that was previously assigned to you as your primary, secondary, repeater, auxiliary link, control, or space station callsign. You do not have to wait two years after expiration to request your former callsign. A callsign request by a former holder may be from any Group. That is, you do not have to hold a specific class of operator license. Although the FCC does not require submitted proof that you previously held a specific callsign, you should be prepared to show evidence if you are asked for it. A callsign requested by a former holder may be from any callsign region.

Q. How do I obtain the callsign of a deceased relative?

A. When the holder dies, a callsign is immediately assignable to a "close relative" once it is no longer in the database. You do not have to wait two years before you apply for the callsign. The FCC defines a close relative of a deceased amateur as a spouse, child, grandchild, stepchild, parent, grandparent, stepparent, brother, sister, stepbrother, stepsister, aunt, uncle, niece, nephew, or in-law. You must indicate your relationship to the deceased person on the vanity callsign application.

There is an important catch, however! You must hold a license class equal to or higher than the deceased. That is, you must be an Amateur Extra Class operator if the deceased held a Group A callsign, etc. (see Q&A on callsign groups for more details).

If the deceased amateur's callsign is still listed in the licensee database, it must be removed prior to vanity callsign application (see procedure above). Be aware that someone could request and obtain this callsign before you do. Callsigns cannot be held by the FCC for assignment to anyone.

Q. How can our club obtain a vanity callsign for our club station?

A. There are three ways: (1) by requesting a vanity callsign by listing assignable callsigns in order of preference; (2) by reclaiming a previously held club callsign; or (3) "in memoriam." While an individual amateur radio operator may hold only one primary amateur radio station license and vanity station callsign, there is *no limit* to the number of club station licenses or vanity callsigns that can be held by the same club.

The trustee's operator class determines the "Group" of the callsign (see above). The club callsign you select must have been unassigned for at least two years if you are simply requesting a vanity callsign for your club. The two-year rule does not apply if you are reclaiming a previously held callsign for which the requester was the license trustee or are applying for the "memorial" callsign of a deceased club member. A callsign request by former holder may be from any Group, but the license-class/Group restrictions do apply to in memoriam callsigns.

Q. How does our club apply for the callsign of a deceased club member?

A. The trustee of a club station may request the callsign as a tribute to a former member even when it has been less than two years following the club member's death. The trustee must hold a license class equal to or higher than the deceased.

The callsign is assignable immediately after the death of a club member, providing a written statement from a close relative of the deceased showing consent to the callsign assignment is in the club station records. The statement of consent must state the sender's relationship to the deceased and confirm the deceased person's association with the club. Do not send the supporting documentation to the FCC unless requested to do so. The relative or club must also request cancellation of the deceased amateur's callsign, as explained above. A close relative is defined in an above question/answer.

Summary

The Vanity Call Sign System is a source of continuing confusion to amateurs and the subject of more correspondence I receive than any other single topic. I hope this list of frequently asked questions has been helpful to you and clarifies what you need to know in order to apply for and receive your callsign of choice. See you next month.

73, Fred, W5YI

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

Summer Newbies

This month in your "What's New" column we'll focus on new radio gear and hamshack accessories that can add to your summer ham radio fun. Let's begin our survey by looking at a top-notch communications receiver that recently hit the radio store shelves.

Radio Gear

AOR AR8600 Communications Receiver. Communications receivers are getting better all the time, and some of the best of them are made by AOR. The company is a leading communications equipment manufacturer headquartered in Tokyo, having been founded in 1977 by Shigeru Takano, JA1AOR, and Jun Oshima, JA1EXM. Besides radio amateurs, AOR serves monitoring enthusiasts, communication professionals, shortwave listeners (SWLs), and others in electronics.

Recently, AOR USA introduced the AR8600 (see photo A), terming the wide-range receiver a "new standard" for demanding users. According to the company's vice president, Takashi "Taka" Nakayama, the AR8600 is so advanced that its design has been awarded a U.S. patent. The new AOR8600 communications receiver can accommodate optional cards that let you add extended features, and it accepts Collins mechanical filters for excellent selectivity.

The AR8600's tuning range is 520 kHz to 2.040 GHz, with cellular ranges blocked. The receiver can hold up to 1000 memories (20 bands × 50 channels/band), and it can search those memories for signals at a rate up to 37 channels per second. In addition, the radio has 40 different search banks. Each memory can store frequency and an array of special choices, including alphanumeric channel labeling.

Receive modes include wide, narrow, and super-narrow FM; wide and narrow AM; USB; LSB; and CW. Innovative features include an area for up to three optional slot cards that perform various specialized functions.

The AOR8600 can use its 10.7 MHz IF output in conjunction with the SDU5500 Spectrum Display Unit, and it also can indicate spectrum activity on its front-panel display. Computer management of the radio is done through a rear-panel serial port; free control software is available from the AOR website.

For more information, contact AOR U.S.A., Inc., 20655 S. Western Ave., Suite 112, Torrance, CA 90501 (310-787-8615; e-mail: <info@aorusa.com>; web: <http://www.aorusa.com>).

Accessories for the Shack

New from Morse Express. In several recent columns we profiled the products of Milestone Technologies, noting several Morse Express keys sold by Marshall Emm, N1FN. Marshall has introduced a steady stream of keys, paddles, bugs, and other accessories to the amateur community. Many of these are imported, and more than a few of them are quite unusual and innovative.

Recently, Morse Express introduced the new CT-6DX Deluxe Straight Key (photo B) manufactured by Anton Koval, UT7CT, of CT Ham Radio Devices in the Ukraine. Said to be a key for the connoisseur, it is of polished brass set on a mirror-bright chrome base. As such, it combines the keying

**289 Poplar Drive, Millbrook, AL 35054-1674*
e-mail: <w8fx@cq-amateur-radio.com>

Photo A– Recently AOR USA introduced the AR8600 wide-range communications receiver. The unit's tuning range is 520 kHz to 2.040 GHz, with cellular ranges blocked. The receiver can accommodate optional cards that let you add extended features, and it accepts Collins mechanical filters for excellent selectivity. (Photo courtesy AOR USA)

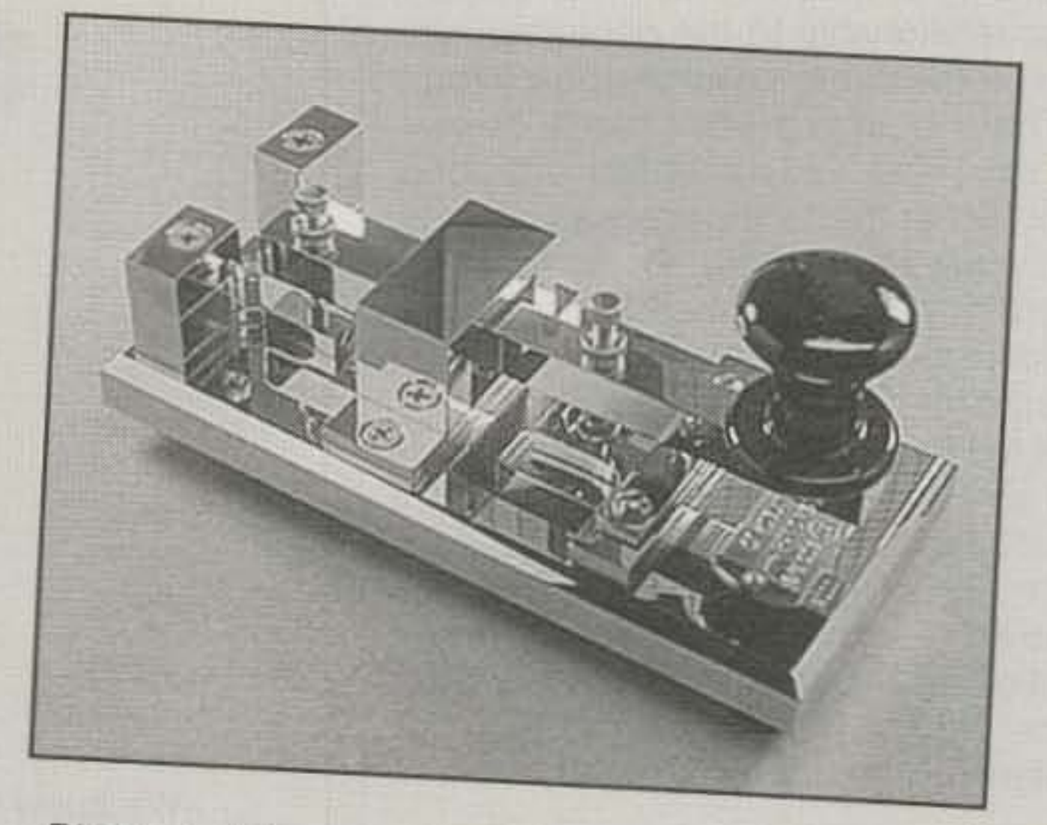


Photo B– Morse Express has introduced the CT-6DX Deluxe Straight Key, manufactured by CT Ham Radio Devices in the Ukraine. It's a stylish key of polished brass and hardwood set on a mirror-bright chrome base. (Photo courtesy Morse Express website)

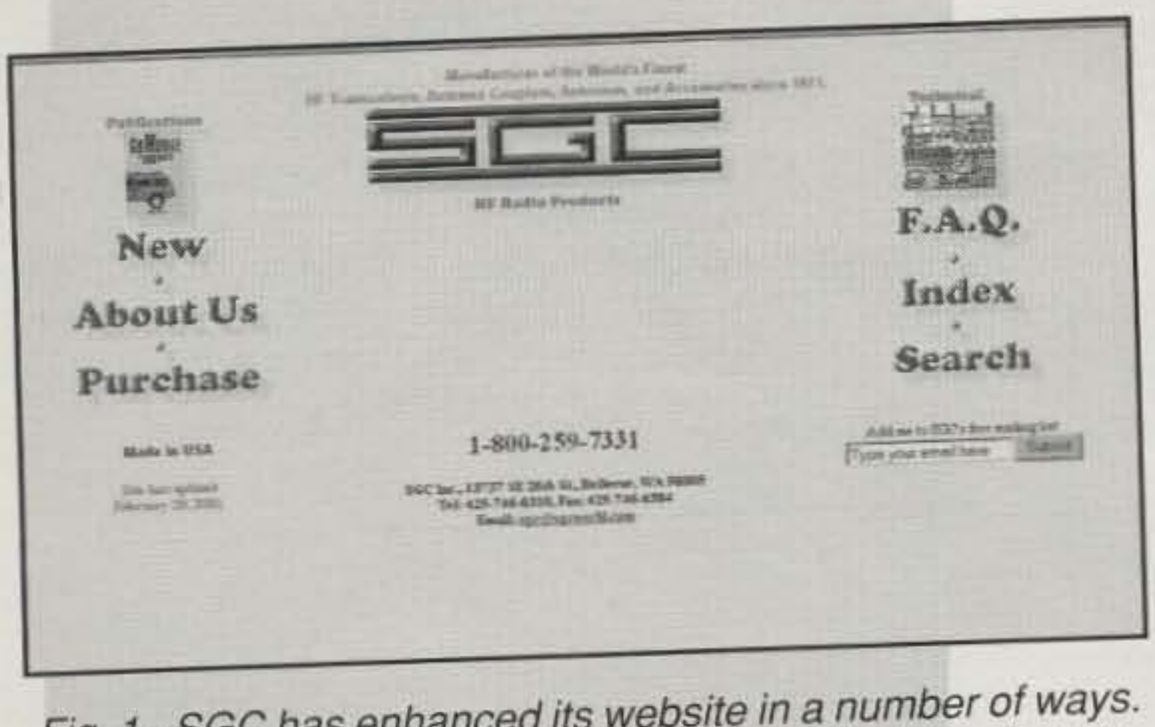


Fig. 1– SGC has enhanced its website in a number of ways. The site includes a comprehensive index of just about everything on the site, a large set of FAQs (frequently asked questions), a sitewide search engine, an online product catalog, a "what's new" section, and more.

ease of a true "lever" key with the elegant simplicity of modern design.

A very large key, it weighs in at more than three pounds. The chromed base is a monolithic block of plated steel, about half an inch thick, with contoured edges. The knob is the classic, easy-to-handle "round knob with skirt" that is typical of the European profile. The key is $199.95.

Contact Morse Express, a division of Milestone Technologies, Inc., 2460 S. Moline Way, Aurora, CO 80014-1833 (1-800-238-8205; e-mail: <nifn@MorseX.com>; web: <http:// www.morseX.com>).

Antennas and Accessories

LDG Electronics RT-11 Remote Mounting Autotuner. In several columns we have noted impressive antenna tuners, baluns, and other antenna-accessory-related items from Dwayne Kincaid, WD8OYG, of LDG Electronics. In the March issue we profiled the rather wide variety of products currently offered. In fact, Dwayne has, with some justification, dubbed his firm "The World Leader in Digital Autotuners."

A new LDG Electronics Autotuner is the RT-11 Remote Mounting Autotuner (photo C). The microprocessor-controlled RT-11 is a compact tuner mounted in a water-resistant ABS plastic enclosure. It was designed with remote mounting in mind, including mobile, marine, tower, or other applications requiring a remote mount.

The RT-11 tunes most coax-fed antennas such as dipoles, beams, verticals, and other antenna systems, over the range 1.8 to 54 MHz. The unit can operate with power and control signals supplied by ICOM and Alinco radios via an optional cable. It tunes in about 3 seconds on average, handles 5 to 150 watts, and matches antenna SWR of 10:1 (3:1 on 6 meters). The RT-11 Autotuner is $209 assembled, or $179 kit; the remote control is $39 assembled, or $29 kit.

For more information, contact LDG Electronics, 1445 Parran Road, P.O. Box 48, St. Leonard, MD 20685 (telephone 410-586-2177; e-mail: <ldg@ ldgelectronics.com>; web: <http:// www.ldgelectronics.com>).

New from Cubex Quad Antennas. For some 45 years Cubex Quad Antenna Company has been designing and building cubical quads for amateurs worldwide. Cubex, under the stewardship of Norman Alexander, W4QN, currently offers cubical quad antennas from 70 cm through 40 meters. All models are built using high-quality materials, featuring cast-aluminum-alloy spiders and quality fiberglass spreader arms for maximum strength and reliability.

Recently, Cubex significantly expanded its product line with the shipment of several new VHF and UHF quads. The firm now has a small but growing line of UHF monoband 70 cm and 2 meter VHF/70 cm UHF multiband quads (photo D). Also, several new quads are on the way for 33 cm and 23 cm applications. For this purpose a new division of Cubex has been formed, known as Cubex asc (for Advanced Satellite Communications), to manufacture and distribute these new antennas.

Contact Cubex asc for product information, pricing, and delivery, at 21911 Hyde Park Drive, Ashburn, VA 20147 (703-858-5348; e-mail: <Cubexasc@aol.com>; web: <www.cubex.bigstep.com>). You can find details and product specifications at this new website. You also can visit their mailing list sign-up page to receive up-to-the-minute product release information.

For more information on Cubex HF quads, contact Cubex Quad Antenna Co., 228 Hibiscus Street #9, Jupiter, FL 33458 (phone 561-748-2830; e-mail: <CubexCo@aol.com>; web: <http://www.cubex.com>).

Precision Cable Preparation Tool. Need some cable help? Jensen Tools now stocks a Cable Preparation Tool (photo E) manufactured by Andrew® Easiax®, that reduces cable preparation time. The tool produces a precise, accurate cut that makes connector attachment quick and easy. It scores the jacketing and cuts the outer conductor at the precise distance required. The tool has a blade-depth adjustment that prevents cutting of the inner conductor, and it comes equipped with five reversible cutting blades.

Also check out the Jensen Tools Communications Catalog. The full-color catalog offers a wide range of tool kits; hand and specialty tools; cable, telephone and electrical test equipment; and service aids. The items from the catalog also can be found online at the Jensen Tools website.

For more information contact Jensen Tools, Inc., 7815 S. 46th Street, Phoenix, AZ 85044-5399 (phone 1-800-426-1194; e-mail: <Jensen@stanleyworks.com>; web: <http://www.jensentools.com>).

New on the Net

SGC Website and Newsletter. We have mentioned SGC in several columns, with profiles of their antenna systems, antenna tuners, and accessories, as well as their other HF communications gear. Founded in 1971, SGC is celebrating its 30th birthday this year. Over this period the company has become a leading global supplier of "ruggedized" communications products, including commercial and military- quality SSB mobile and base-station transceivers, antennas, antenna couplers, and other accessories.

SGC has enhanced its website (see fig. 1) in a number of ways to make it more useful to radio amateurs. The website includes a comprehensive index of just about everything on the site, a large set of FAQs (frequently asked questions), a

← *Photo C– A new LDG Electronics Autotuner is the RT-11 Remote Mounting Autotuner. The microprocessor-controlled RT-11 is a compact tuner mounted in a water-resistant ABS plastic enclosure. The Autotuner was designed with remote mounting in mind, including mobile, marine, tower, or other applications requiring a remote mount. The RT-11 tunes most coax-fed antennas. (Photo courtesy LDG Electronics website)*

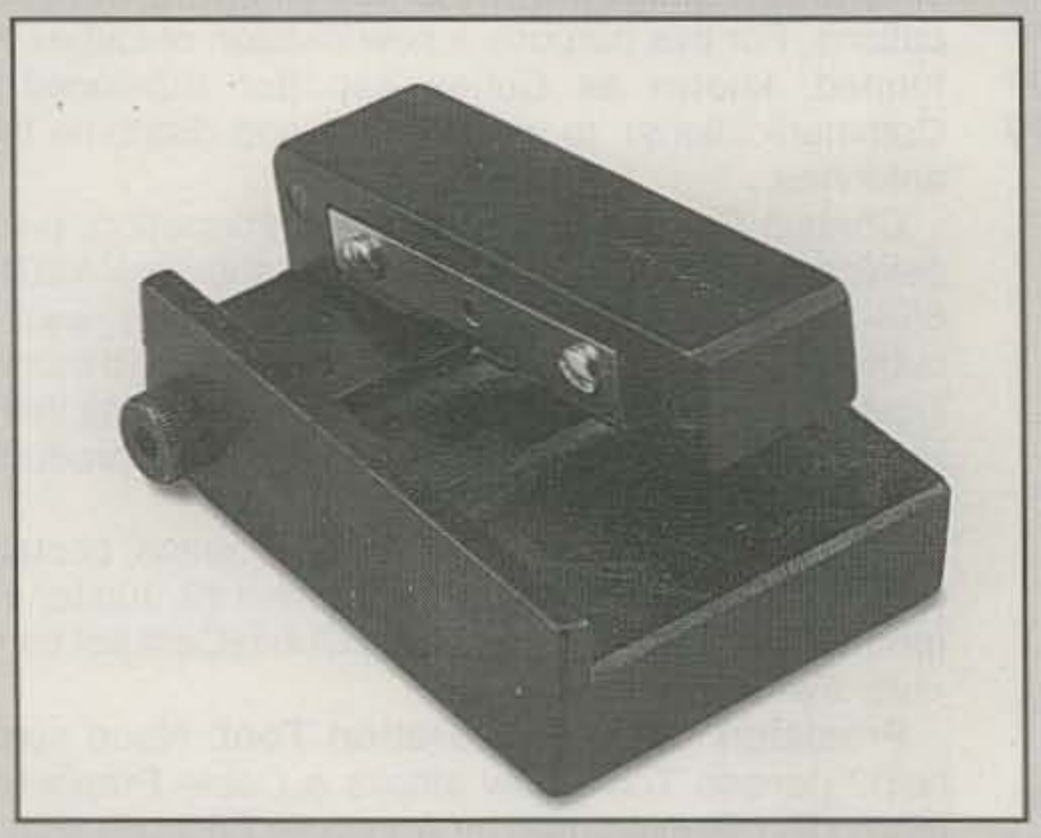


Photo E–Jensen Tools now stocks a precision Cable Preparation Tool that reduces cable preparation time to seconds. The tool produces a precise, accurate cut that makes connector attachment quick and easy. (Photo courtesy Jensen Tools)

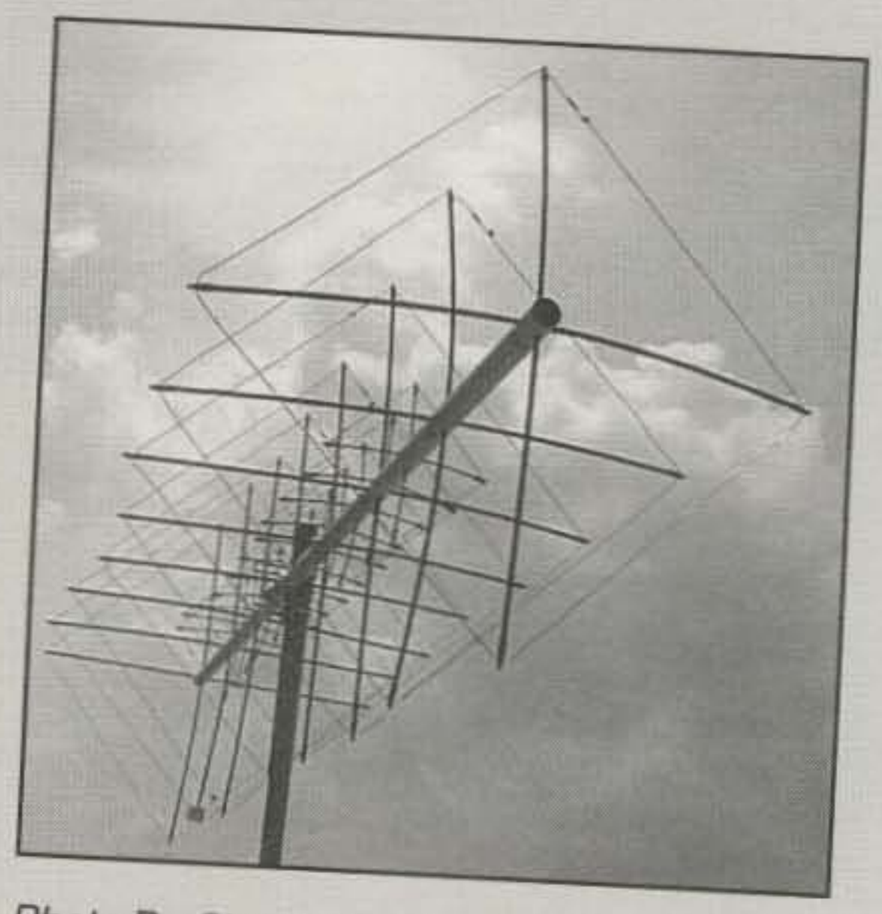


Photo D– Shown here is one of Cubex asc's new VHF/UHF Dual Band Scorpion quad antennas. The Scorpion is an 8-element VHF and 11-element UHF, high-performance dual-band quad. With its high gain and narrow beamwidth on both bands, the antenna is well-suited for long-haul communications. (Photo via Cubex asc website)

sitewide search engine, an online product catalog, a "what's new" section, and more.

A particularly nice feature of the SGC website is one that lets you freely download a variety of SGC publications. These include equipment brochures, books, equipment manuals, and "how-to" guides. These documents are in the form of popular Adobe® Acrobat® PDF files. You also can sign up for SGC's free mailing list simply by typing in your e-mail address.

For more information, contact SGC, Inc., 13737 S.E. 26th St., Bellevue, WA 98005 (1-800-259-7331; e-mail: <sgc@sgcworld.com>; web: <http://www.sgcworld.com>).

Peachpit Press QuickStart Online Library. Are you building a website, and are you interested in learning more about web, graphics, and multimedia topics? Peachpit Press has introduced a new, web-based learning and reference tool that contains many step-by-step, how-to tutorials on these and other web and graphics topics designed for professionals and new users alike. The Visual QuickStart Online Library is a collection of task-based, visual reference guides that contains the entire contents of 25 of Peachpit's Visual QuickStart books in a quick-search, quick-find online format. Covering a broad range of subjects, the searchability, personalization, and workgroup tools are said to be real advances.

The online format is very intuitive, and new users will quickly learn how to navigate books, perform online searches, make personal comments for later reference, and more. Charter Visual QuickStart Online Library subscriptions are $49.95, and you can try out the service for free.

For more info, check out the Peachpit Press Visual QuickStart Online Library at <http://www.quickstartonline.com>. The library is sponsored by Peachpit Press, 1249 Eighth Street, Berkeley, CA 94710 (1-800-283-9444; e-mail: <info@peachpit.com>; web: <http://www.peachpit.com>).

From the Bookshelf

New *Repeater MapBook*. Artsci Publications—"where art and science work for you"—has been producing books and manuals for the amateur radio community since 1989. The firm, under Bill Smith, N6MQS, prides itself on providing straightforward instructions and

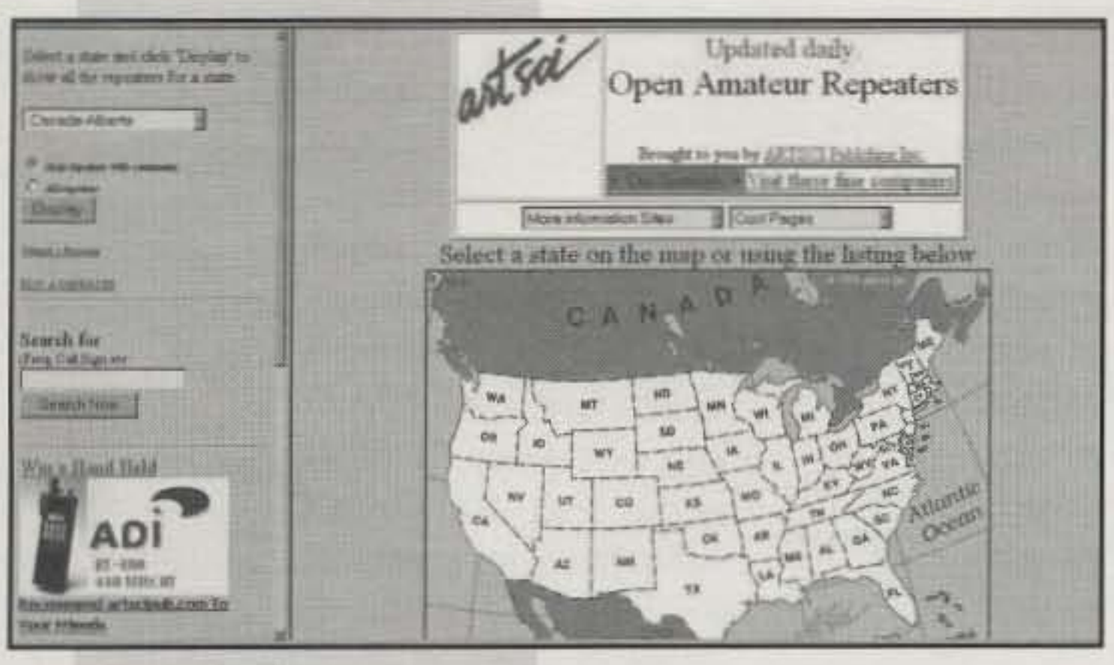


Fig. 2– Among the most popular of Artsci's publications is the $9.95 Repeater MapBook. *The book has been completely updated for 2001 using Artsci's Open Repeater Database, which is claimed to be the largest and most accurate repeater database anywhere. The opening page of the database site, which you'll find at <http://artscipub.com/repeaters>, is shown here.*

drawings to make complicated aspects of the hobby simple to understand. Other products are offered, but publications lie at the heart of the business.

Artsci offers several reference pubs for the radio amateur, SWL, and scanner buff. Among the most popular is the *Repeater MapBook,* now in the tenth edition. The book has been completely updated for 2001 using Artsci's Open Repeater Database, which you'll find at <http://www.artscipub.com/repeaters> (see fig. 2). Artsci claims that its database, which is updated daily, is the largest and most accurate repeater database anywhere.

Billed as a perfect traveling companion, the printed *Repeater MapBook* contains the locations of many hundreds of open repeaters throughout the United States, Canada, and Mexico. With the book you easily can find and operate repeaters anywhere in these countries. The detailed maps show all highways and major cities in each state, and grid square information is provided for all 50 states. In addition, NOAA weather frequencies are listed. The book still is priced at $9.95.

For more info, contact Artsci, Inc., P.O. Box 1428, Burbank, CA 91507 (818-843-4080; e-mail: <bills@artsci.net>; web: <http://www.artscipub.com>). The website has a number of links to other amateur radio websites, as well as a lengthy directory of amateur radio manufacturers.

Guide to PIC Microcontrollers. Are you something of a "techie" who is "into" peripheral interface controllers (PICs)? PICs have been described as the hobby chip of the century, due to their ease of use and programming, compact size, and ability to provide simple solutions to complex programs.

Aimed at both students and seasoned users, the new *Prompt® Publications Guide to PIC Microcontrollers,* by Carl Bergquist, takes you through PICs like no other text. Tips on programming and design are included, and hardware and software also are discussed. The 336-page book is priced at $39.95. Another related text, *Exploring Programmable ICs,* by Clement C. Pepper, was released at the same time. This 368-page book offers an excellent introduction to integrated circuits (ICs), and especially to the world of programmable ICs. It's priced at $34.95.

For more information, contact Sams Technical Publishing, 5436 West 78th St., Indianapolis, IN 46268-4149 (1-800-552-3910; e-mail: <customercare1@samswebsite.com>; web: <http://www.samswebsite.com>).

We Get Letters

Once again we're just about out of space in this month's column. Before wrapping things up this time around, however, we would like to acknowledge some of the good folks who corresponded with us in recent months. A tip of the W8FX hat goes to Ken Brown, N4SO; Bonnie Crystal, KQ6XA; Robert G. Chimel, WA3LWR; George Hellebrand, W2FLN; L. B. Cebik, W4RNL; Brent Walton, KF6FGB; Jim Termini; and Jeff Reinhardt, AA6JR.

Keep the cards, letters, and e-mails coming, and let us know what "new stuff" you'd like to see in your column.

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: Didn't really like someone with whom you just had a QSO? Truth of the matter is that after meeting someone eyeball-to-eyeball, you usually think more highly of them.

73, Karl, W8FX

BY CARL SMITH, N4AA

News Of Communication Around The World

Yasme and The Colvins

Hearing the word *Yasme* should bring older DXers wide-awake with memories. Many of you will remember Danny Weil, VP2VB, back in the 1960s sailing his ship *The Yasme* off into the sunset to operate from yet another rare island. I have a number of QSLs from his operations, mostly in the Pacific, and I'm sure many of you have them also. Then, too, Lloyd, W6KG, and Iris, W6QL, Colvin were traveling all over the world, operating from many rare places.

YASME continues today as The YASME Foundation, as the following news release tells us. Perhaps you have something you could share with the writer concerning the Colvins.

Lloyd, W6KG, and Iris, W6QL, in 1993. (Photo courtesy Jim, K1TN)

Yasme Foundation to Publish History

Manchester, Comnnecticut: A husband-and-wife team who took ham radio to some 200 countries will be the main subject of a book soon to be published. The Yasme Foundation has commissioned a full-length history of the foundation and a biography of its two principal luminaries, Lloyd Colvin, W6KG (who died in 1993), and Iris Colvin, W6QL (who died in 1998).

The assistance of radio amateurs and others around the world is sought in this effort. The foundation has retained freelance writer Jim Cain, K1TN, to write the book. Anyone who has information to share (reminiscences, anecdotes, photos, and so on) may contact Jim at <yasmebook@mybizz.net>.

"The foundation is extremely pleased to have Jim Cain, a writer well-known and respected among radio amateurs and a licensed ham since 1961, to research and write this important amateur radio history of Lloyd and Iris Colvin, W6KG and W6QL. We believe that Jim is the most qualified person for the job," said Yasme Foundation President Wayne Mills.

The Yasme Foundation is a not-for-profit corporation organized to conduct scientific and educational projects related to ham radio, including DXing and the introduction and promotion of amateur radio in underdeveloped countries.

Lloyd and Iris Colvin visited and operated from more than 200 ARRL DXCC countries, including nearly every member country of the United Nations. Other amateur radio operations under the *Yasme* banner were conducted by Danny Weil, VP2VB; Martti Laine, OH2BH; and the late Dick McKercher, WØMLY, among others. A list of Yasme operations can be found at the website <www.yasme.org>.

The Yasme Foundation's officers and directors are Wayne Mills, N7NG (president); Rusty Epps, W6OAT; Bob Vallio, W6RGG; Charles "Mac" McHenry, W6BSY; G. Kip Edwards, W6SZN; Martti Laine, OH2BH; and Fred Laun, K3ZO.

3B6RF – Agalega

This operation got underway on May 5 after some transportation difficulties. The team had to resort to a 34-hour boat trip from the Seychelles in rough seas to reach Agalega. They seemed to be no worse for the wear, as they were active on most bands within a relatively short period of time. It was reported that they would have to shut down sooner than expected due to the 5 miles they had travel to transport all of the gear to the boat to take them off the island.

HK3JJH/HKØ – Malpelo

Pedro wrapped up his month-long adventure on Malpelo on May 2 and was able to celebrate his birthday on May 10 at home. He reported some 15,000 QSOs on 80–10 meters. QSL cards continue to pour into the mailbox at N4AA at the rate of 50–100 each day. The logs and cards all should be ready so we can begin processing those requests by the middle of June.

Convention News

Dayton 2001. Here in early May, we know that Chuck Brady, the NASA Astronaut, famous for his latest DXing as 3Y0C from Bouvet, will be the featured speaker at the DX Dinner this year. The dinner was completely sold out and many were desperately looking for tickets at the last minute so they wouldn't miss out. Lots of other DXing activities will be going on and I'll be able to report on them here next time.

The Saturday banquet at Visalia 2001. A good time was had by all!

Visalia DX Convention 2001. This was a very well-attended event in late April. Nearly 600 people attended the Saturday banquet, and all had a good time. The 2002 convention will be held next April at the Holiday Inn Visalia, and I'm already looking forward to a return trip to the west coast.

W9-DXCC Convention. Bill Smith, W9VA, has announced that the 2001 convention will be held on Saturday, September 15 at the Holiday Inn, Rolling Meadows, Illinois (Chicago). N4AA and DX Publishing will be hosting the Friday Welcome Reception. The Northern Illinois DX Association will host the Late Friday Hospitality Suite, and the Greater Milwaukee DX Association will host the Saturday Night Hospitality Suite. Details and registration forms may be obtained at <http://www.qtrh.com/w9dxcc>.

DXCC Yearbook 2001

The *DXCC Yearbook 2001* came out in late April with a number of good articles, along with all of those DXCC total numbers. The winner of the first Desoto Cup

P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The WPX Program

SSB

2794	K4WES	2799	N4OWG
2795	JK7QJK	2800	KC7WUE
2796	JR3HAL	2801	UA4LDP
2797	K1ATL	2802	LU1FBK
2798	4Z5GV		

CW

3066	JG3LGD	3067	KN2GSJ

CW: 400 DL4NBV. 750 JG3LGD. 800 WD6CKT.

SSB: 350 N4OWG. 400 JR3HAL. 550 K4WES, LU1FBK. 600 UA3LIU. 1100 JN3SAC. 1300 WD8ANZ. 1350 4Z5GV. 1500 KWØU. 1950 LU5DV. 2800 LU8ESU.

MIXED: 550 WBØWAO. 650 WO8L. 1000 JA2-3803. 1300 WD8ANZ. 1800 AA1KS. 2000 ON4CAS. 3050 JF1SEK. 3950 N9AF.

10 meters: VE9FX, LU1FBK
15 meters: JR1DHD, JA2-3803
20 meters: AE5DX
40 meters: E4/G3WQU, AA1KS

Asia: AA1KS, WO3Z
Africa: AE5DX
N. America: K4WES
S. America: VE9FX, JN3SAC, LU1FBK
Europe: WO3Z, K4WES, AE5DX, LU1FBK
Oceania: JR1DHD, AE5DX

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT.

160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA.

(and a 2001 CQ DX Hall of Fame inductee), Bob Eshleman, W4DR, is featured. I did not count the actual number of calls, but there are nearly four pages of those now listed as being on the DXCC Honor Roll. The individual band listings are getting rather lengthy also, and 12 meters isn't even shown in this issue, but will be added in the next one.

Antenna Zoning for the Radio Amateur

This is a new book from the ARRL written by Fred Hopengarten, K1VR. Quoting from the foreword in the book, "Fred has written this book to help the ham navigate the thicket of ordinances and bylaws, with the goal of obtaining a building permit for an antenna system. After all – *no antenna, no ham radio.* Fred's lively, conversational tone minimizes the numbing 'legalese' often used by lawyers. Numerous sample letters in Microsoft Word format are on the CD-ROM that accompanies the book."

Antenna Season

Summer is upon us and that means antenna work time. All those plans we made during the cold winter months can

The WAZ Program

Single Band WAZ

10 Meter SSB

522 ..... N4PQX
523 ..... JA1FYS
524 ..... JR7DXA

20 Meter SSB

1076 ..... WAØQII

12 Meter CW

23 ..... N4JJ

15 Meter CW

288 ..... KØCA

17 Meter CW

30 ..... N4JJ

20 Meter CW

514 ..... KØCA

40 Meter CW

216 ..... G3IFB
217 ..... KØCA

80 Meter CW

56 ..... PY2YP

6 Meters

1 ..... N4CH (25 zones)
2 ..... N4MM (26 zones)
3 ..... JI1CQA (34 zones)
4 ..... K5UR (25 zones)
5 ..... EH7KW (33 zones)
6 ..... K6EID (26 zones)
7 ..... KØFF (26 zones)

160 Meters

163 ..... W2YC (30 zones)
164 ..... K5NA (38 zones)
165 ..... KØFF (30 zones)
71 ..... WB9Z (endorsement 40 zones)
11 ..... K5UR (endorsement 40 zones)
83 ..... K6EID (endorsement 35, 36 zones)
101 ..... G4BWP (endorsement 39 zones)

All Band WAZ

SSB

4647 ..... 4Z5FL (all Mobile)
4648 ..... N4WDU
4649 ..... KD2GC
4650 ..... JH8BRN
4651 ..... W6RFL
4652 ..... W2QS
4653 ..... JN4ASA
4654 ..... N6HC
4655 ..... RZ1AZ
4656 ..... F5DGB
4657 ..... IK2CMN
4658 ..... N1SHM
4659 ..... N1QM
4660 ..... K2YEH
4661 ..... K2JG

Mixed

8032 ..... DF9QV
8033 ..... JA2EOW
8034 ..... N1LN
8035 ..... K2YWE
8036 ..... W4PJI
8037 ..... IK7XNA
8038 ..... UU2JQ
8039 ..... UU2JZ
8040 ..... JA8DGO
8041 ..... JG3WCZ
8042 ..... JF2AFP
8043 ..... KF9NZ
8044 ..... KEØA
8045 ..... JN4ASA
8046 ..... N6HCS
8047 ..... AAØZP
8048 ..... WX7M

All CW

240 ..... F9CI
241 ..... JN4ASA
242 ..... N6HC
243 ..... ISØIGV
244 ..... N5DUW
245 ..... KØCA

Satellite

17 ..... KE4SCY

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

Last November Fred, K3ZO, attended the first Korean DX Club National Convention in Chonnam in order to provide the ARRL DXCC card-checking service for those in attendance. Here Fred (right) is shown at the card-checking table with Lee, HL1LKF (left), and Lee, DS1BHE (center). (Photo by HL1LKF, and provided by Fred, K3ZO)

5 Band WAZ

As of April 30, 2001, 562 stations have attained the 200 zone level and 1202 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
K5NA SM5FUG W7EKM I4TJE

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
ABØP, 199 (23)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
K4PI, 199 (23)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K2UU, 199 (26)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
K4ZW, 199 (23)
W9RPM, 199 (19)
HC8N, 198 (36 on 80, 39 on 40)
EA5BCX, 198 (27,39)
G3KDB, 198 (1,12)
KG9N, 198 (18,22)
KØSR, 198 (22,23)
UA4PO, 198 (1,2)
JA1DM, 198 (2,40)
9A5I, 198 (1,16)
LA7FD, 198 (3,4)
K5PC, 198 (18,23)
VE3XO, 198 (23,23 on40)
K4CN, 198 (23,26)
KF2O, 198 (24,26)
W6BCQ, 198 (37,34on40)
G3KMQ, 198 (1, 27)
W5BOS, 198 (18,23)
N2QT, 198 (23,24)
OK1DWC, 198 (6,31)

The following have qualified for the basic 5 Band WAZ Award:
RA3AJ (190 zones)
KØCA (187 zones)
W8PT (180 zones)

Endorsements:
HC8N (198 zones)
K4PI (200 zones)
W2JZK (197 zones)
NØAH (200 zones)
IØDJV (200 zones)
GM3YTS (200 zones)
KZ2P (181 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached at e-mail: <k5rt@cq-amateur-radio.com>.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

4922 9X2AA	3652 VE3XN	3091 WA8YTM	2849 4N7ZZ	2469 YU7GMN	2256 K5UR	1877 OZ1ACB	1443 KØKG	1154 EA2BNU
4302 W2FXA	3624 9A2NA	3029 YU7BCD	2835 W2WC	2464 K2XF	2170 W4UW	1842 I2EAY	1436 N1KC	1147 W2CF
4034 W1CU	3606 N4MM	3027 YU7SF	2831 IT9QDS	2455 N6JM	2093 W7OM	1745 AA1KS	1429 W2EZ	1082 OK1DWC
4030 F2TT	3523 SM3EVR	3026 K9BG	2800 JH8BOE	2424 W9IL	2028 WB3DNA	1670 W7CB	1418 WT3W	1040 PY1NEW
4027 K6JG	3513 I2PJA	3010 WB2YQH	2798 IK2ILH	2372 S58MU	2019 HA9PP	1651 I1-21171	1408 NG9L	1020 KU6J
3960 EA2IA	3458 YU1AB	2974 I2MQP	2787 KØDEQ	2314 W6OUL	2012 JN3SAC	1642 Z35M	1343 VE6FR	1006 VE9FX
3772 UA3FT	3333 N5JR	2970 S53EO	2773 W2ME	2305 W8UMR	1939 PY2DBU	1613 YU1ZD	1337 VE6BMX	1006 K67XO
3762 N6JV	3144 PAØSNG	2945 I2EOW	2743 HAØIT	2281 9A4W	1916 DJ1YH	1572 VE6BF	1165 KX1A	937 N3KR
3736 N4NO	3118 W9HA	2903 KF2O	2597 HA5NK					

SSB

4306 IØZV	2968 EA8AKN	2500 4X6DK	1975 K5UR	1655 K5IID	1525 IKØEIM	1273 NG9L	1051 EA3EQT	781 N3DRO
3845 ZL3NS	2909 N4NO	2488 I8KCI	1972 W4UW	1643 W6OUL	1514 W2ME	1222 LU3HBO	1005 DL8AAV	717 F5RRS
3730 K6JG	2888 I4CSP	2412 WA8YTM	1860 N6FX	1631 HA5NK	1493 IK2AEQ	1179 KI7AO	990 HA9PP	716 KX1A
3549 F6DZU	2877 9A2NA	2404 KF7RU	1860 K2XF	1631 K3IXD	1483 DF7HX	1165 EA5DCL	972 AI6Z	699 KU6J
3503 I2OJA	2758 PAØSNG	2381 YU7BCD	1767 LU5DV	1626 W7OM	1444 SV3AQR	1154 WT3W	932 LU4DA	680 OK1DWC
3172 CT4NH	2739 I2MQP	2325 EA1JG	1748 YU7SF	1617 I3ZSX	1427 N3XX	1153 K4CN	890 AG4W	652 F5LIW
3168 N4MM	2706 I2EOW	2305 CX6BZ	1717 W9IL	1599 DK5WQ	1421 W2FKF	1141 IKØJMS	877 JN3SAC	634 F5UTE
3056 EA2IA	2672 CT1AHU	2134 IN3QCI	1707 I8LEL	1591 IT9SVJ	1410 T30JH	1092 N1KC	855 VE9FX	609 VE7SMP
3019 OZ5EV	2515 LU8ESU	2038 OE2EGL	1698 EA7TV	1568 CT1BWW	1385 I3UBL	1064 I2EAY	783 VE6BMX	605 KE4SCY
3019 F2VX	2515 EA5AT	2033 HAØIT	1667 KS4S	1548 K8MDU	1318 N2SS	1064 NH6T		

CW

4045 WA2HZR	3005 EA2IA	2288 W2WC	1996 G4SSH	1706 JN3SAC	1485 9A3SM	1268 4X6DK	1121 EA2BNU	832 WT3W
3634 N6JV	2699 LZ1XL	2238 JA9CWJ	1946 I7PXV	1672 IK3GER	1480 K5TSS	1257 EA2CIN	1060 W4UW	787 WA2VQV
3365 VE7CNE	2566 9A2NA	2198 EA7AZA	1923 K2XF	1572 W9IL	1466 IK2ECP	1248 AC5K	987 K6UXO	750 KX1A
3291 K6JG	2548 N4MM	2159 KA7T	1866 LU2YA	1555 I2EAY	1393 EA6AA	1244 I2MQP	935 VE6BMX	732 N1KC
3149 N4NO	2534 W2ME	2105 G3VQO	1821 K5UR	1546 W7OM	1339 LU3DSI	1154 LU7EAR	926 PY4WS	668 KU6J
3043 K9QVB	2437 YU7BCD	2016 N6FX	1779 IT9VDQ	1488 VE6BF	1310 I2EOW	1150 DF6SW	898 JK1AJX	612 F5RRS
3021 YU7LS	2396 WA8YTM	2000 OZ5UR	1762 W6OUL					

Per, JW3FL/LA3FL, points to signs in one of the buildings on Hopen Island. He was part of a four- man team doing weather/meteorology/observation work on the island in May. The total population on Hopen Island is four persons, five dogs, and several roaming polar bears—the reason for the warning signs. (Photo courtesy Dave, N4SU)

now be put to good use—digging the holes, pouring the concrete, stacking those tower sections, stretching the guy wires, and finally putting something on top. Will it work? Was it worth the effort, to say nothing of the cost?

Well, we all know the proof is in the operating and testing of these new an-

QSL Information

3D2HY to JAØSC
3D2XU to PA3AXU
3E500BYS to HP1RCP
3V8SM to DL1DBF
3W2LWS to WA1LWS
3W2NY to JH1MZG
3W7CW to SP5JTF
3W9HRN to DL1HRN
4L5T to LY2MM
4L7O to DL7BY
5A24PA to PA1AW
5R8GT to DK8ZD
5U2K to I2YSB
5U3T to I2YSB
5WØDA to F6EPY
7Z1AB to WD6CVB
7Z1AC to WA4JTK
8P5A to W2SC
8Q7DD to W4WET
8S7A to W3HNK
9K2ZZ to W8CNL
9K9X to 9K2HN
9MØM to K7XN
9M2DB to KD6WW
9M6A to N2OO
9N7RB to W4FOA
9Q5FH to EA1FFC
9U/EA1FH to EA1FFC
A35SC to JAçSC
A51AA to F2VX
A52CO to UA9DD
AF4LX/KH2 to JA6HJP
AH7X to JP1NWZ
AH7X/WH2 to JP1NWZ
AM8CI to EA8AKN
AN6AEQ to EA6AEQ
AY8A to LU8ADX
BV9O to BV8BC
C21AN to DF8AN
C21XU to PA3AXU
C6AKK to AA7X
CC4A to CE4USW
CQ1CV to CT1ETE
CWØZ to EA5KB
CW6V to W3HNK
DJ7ZG/HI9 to DL7AFS
DSØLT to KU1CW
E44A to K3IRV
EA/NE8Z to NE8Z
EA5/JI6KVR to EA5KB
EA8AH to OH1RY
EA9/JI6KVR to EA5KB
EP2MKO to RU6FZ
EY8MM to K1BV
FK/F2CW to ZL3CW
FOØARE to HA8IB
FS/W3HNK to KU9C
3A/IK5GQK (2 and 6 meters only) to IW5BZQ, Stefano Mannelli, P.O. Box 569, 50123 Firenze Centro, Italy
3A/IK5YOJ (2 and 6 meters only) to IW5BZQ
3A/IW5BZQ (2 and 6 meters only) to IW5BZQ
3A/IW5EDQ (2 and 6 meters only) to IW5BZQ
3B6RF May 2001/Oct. 2000 to HB9AGH, Ambrosi Flütsch, Lerchenweg 29, CH 8046 Zurich, Switzerland (Bureau OK)
3V8BB Mar 21/26, 2001 to YT1AD, Dr. Hrane Milosevic, 36206 Vitanovac, Yugoslavia
3V8DJ April 2001 to DJØQJ, Mehmed Avdibegovic, Friedrichrodaer Str. 67 B, D-12249 Berlin, Germany
4L2M to Mamuka Kordzakhia, P.O. Box 123, Tbilisi 380004, Georgia
4Z4UN to Ilan Sadeh, Box 4051, Haifa 31040, Israel
5B4/RZ3TX to Valery Penkin, P.O. Box 85, Nizhny Novgorod 603024, Russia
5B4AGP to Tom Appleby, P. O. Box 42913, Larnaca, Cyprus
5Z4GT to L. M. Rajeev, P. O. Box 84143, Mombasa, Kenya
7J6CCU to Eric Uyematsu, 335, Mizugama, Kadena,Nakagami gun, Okinawa 904 0204, Japan
7P8/ZS5GMW to Garth Wheeler, P.O. Box 95, New Germany 3620, South Africa
9K2ID to Faisal al-Kateefi, P.O. Box 12246, 71653 Shamiya, Kuwait
AP2HA to Hasnat Ahmed Bugvi, POB 2410, Islamabad 44000, Pakistan
C21NI to Radio Club, POB 29, Nauru, Rep of Nauru, Central Pacific
EA1FFC to Jesus Manuel Huerta Cuervo, Apartado 727, 33400 Aviles, Asturias, Spain
EA5KB to Jose F. Ardid Arlandis, Apartado 5013, 46080 Valencia, Spain
EK4GK to Serge Mnatsakanyan, Box 9-A-33, 375062 Yerezan, Rep of Armenia
EK4JJ to Serge Mnatsakanyan, Box 9-A-33, 375062 Yerezan, Rep of Armenia
EX8W to Sergei Chikutov, P.O. Box 1, Moscow 109387, Russia
FT4WC to Michel Godefert, F6GVH, B.P. 35, F-45700 Villemandeur, France
GWØANA to G. O. Jones, Nirvana, Castle Precinct, Llandough, Cowbridge CF7 7LX, UK
H44AA to P.O. Box G-11, Honiara, Solomon Islands
JAØSC to Hirotada Yoshiike, 722-1 Shiba Matsushiro-Cyo, Nagano-City 381-1214, Japan
JA1TAA to Hiroshi Hotta, 4-12-53 Kameino, Fujisawa, 252-0813, Japan
JM1LRQ to Nobuyuki Arai, 5-6-1-1002 Kitayamata, Tsuzuki, Yokohama, 224-0021, Japan
KHØCE to P.O. Box 2249, Saipan MP 96950 , USA
KH2A to P.O. Box 6488, Tamuning, Guam 96911 USA
KH2D/KHØ to P.O. Box 25666, GMF Guam 96921 USA

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 901-641-0109; e-mail: <golist@wk.net>.)

PWØS, St. Peter & St. Paul Rocks. This should answer any question as to why it took the team so long to get on the island. Could you, or would you even attempt, such an operation? Members of the PWØS team were scheduled to be at Dayton, and they wish to thank all of their sponsors and individual contributors for helping to make the operation a success. (Photo courtesy Steve, KU9C)

tenna systems. You have a couple of events during the summer to find out if you need to make any "minor" adjustments before the big events in the fall. The IARU HF Championship comes up in July, and it's a good one to find out if those new antennas will allow you to hold a frequency as you run the pile-ups or how you stack up against the competition to work a new one.

Hopefully I saw you at Dayton. If not, perhaps we'll meet in Chicago at the W9-DXCC Convention in September. However, if we don't get together at one of those places, I'm sure we'll run into one another soon in one of the pile-ups or during one of the contests. Until next time, Good DXing!

73, Carl, N4AA

CQ DX Awards Program

SSB

2341.....KF3AA
2342.....WD9DZV
2343.....4Z5GV
2344.....KQ6JQ

CW

1020.....VE6RWC

SSB Endorsements

320.....KE5PO/333
320.....VE2WY/331
320.....W8KS/331
320.....WØBNC/330
320.....W7FP/330
320.....N5ORT/327
300.....CP2DL/314
275.....G4URW/275

CW Endorsements

320.....DJ2PJ/333
320.....K6GJ/332
320.....K1HDO/327
320.....KE5PO/3220

RTTY Endorsements

275.....KE5PO/297

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 333 active countries. Please make all checks payable to the award manager.

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Is Riley Going to Come and Get You?

In the last couple of years the FCC has once again become proactive in enforcing the rules on our bands. We've all heard the stories and cheered that something is finally being done about the bad apples, but do you really have a working, day-to-day understanding of what's legal and what's not? There's no need for guesswork or hoping; it really is pretty straightforward.

One thing to keep in mind is that things have changed in the last 20 years or so. Sometimes the guys who have been around for a while seem a little uptight about some of the rules. A short "history lesson" will explain to you why that is.

In the early days, radio served much the same function as telegraph or long-distance telephone service of today. Forget e-mail; there was nothing equivalent to it, except maybe ham radio. Radio companies were paid so much for each message that they passed. Basically, they did not want a bunch of amateurs undercutting their pricing. That's understandable. Therefore, we had a rule that prohibited hams from engaging in business communications. It was pretty clear cut that the intention was to keep hams from opening shop and competing head-on with the regular radio companies. This historical background can also be used to explain how the National Traffic System evolved and some of the quirky rules and traditions surrounding third-party traffic. However, that's another column.

By the 1970s, long-distance telephone service had pretty well eliminated the radio message business except for ships at sea and that sort of thing. The language was still the same as it had been for over 30 years though. It hadn't been much of an issue except in a few cases such as the Eye Bank net.

Then along came a big change in the technology. Suddenly, most hams were getting involved in VHF-FM communications—particularly 2 meter repeaters. One of the biggest drawing cards for a repeater was the auto-patch, as there were no cell phones in those days! It was very cool to make phone calls from your radio. The closest thing to a cell phone was something called IMTS (Improved Mobile Telephone Service. Heaven only knows what it was improved over. I wouldn't want to guess what the system was like before then.) A good autopatch and 2 meter radio were equal to or better than an IMTS phone, which could have cost big bucks to buy and to operate.

Now we had something that was socially "hot"—a pretty good mobile phone system that was essentially free if you were a ham! There was nothing, nothing in the consumer market that came close to it. We also had rules that were written when spark-gap radios were still on the air.

There was the rule-making and interpreting side of things, too. You have to understand that the number one concern of any bureaucrat is CYA—Cover Your Assets. Buy an IBM computer, not because it is the best on the market, but because it is so safe that no one ever got fired for recommending it. Buy Sony, not because it is the best audio system (or whatever), but because it is safe. Always CYA. That's the number one rule of any bureaucrat.

Who runs the FCC? Not the commissioners. That's just a myth of how things ought to be in an ideal world. It is the staff, and they are, by definition, career bureaucrats. Some of them are hams, too. As the 2 meter FM repeater fad really took off, one of the up-and-coming bureaucrats caught the bug. He even brought a rig into his office and set it up so the other staffers could see what a great innovation it was.

Fate took an ugly turn a few days after he moved the rig in. One morning the up-and-coming bureaucrat bumped into some real brass in the hallway and started telling them about the wonders of the 2 meter FM wave that was sweeping ham radio. People were calling in accidents to the police station from the highway and all sorts of wonderful things. "Here, come listen in for just a few minutes. Who knows what great things we will hear?" What is the first thing out of the speaker?

Ring. Ring. "Good morning, Dr. Swartz's office." Oh, wow. Maybe an emergency call to a doctor's office from some ailing motorist? No.

"This is the Doctor. Do I have any messages?"

Our young bureaucrat was standing there with his superiors. He was busy wiping the egg off his face. He was humiliated, angry. This single incident has tarnished his image. Obviously, too, the Cover has fallen off, and his Assets are exposed and waving in the wind for all to see. Not a comfortable place to be if you are "Johnny Bureaucrat." He had to do something to save face.

Now as fate would have it, this bureaucrat was the one to whom hams turned to find out what was legal and what was not. Do you think he was in the mood to take chances again? I don't think so. From a career standpoint, what is the safest answer to give to any question that isn't absolutely clearly allowed? "Don't do that; it's illegal."

From that day until the early 1990s, any question that came up pretty much got the automatic answer "Don't do that; it's illegal." After a while, just thinking about using ham radio in any way that might somehow benefit someone's business interests became the equivalent of speeding in Ohio—potentially a capital offense.

In those 20-odd years that followed, the FCC interpretation of what was legal and not legal became more and more restrictive, particularly in the area of public-service communications. Remember, the rules were written in the 1930s. By 1992 it was clear that this mentality was severely limiting the effectiveness of hams to be of service to their communities, both in times of emergency and at major events, such as the New York City Marathon.

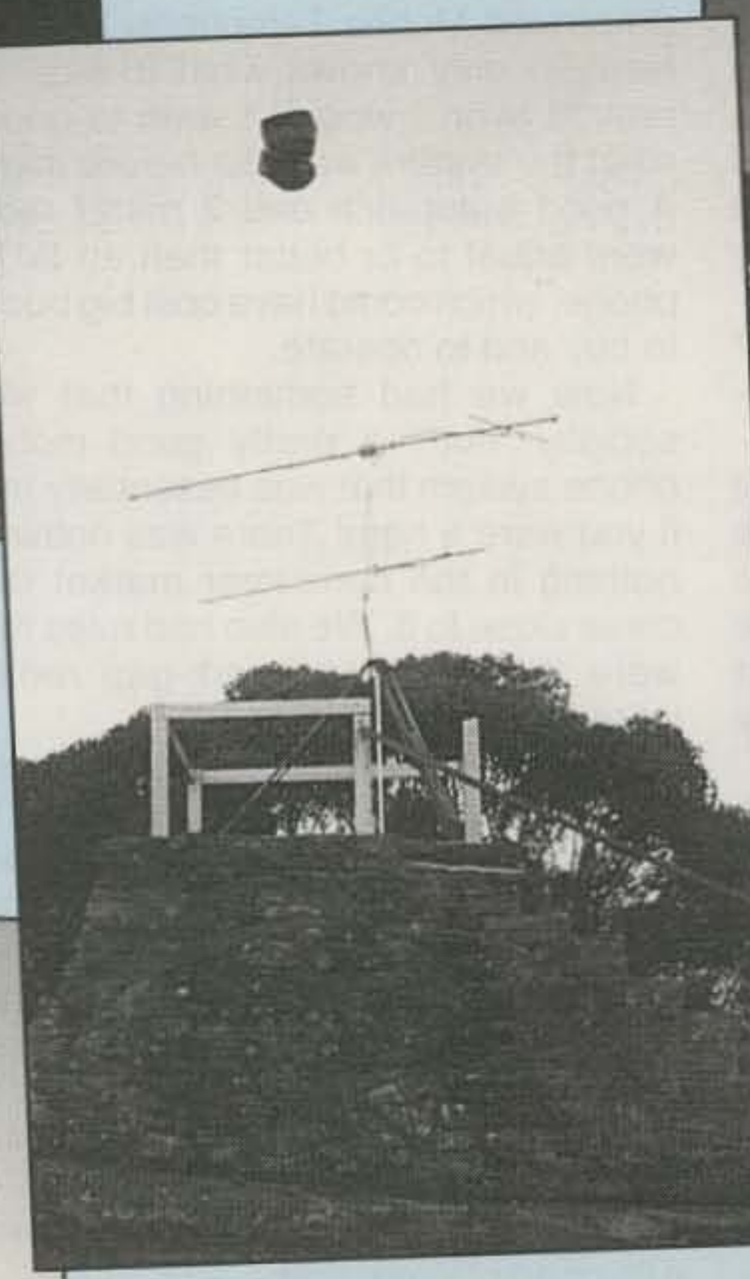
At the request of the ARRL and others, the rules were changed, and as of September 1993 a modicum of sanity returned to the scene. Forget the good old days. Let's take a look at what is legal these days.

Nowadays . . .

In an emergency situation any communication is legal as long as it pertains to the emergency in some way. There are basically two kinds of emergencies: those which have been declared to be so by the FCC and those which involve a common-sense decision that it is an emergency. The first is pretty clear cut: If the FCC declares a situation to be an emergency, it is. End of discussion. The other requires a minimal amount of thinking and decision making. The rules talk about emergency communications being "in connection with the immediate

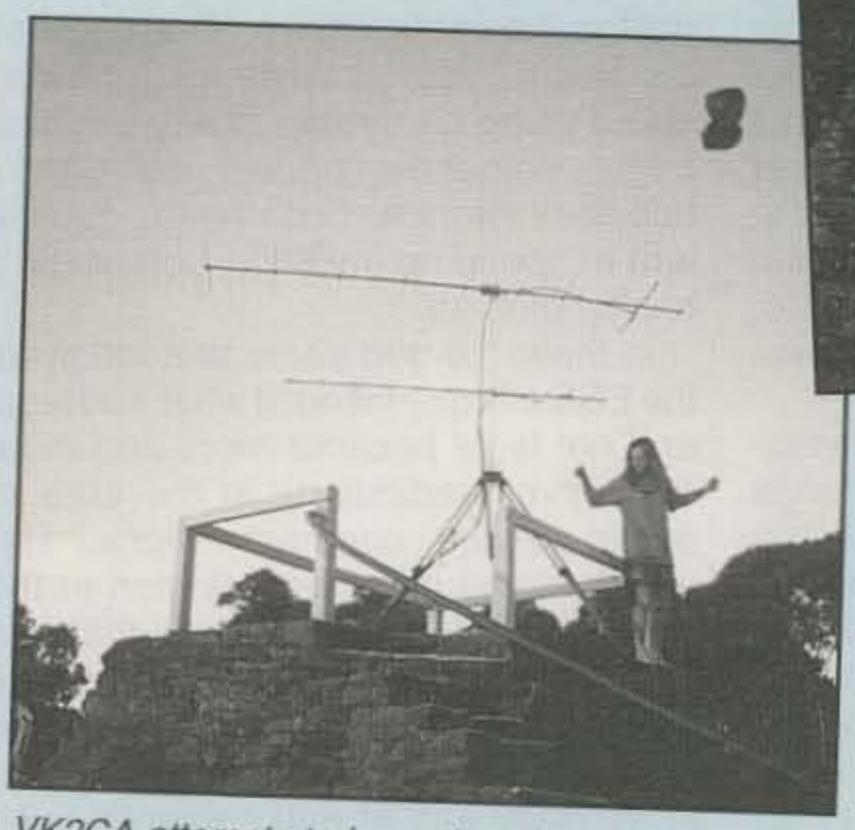
*123 NW 13th Street, Suite 313, Boca Raton, FL 33432
e-mail: <wb2d@cq-amateur-radio.com>

Andrew Castle, VK2CA, inflates the home-made balloon with helium.



The balloon carries the wire antennas above the operating position. Note: The VHF/UHF antennas visible belong to VK2CBD and are not part of the balloon operation.

VK2CA in front of the operating position. Just after this photo was taken, a gust of wind destroyed the dipole suspended from the balloon.



VK2CA attempts to keep the wires from getting tangled.

Another shot of VK2CA filling the balloon as dawn approaches Sydney Harbor.

Working DX via Balloon-Supported Antennas

Shane Magrath, VK2KEP, sent the photos presented in this month's column and the following note about some fun his group has had using helium balloons to support wire antennas and work DX.

"This collection of photos shows two portable operations performed by Brett Dawson, VK2CBD; Andrew Castle, VK2AC; and Shane Magrath, VK2KEP. The first operation, shown in photo A, was at a location in Sydney Harbour (Five Dock). The second operation, at another Sydney Harbour location (Berowra), is shown in the remaining photos.

"The first operation was the most successful. The antenna consisted of about 20 meters of wire for the vertical element (quarter wave on 80 meters) attached to the coax center, and a short length of wire attached to the coax braid and then clamped to some chicken-wire mesh. The chicken-wire mesh was thrown into the salt water to make the counterpoise. The "balloon" was a 250 litre plastic garbage bag filled with helium (obtained from a party rental store). It was inflated and taped tightly and secured to the wire/vertical element. We carefully let the balloon go, and as can be seen in the photo, a good result was obtained. Since we were trying to work 80 meter DX (There's a short window from Australia into Europe at around sunrise.), we tuned up. The VSWR was low, and before long we were hearing a lot of good signals from Europe through to Russia. Also solid was VK5PO, who is a regular 80

safety of human life and the immediate protection of property when normal communications systems are not available. ([97.403] Here you do need to use some common sense.

For instance, your town is flooded. It may be the regular business of the police and fire department to look for survivors and care for the injured. It may be the regular business of the Red Cross to provide aid to the now homeless families. However, that is not the primary concern here. Lives are at risk, and so is property. Invariably, normal emergency communications channels

This is the first trial over Sydney Harbor. With the balloon fully over the salt water, a large number of QSOs were racked up in about an hour on 80 meters.

meter DXer. Since we were running portable, we were limited to 100 watts with our FT-847. A lot of fun was had.

"Our second operation was a combination with HF and VHF/UHF DX. Brett, VK2CBD, is interested in UHF DX. Andrew, VK2AC, and I tend to HF. Andrew erected a vertical dipole for 20 meters, and we soon had that in the air. We had borrowed an MFJ antenna analyser for this trip (I love this box!) and had the system tuned so well I'm sure I could hear the "Hallelujah Chorus." However, a bit of breeze came up and we quickly learned the hard way about the need to guy our system. With a sudden gust, the balloon and dipole broke away from the feedline and very quickly headed for the stratosphere! We considered notifying AMSAT to see if we could get an OSCAR designation for the new "satellite," but after a bit of thought, we realized they're busy with their own problems.

"On our next excursion we will be trying out a guying system consisting of gelspun fishing line (e.g., SpiderWire or similar). This is very strong, very light, and very unelastic. With the use of some fishing swivels, a collar on the balloon, and some weights, we should have a more stable, secure, and effective antenna system to try.

"Look for us on the DX bands!" – *VK2KEP*

are overloaded. There is no question that you should be in there helping out, yet some hams have been known to question just what help they could give in such situations.

There is a very simple answer to this question. Do whatever needs to be done, and forget about the fears of those who lived through the '70s and '80s. For instance, suppose a doctor needs to speak to an Emergency Medical Technician and give him some technical medical instructions. Be reasonable. Just hand the mics to the doctor and med tech and let them do their job. You can ID when they no longer need the radios. Believe me, in that sort of situation neither one is going to say one more word over the radio than is absolutely necessary. And if one of them happens to use one of George Carlin's words, nobody is going to worry about it. No one is going to cite a ham because some EMT used a four-letter word in the frenzy of trying to save a life. Be reasonable.

What about a situation that is not quite as "clean" as a flood. For instance, suppose you spot a stranded car on the highway. Should you call it in on the autopatch? Of course. Even if you don't live in an area prone to drive-by shootings, a stranded car presents a safety hazard for the driver, passengers, and occupants of other vehicles. Just use some common sense. These days, chances are that someone with a cell phone has already called it in; in case you haven't noticed, we are outnumbered.

Public-Service Events

Here the new rules focus on two areas. Instead of a blanket prohibition of business communications, the rules focus on whether you or your employer stand to benefit financially. Thus, our 1970s doctor would still be in violation, because he was using ham radio to benefit his own personal business. On the other hand, if you are traveling and need to find a motel room, it would be okay for someone to bring up the patch and call a motel for you, or you even could order a pizza if you wanted to. In reality, though, cell phones are so prevalent and inexpensive now that examples like this seldom come up.

As far as providing communications for some charity event, it is now perfectly legal. The FCC figures that such situations will tend to be self-regulating. The events typically come up once or twice a year for most organizations. How much time would a bunch of volunteers be willing to donate to an organization? You might do it a few Saturdays a year or something on that order, but not every day.

The FCC even went so far as to single out one area where hams provide assistance to an organization on an ongoing basis that is not only legal, but just the sort of thing that the FCC feels hams should be doing. What is it? Collecting data for the National Weather Service when storms threaten. This activity was singled out by the FCC as something that should be encouraged.

You are still prohibited from accepting payment for any communications that you provide, but what about out-of-pocket expenses? If you are 100 miles from home at some disaster site and the Red Cross offers you a cup of coffee, it's okay. Take it—and the free meal and a room to sleep in, if it is available. The bike-a-thon can give you a doughnut without any concern that the FCC will be fining you. On the other hand, a check for $500 for "services rendered" is a big No-No.

Another area that sometimes causes the old-timers to wheeze and gasp is the use of tactical callsigns. Suppose your group is providing communications for a marathon. Typically, there will be aid stations and activities of one sort or another at each mile marker. Most groups will position a ham at each mile marker, too. It just makes sense.

It is also common sense to use tactical callsigns that easily identify the station in question to both hams and nonhams alike. It is much easier to figure out who Mile 17 is than KZ4XYZ. It is legal as long as the participants properly identify themselves according to the rules.

The rules on IDing are pretty straightforward. You must ID once every 10 minutes and at the end of a series of transmissions. Your group can figure out some very simple ways to comply with this rule. It's not rocket science.

Summary

The next time you are involved in a public-service event, don't be angry with the old timer who questions whether what you are doing is legal or not. He lived through some rough times brought on by technology outstripping the language of the rules, and it was brought on by some hams who were using bands for their own personal gain by a lot of fear and anger.

Just ask him if he knows that the rules were changed in 1993. Tell him to go look it up in the ARRL's *FCC Rule Book*. Be kind, however, as he has been through some bad times. Then just go ahead doing what you were doing. It's legal to do that on the air now.

Next time we will take a look at more rules, including logging. Does anyone keep a log these days?

73, Pete, WB2D

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

Phone vs. CW Contesting—Where Do You Stand?

July's Contest Tip of the Month

Here's an oldie but goodie. As we are now coming off the peaks of the current sunspot cycle, it's more important than ever to leverage high-band openings—especially 10 meters. So, as has often been recommended by others in the past, do your best to operate on the highest open band. I have always favored operating for extended periods on 10 meters during the first day of a DX contest, assuming the second day may be a total bust. While it may make your breakdown numbers seem awkwardly skewed in the early going, you'll be very thankful the next day when you have hundreds of QSOs that could only have been worked in those first fateful 24 hours of the contest.

Calendar of Events

June 23-24	Marconi Memorial HF Contest
June 23-24	ARRL Field Day
July 1	RAC Canada Day Contest
July 7-8	Venezuela Ind. Day SSB Contest
July 14-15	**CQ WW VHF Contest**
July 14-15	IARU HF World Radio Champ.
July 15	Colombian Ind. Contest
July 21-22	NA RTTY QSO Party
July 21-22	Georgia QSO Party
July 28-29	IOTA Contest
July 28-29	Russian RTTY WW Contest
July 28-29	Venezuela Ind. Day CW Contest
Aug. 4-5	North American CW QSO Party
Aug 4-5	ARRL UHF Contest
Aug. 5	YO DX Contest
Aug. 11-12	WAE CW Contest
Aug. 11-12	Maryland/DC QSO Party
Aug. 18-19	SARTG RTTY Contest
Aug. 18-19	North American SSB QSO Party
Aug. 18-20	New Jersey QSO Party
Aug. 25-26	Ohio QSO Party
Aug. 25-26	Hawaii QSO Party
Aug. 25-26	South Dakota QSO Party
Sept. 29-30	**CQ/RJ WW RTTY DX Contest**

The majority of us have heard those all too familiar comments such as "CW is a dying mode," or "Boy, do I hate phone." It seems that many contesters are very opinionated and have become quite polarized on the subject of their favorite mode of operation, and that's without even considering the more obscure digital modes, which have over a dozen dedicated contests sponsored around the world on an annual basis.

With that thought in mind, let's focus on each mode individually and get some thinking going on the subject.

An Introspective Look at CW

CW (or "the code," are we often call it) has been viewed by most hams as one of our most distinguishing attributes—a rite of passage to the self-proclaimed differentiation that exists between ham radio and citizen's band operation. It's for this reason that the "dummying-down" of our cherished mode of operation has been such a hotly debated topic over the years.

I find it ironic that more often than not the general public is keenly aware of our CW requirement when discussing ham radio licensing from a non-ham perspective. I've frequently been asked the same question over the years: "Don't you have to learn Morse code to get your license?"

Well, I'll admit that I fondly remember the good old days of taking my FCC General Class 13 wpm CW test in the New York City examiner's office by placing a decrepit set of 1940s-vintage headphones around my ears and listening to perfectly sent CW originating from an old 1920s code machine populated with tube types that had identifying numbers higher than my age. Do any of you remember copying those initial strings of "VVV VVV" that were intended to calm your nerves and prepare you for what was still to come? Surely those letters counted in the evaluation, didn't they?

Well, my, my . . . have times changed. Now CW is not even required for the initial entry into our hobby in this country. Instead of providing a page of handwritten text to the examiner, applicants now answer a series of multiple-choice questions. Also, in many countries around the world CW has been eliminated entirely as a required mode or is well on its way to extinction as a licensing prerequisite. It seems the US is hot on the tails of this movement.

With all of the disturbing trends outlined above, an uninformed reader may quickly draw the conclusion that CW is a dead mode. However, its resiliency in our hobby seems to continue unabated. Here are just a few evidentiary points to prove my case:

• Take a look at the number of QSOs being made in many of the most recent CW contests. In fact, the numbers are increasing rather than declining—and at a rather dramatic rate.

• There is certainly no lack of activity on the CW bands when a DXpedition fires up from somewhere around the world. In most cases, major DX operations sport a nearly even mix of CW and SSB QSOs. In fact, many of them proudly operate CW-only, such as the recently concluded VK9C event led by G3SXW, G3MXJ, and G3TXF.

• When tuning an open band, activity appears as high as ever on CW. On a sunny Saturday morning on 10 meters I can still crank out a big pile-up of Europeans on 10 meters as easily as I could 20 years ago.

• Have you compared your CW rates to those of years past? Some of the highest CW rates I've ever had in a contest were in the past two or three years. While some of that is due to solar activity, it's also a measure of interest in the mode and the level of activity.

• As you will see in next month's 2001 CQ Contest Survey results in this column, most contesters are claiming that their CW skills are at least staying constant, with many increasing their abilities in a significant way.

Before we get too far ahead of ourselves, CW contesting does not necessarily equate to skillful CW operating. Here's a test I'd like you to try to prove the point. While on CW, pose a question to another contester at a fairly high rate of speed. How many will actually be able to copy your message? Yes, unfortunately, there are many of us who are skilled at copying callsigns and contest exchanges, but who are severely challenged at the sport of conversational CW.

As it turns out, CW favoritism is quite a personal matter. For many, their stations dictate CW due to antenna or geographical challenges. Others prefer the mode for physical reasons. Perhaps, too, the majority prefer CW simply because they like it.

So What About Phone?

Although not nearly as contentious as the CW debates, SSB operation has had its share of discussion of late as

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

well. Here's a rough quote from my very own K1AR ARRL DX Contest Internet posting; for example: "I'd support the idea of eliminating all SSB contests in favor of CW operating." Now while that post was delivered in the spirit of a tongue-and-cheek comment, I guess I have now exposed my own personal preferences. The fact is, however, that I operate both modes equally, as do most serious contest competitors. Having said that, a trend does seem to be brewing with some contesters moving away from phone operating as a preferred mode. Why is that? Well, here are some thoughts:

• For many of us, CW is simply an easier and less physically demanding mode of operating. It's less taxing to send CW via your computer's F1-key than to scream into a microphone over the course of a 24- or 48-hour contest.

• As with most hams, contesters in particular hate QRM. Also, there's no better place for lots of QRM than a crowded phone band. We're all wondering what 20 meters SSB is going to be like in just a few short years from now as the sunspot cycle continues to erode towards the minimum.

• SSB contests generally require more power and hardware than their CW cousins. In an era where the cost barrier of entry into contesting is escalating at geometric rates, competitive SSB operating seems to be a huge hill to climb for owners of modest stations.

Well, before I get thrown out of the unbiased reporting club, let me make a few points about the strengths of SSB operating. Contesting, by its very nature, adds a layer of complexity to ham radio operating. As a new ham, it's intimidating enough to build up the nerve simply to talk to someone, much less doing so under the pressure of the speed, rules, and other subtleties of contesting. For that reason, SSB contesting offers a lower barrier of entry, from an operating standpoint, to the new contester. Most new guys have already mastered the skill of "talking" and can operate without being weighed down by the ball and chain of an added skill requirement we call "copying and sending the code." Too, while us old-timers may not like it, SSB does present a low-resistance path to attracting new contesters from around the world who would likely never appear in our logs if CW were the only means to get there.

Finally, I do have to admit that the higher QSO rates on SSB are very stimulating, especially when operating off shore. Some of my fondest operating memories in contesting are of enjoying a 300+ QSO/hour rate during an SSB DX contest. In contrast, slogging along at 60 QSOs/hour on a crowded 20 meter phone band is the rough equivalent of having your dentist perform root canal without anesthesia!

Some Conclusions

I'm sure I'm not alone in the claim that many contesters' mode preferences have changed over the years. Also, while we haven't really touched digital contesting, it's very clear that this mode of operation is growing as fast as any other area of contesting these days. I truly believe that while we may have our preferences, contesting as a sport is better served by our use of all modes of operation—whether it be CW, SSB, or digital (I do draw the line on SSTV—sorry). While I don't like the legislative trend away from CW around the world, I am encouraged by the hobby's resilient use of Morse code in general and by contesters in particular. We clearly have quite a bit of runway to go before the claim "CW is dead" becomes a reality.

As for SSB, we need to think about the bands as a crowded highway filled with commuters. Despite the temptation to engage in QSO rage, we have to move away from operating practices designed to run slow drivers off the road. That, in my view, is a much more serious consideration than whether or not it's our preferred mode of operation.

Final Comments

I'm out of space and time for this month. The power of today's modern laptop and this particular Boeing 757 airplane that I'm now riding in at 37,000 feet has provided the creative environment for this month's column. As it turns out, I'm actually on my way to Sacramento with a return swing scheduled through Dayton for this year's Hamvention™. While you may think that's a crazy itinerary, Sacramento actually appears to be quite close to Dayton when viewed from the Space Shuttle at 25,000 miles above Earth!

Be sure to look for the *CQ* 2001 Contest Survey results in next month's column. There will be some fascinating results for you to enjoy this year, and as always, your input has been invaluable.

73, John, K1AR

Announcing:

The 15th Annual CQ/RJ World-Wide RTTY DX Contest

Sponsored by CQ Magazine and The New RTTY Journal

September 29–30, 2001
Starts: 0000 GMT Saturday, Ends: 2400 GMT Sunday
Logs are due no later than November 16, 2001

I. Period of Operation: All stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands.

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high-power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign can be used to aid the entrant's score.

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as 1(a) except that output power is 150 watts or less. Stations in this category compete with other low power stations only.

(c) Assisted (All band operation only): Same as V.1(a) except the passive use of DX spotting nets is allowed. No self-spotting permitted. No power categories.

(d) Single Band: All contacts are made on one band, regardless of power level. However, entrants may make contacts on other bands if, and only if, they submit logs in Cabrillo format and clearly mark their log as a single-band entry (see Rule X below). No power categories.

2. Multi-Operator (All band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to six band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Two power categories: Low Power (150W or less) and High Power (greater than 150W).

Exception: One and only one other band may be used during the same time period if and only if the station worked is a new multiplier. Violation of the six band-change rule by either transmitter may result in reclassification to the Multi-Multi category.

(b) Two-Transmitter: A maximum of two transmitted signals are allowed as long as each transmitter is on a different band. Each of the two transmitters is limited to six band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the six band-change rule will result in reclassification of the entry to the Multi-Multi category. No power categories.

(c) Multi-Transmitter: No limit to transmitters, but only one signal and running station allowed per band. No power categories.

VI. Modes: Baudot only. No unattended operation or contacts through gateways or digipeaters permitted.

VII. Exchange: Stations operating within the 48 continental United States and the 13 Canadian areas transmit RS(T) report plus State or Area (Canada only) plus CQ Zone. All other stations transmit RS(T) and CQ Zone.

Valid Contacts: A given station may be contacted only once per band. Additional contacts are allowed with the same station on each of the other bands used in the contest.

VIII. Identification of Transmitters: Multi-Single and Multi-Two log entries must identify which transmitter made each QSO in the log. Multi-Multi entries must provide a separate log for each transmitter.

QSO Points: One QSO point for contacts within your own country.

Two QSO points for contacts outside your own country but within your own continent.

Three QSO points for contacts outside your own continent.

IX. Multipliers: One multiplier point for each US state (48) and each Canadian area (13) on each band. One multiplier point for each DX country on the ARRL and/or WAE country lists on each band. *Note:* KL7 and KH6 are counted as country multipliers only and not as state multipliers. One multiplier point for each CQ Zone worked on each band. Maximum of 40 Zones per band.

Canadian areas are VO1, VO2, VE1 (NB, NS, and PEI), VE2, VE3, VE4, VE5, VE6, VE7, VE8 (NWT), and VY (Yukon).

X. Scoring:

Final score = total QSO points × the total multipliers (US states + VE areas + ARRL/WAE countries + CQ zones).

XI. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia, and Japan. All scores will be published. *To be eligible for an award a log must be submitted in Cabrillo format.* A Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single-band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless clearly specified otherwise in the submitted log.

All certificates and plaques will be issued to the licensee of the station used.

To the extent sponsors or winners purchase plaques through the Contest Director, plaques will be awarded in the following categories:

Single Operator, All Band, High Power: World, North America, USA, Africa, Europe, Asia.

Single Band, All Band, Low Power: World, North America, South America, Europe, Asia, Oceania, Africa, USA.

Single Operator, Assisted: World, USA, N.A., S.A., Oceania, Africa, Europe, Asia, .Canada

Multi-Single: World, USA, N.A., Oceania, S.A., Europe, Asia, Canada.

Multi-Two: World, USA, N.A., Oceania, S.A., Europe, Asia.

Multi-Multi: World, Europe, Asia.

XII. Instructions for Preparation of Logs:

1. All logs containing 100 or more QSOs and which were generated using a computer program must be submitted via e-mail or on a 3.5" floppy disk.

2. Logs must be submitted electronically or postmarked no later than **November 16, 2001.**

3. Electronic submissions.

a. We **want** an electronic log in the **Cabrillo** format. We **require** an electronic log for any possible high score. In the "Subject:" line of your e-mail message please include your callsign and the category you entered—e.g., SOABL, M2, MS, etc. If you submit a floppy disk, please be sure to use a proper disk mailer to protect your log.

b. Entries from Multi-Single and Multi-Two stations must be merged into a single chronological log that **clearly** indicates which transmitter made each QSO.

c. Multi-Multi logs must be submitted chronologically by band.

d. If the Cabrillo format is not available, logs required to be submitted electronically (per Rules XII.1. and XII.3.a.) must be prepared in accordance with Rules XII.3.d.i. and XII.3.d.ii. below and submitted via e-mail as an attachment. Submit and name your files as follows:

Summary sheet: *yourcall.sum*
Chronological log: *yourcall.log*

i. The chronological log must contain the date, time in GMT, band, callsign of the station worked, sent and received exchanges, multiplier claimed, and points claimed for each contest QSO. Multipliers should be logged only the **first time** they are worked. All duplicate contacts must be shown and indicate zero points claimed.

ii. Entries from Multi-Single and Multi-Two stations must be merged into a single, chronological log that **clearly** indicates which transmitter made each QSO. Multi-Multi logs must be submitted chronologically by band. A ZIP file containing the files listed above is acceptable and must be named *yourcall.zip*

4. **Paper and floppy disk log submissions.**

a. Logs must be prepared in accordance with Rules XII.3.d.i. and ii. In addition, an alphanumeric checklist of all callsigns worked (dupesheet) and a list of claimed multipliers must be submitted.

b. Each entry must also be accompanied by a Summary Sheet listing all scoring information, the category of competition, the entrant's e-mail address if available, and the entrant's name and mailing address in BLOCK LETTERS. Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

c. Entries on 3.5" floppy disks must contain the required files in **plain ASCII text** and a printed summary sheet must be enclosed.

5. **Logs submitted via e-mail** should be sent to <wwrtty@kkn.net>. Remember to include in the "Subject:" line of your e-mail message your callsign and the category you entered—e.g., SOABL, M2, MS, etc. Receipt of e-mailed logs will be confirmed via return e-mail.

6. **Paper logs and 3.5" diskettes** should be sent to: CQ Magazine, CQ/RJ WW RTTY Contest, 25 Newbridge Road, Hicksville, NY 11801 USA.

Questions pertaining to the CQ/RJ WW RTTY Contest may be sent to the Contest Director, Glenn Vinson, W6OTC, 488 Locust Street #401, San Francisco, CA 94118 USA; e-mail: <w6otc@garlic.com>.

7.Official log forms and summary sheets are available for an SASE with sufficient postage from: Wayne Matlock, K7WM, Rt. 2, Box 102, Cibola, AZ 85328 USA; e-mail: <k7wm@i10net.com>.

XIII. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the CQ/RJ WW RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he will be ineligible for any *CQ* contest awards for three years.

XIV. Deadline: All entries must be postmarked NO LATER than **November 16, 2001.** E-mail logs are subject to the same deadline. Logs that are postmarked after the deadline may be listed in the results but will be ineligible for any awards.

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

This month we are very happy to recognize Rex Grew, VK3MW, another Australian station completing USA-CA and within less than three months of VK4AAR's accomplishment. Notice the large number of DX stations listed this month in the USA-CA Honor Roll. Perhaps it is a result of improved conditions, but judging from some of the application data, these stations have been collecting cards through more than just one solar cycle.

As I write this in late April, there is a good deal of activity behind the scenes working to get Yaz, JH8GWW, his final few dozen counties. When it happens, he will be the first Japanese station to accomplish this feat. We tip our hats to the incredible devotion of the overseas operators who pursue this most difficult of goals.

USA-CA Special Honor Roll

Rex Grew, VK3MW
USA-CA All Counties #1018
March 31, 2001

Mike Greenway, K4PI
USA-CA All Counties #1019
April 19, 2001

USA-CA Honor Roll

500		2000	
HB9ANR	3150	WA2RZJ	1208
K4PI	3151	K4PI	1209
SM6NT	3152		
1000		**2500**	
K4PI	1570	VK3MW	1131
		K4PI	1132
1500		**3000**	
HB9BYZ	1309	G3SPU	1037
K4PI	1310	VK3MW	1038
		K4PI	1039

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

A "Down Under" Experience

By Eldon, N8STF/VK4STF

The finish started with 14 degree temperatures and ended just short of 100 degrees two months later. My flight from Michigan touched down in Lincoln, Nebraska, and then I headed to Grand Isle, the jumping off point to get the last four of the 3076 counties needed by Alan, VK4AAR, to complete his USA-CA All Counties *(see last month for VK4AAR's account—ed.)*.

After the contacts were completed, I returned home to Michigan, where I followed VK4AAR's frustrating progress to get his remaining county confirmations together, the required checking complete, and the documentation to K1BV. It was during this time that I decided to visit Alan and other county hunters in Australia. I sent an e-mail to VK4AAR to let him know I'd be making a visit to Australia and to tell him that I wanted to meet him and the others "Down Under." I wanted to do this quietly, without letting anyone know, just pop up on the net from VK land.

As the expected date of Alan's USA-CA being confirmed and his certificate/number being issued was drawing near the date of my planned departure from the U.S., I had another idea. It would be great to make an "in person" presentation of the award to Alan, and the announcement of his number to the net, in Alan's own shack. This was planned with the help of K1BV. Committed to a travel date of January 22, Alan and I had several "trip planning" communications via e-mail.

The phone rang the evening of January 13. It was Ted, K1BV, who said, "I have Alan's package and it looks good; I can issue him USA-CA #1014." On Wednesday, January 17 the plaque arrived at my QTH, followed by the certificate on Friday, January 19. Everything was in order. "Silence is golden," the saying goes, and that's just how it continued—no number announced and VK4AAR with no idea that he was being "set up" for the surprise of a county hunter's lifetime.

I arrived in Brisbane, Australia in the near-100 degree heat of summer on January 24 (still January 23 in the U.S.). Alan, VK4AAR, and his wife Mee Wah met me at the airport, and at my request they drove to the ACA (Australian Communications Agency), which took my request (and a bit of money) for the callsign VK4STF (yet unissued, and a bit of a "vanity" callsign, at that). Now I was an honorary Aussie!

On our arrival at VK4AAR's home, Alan showed me "my" room and said he had to go check the e-mail for any news from K1BV. Hurriedly I unpacked the certificate and plaque and asked Mee Wah to go to the ham shack with me. I

Eldon, N8STF/VK4STF, presented Alan, VK4AAR, with his USA-CA All Counties Award #1014 at Alan's QTH in Australia. Left to right: Alan, VK4AAR; Eldon, N8STF; June, VK4SJ; and Jim, VK4BS.

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@cq-amateur-radio.com>

followed her into the room, extended the certificate towards Alan, and said, "Congratulations, USA-CA #1014." What an absolute treat for me to have given Alan his last four contacts to complete all 3076 and then to personally deliver, announce, and present the USA-CA award to VK4AAR nearly 10,000 miles from home.

All was not yet complete, as the rest of the county hunters hadn't been informed. It would be midnight for us before we'd hear any stateside stations. Alan received my final surprise instructions: I needed to make the announcement to Fred, K5CWR, because he has done so much to assist the VK's as they sought county contacts.

Alan contacted K5CWR. I took the microphone and said, "K5CWR, this is VK4STF. On behalf of *CQ* magazine and K1BV, I'd like to announce VK4AAR as the recipient of USA-CA Award #1014 dated 14 January 2001. Since Alan is at my side, in his shack, please offer your congratulations for an outstanding job well done." K5CWR repeated the announcement stateside as best he could, and KZ2P came on frequency and repeated it westward. With that completed, the rest of the time in Australia was dedicated to making new acquaintances.

On Saturday, January 27 the Brisbane area county hunters planned a gathering at the Brekky Creek Hotel. Alan, VK4AAR; June, VK4SJ; and Jim, VK4BS attended. Without question, the fine company, great food, and conversation made for a memorable event.

For the next several days I was the guest of VK4BS at his home on Russell Island. On Monday we headed for the home of VK4SJ and her husband, Doug. On the way, we stopped to visit VK4EJ and wife Linda. Later that evening (really early morning, because it's after midnight) I used VK4SJ's station to run VK4STF in Queensland and make quite a number of stateside contacts on 14.336.

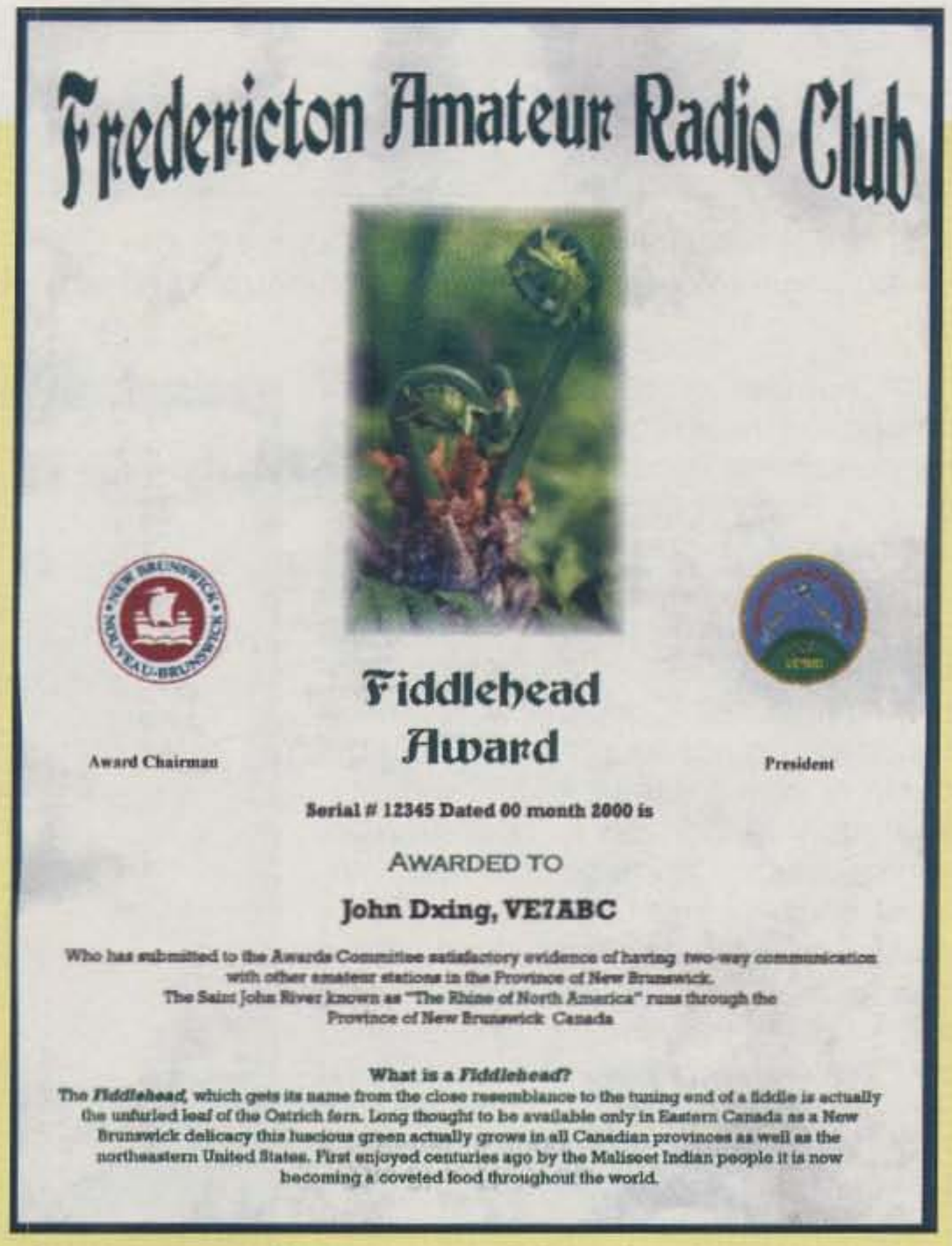
On Wednesday Jim drove me to Brisbane Airport for the flight to Melbourne. On arrival in Melbourne, Rex, VK3MW, was waiting to take me to another "home away from home." Rex had set a schedule on Thursday for us to visit Cliff, VK3CB. Friday evening a barbeque was planned at a neighbor's house, and I felt right at home. This is how it was everywhere I visited. On Saturday Rex took me back to the airport as my time with the Australian county hunters approached an end.

During my stay with VK4AAR, VK4SJ, and VK3MW, I had the privilege of operating from their stations for CH net operations. I gained an appreciation of county hunting that is simply unknown stateside. The hours of operation don't begin before midnight and are generally over less than three hours later if propagation permits any operation at all. The window to the west coast may just start to open when the band is about to close. Some long-path communication may occur early in their waking hours, but the window tends to be very short. Competition is fierce to get a weak signal report through to a mobile when stateside stations exchange 55, 59. Just hearing a mobile is sometimes a stroke of good fortune. Thankfully, there are a few stations stateside that can be heard and are willing to assist the VK stations.

The persistence to earn the USA-CA award from "Down Under" is far greater than that required of stations in the U.S. A request is extended by one who has experienced a brief "walk in their shoes": Please be courteous and helpful to our off-shore neighbors when they seek a contact with a mobile, or when you are mobile, listen carefully for those DX stations, especially when you know their window is open.

It is important that I thank a special person, my wife, Mary. She has shared my hobby, been by my side and by the radio for innumerable hours and countless miles—logging, navigating, making decisions, and rerouting the trips that gave many of you requested counties, listening, and making friends across the world. Although she was unable to make the trip, it truly was her inspiration and support that allowed me to fulfill a dream. For that I am extremely grateful and blessed.

Someone who has a great deal to do with my special affiliation with the VK county hunters is Fred, K5CWR. His devoted, positive commitment to their needs may largely go unnoticed, but it definitely has had an impact on their success in working counties. Thank you, Mary and Fred. — *Eldon, N8STF*



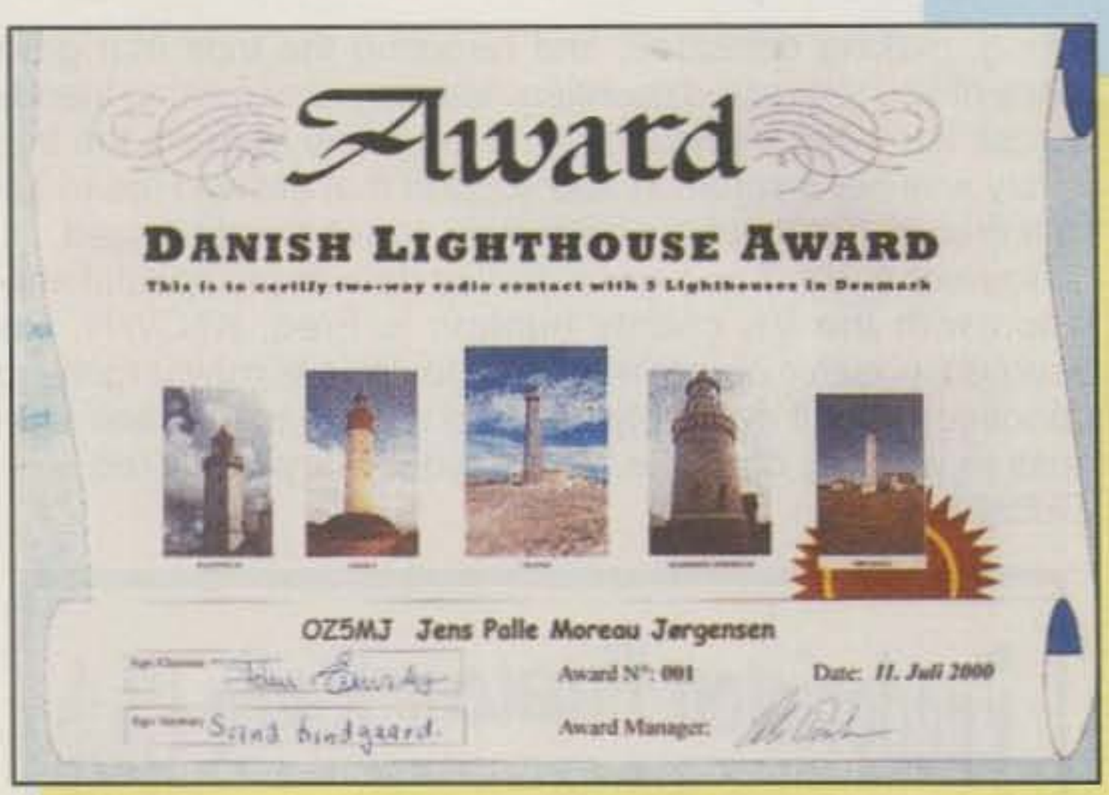
Canada's Fiddlehead Award is given for contacting stations in Fredericton, NB.

DX Awards

Canada's Fiddlehead Award. The Fredericton ARC of New Brunswick, Canada sponsors this well-designed multicolored award carrying the unusual name of this edible fern. I've tried steamed fiddlehead ferns in the springtime, and they taste like asparagus—quite good with a little butter!

Contact stations located in Fredericton, New Brunswick on or after the starting date of 31 December 1999. North Americans must contact ten Fredericton stations; all others need five. HF contacts only, using any mode. All contacts must be confirmed by QSLs in your possession. Send GCR list and fee of $C5, $US5, or 5 IRCs to: Fred LeBlanc, VE9UN, 17 DeWitt Acres, Fredericton, NB, Canada E3A 6S3. *(Tks, VE9UN)*

Danish Lighthouse Award. There's something about a lighthouse that stirs the imagination and provides a sense of stability for the sailor. My Navy days are long in the past, but I still appreciate the assistance that lighthouses provided as we approached land at night.



The Danish Lighthouse Award is issued by the Danish Lighthouse society for contacting lighthouses in Denmark.

The Moldova ER Pennant is given for QSOs with stations in Moldova in all ER areas 1 through Ø.

A number of countries, Denmark among the most recent, offer an award for contacting lighthouses along their shores. Each of the three levels of the award displays greater numbers of the lighthouses.

The award is issued by the Danish Lighthouse Society for contacting Danish Lighthouses. Contacts with Danish lightships *do not* count. Contacts must be on or after 1 January 1996 with stations duly authorized to operate from lighthouses in Denmark. QSL and SWL must show actual QTH and photo or stamp on QSL or similar evidence of the operation. Submit a GCR-list showing full details of the contacts and certified by the award manager of your national amateur radio society.

Award 1: For confirmed QSOs with 5 lighthouses in OZ

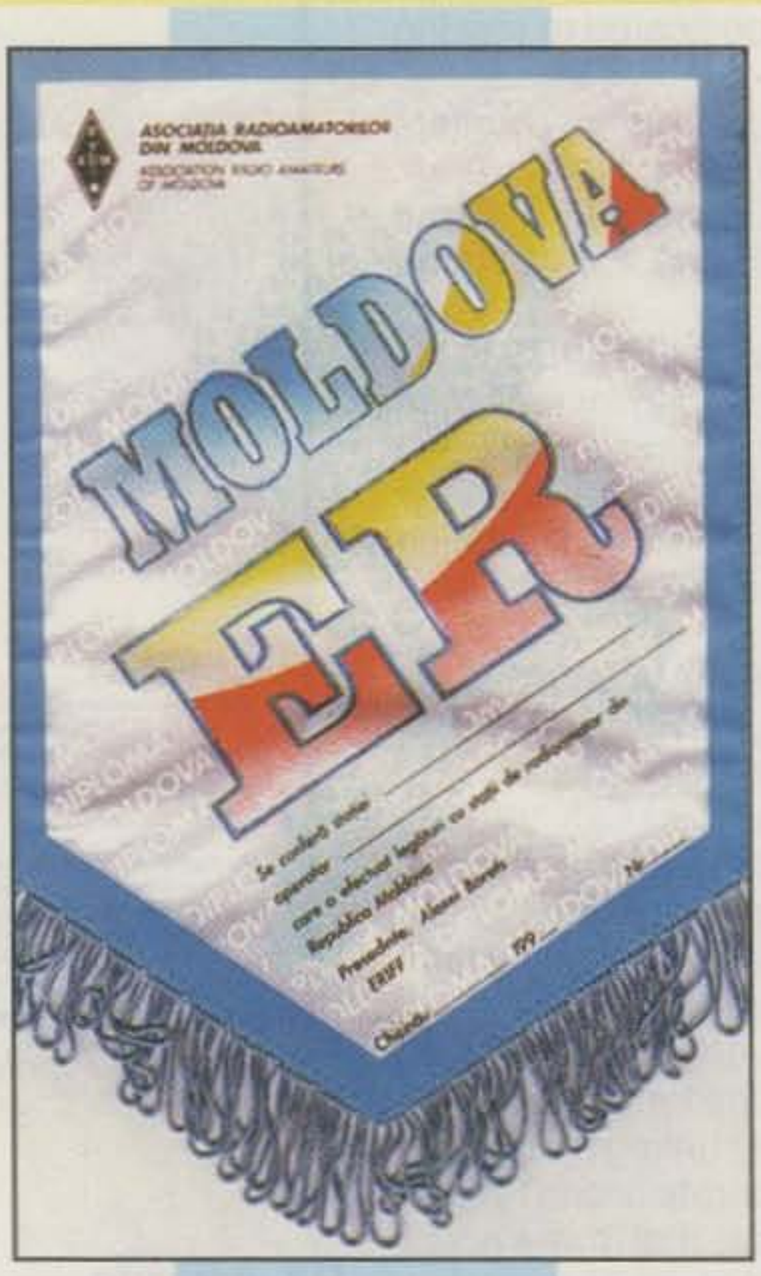
Award 2: For confirmed QSOs with 10 lighthouses in OZ

Award 3: For confirmed QSOs with 15 lighthouses in OZ

The fee for the award is 12 IRCs, 9 $US, or 50 DKK. The price includes shipment by first-class mail. Apply to: Allis Lang Andersen, OZ1ACB, Kagsavej 34, DK-2730 Herlev, Denmark. The Danish Lighthouse Society is contributing any excess funds to The Sletterhage Lighthouse maintenance fund.

Moldova ER Pennant. The Moldova ER Pennant is a colorful cloth embroidered pennant which will be a real attention getter when hung on the wall among your other awards. A couple of ER stations always seem to be active during DX contests, and while the prefix is slightly rare, this award should be fairly easy to earn. A quick check of my card collection shows the needed ten.

This award is given for QSOs with station in Moldova in all ER areas 1 through Ø. QSOs with areas 6 to Ø count for two QSOs. Contacts must be on or after 27 August 1993. All modes. All contacts must be different. SWL okay.



Diploma Ljubljana is sponsored by the Radio Club Triglav in the city of Ljubljana, Slovenia.

Europeans need 25 QSOs on any HF band, including the WARC bands. All others need 10 QSOs. On VHF (50 MHz or higher) only 7 QSOs are needed.

Send GCR list and fee of $US15 or 30 IRCs (since it is a cloth pennant, a higher award fee is charged) by registered mail to: ER1BF, P.O. Box 1561, MD2044 Chisinau, Moldova, Europe (e-mail: <er1bf@moldtelecom.md>; <http://www.net.md/tincom/awards/index.html>.

Slovenia's Diploma Ljubljana. Well-known contester and award hunter S53EO sent the following information. This is an especially well-designed award showing seven views of this old Slovenian city. The requirements are very modest, and this award is highly recommended.

The award is sponsored by the "Radio Club Triglav" in the city of Ljubljana. Make contact with stations located in this capital city of the Republic of Slovenia) after October 24, 1992. A complete list of stations in Ljubljana may be found on the club's webpage: <http://hamljaward.members.easyspace.com>. All bands are allowed (1.8, 3.5, 7, 14, 21, 28, 50 MHz, WARC, and UHF/VHF). All modes may be used, however, contacts via repeaters do not count for the award.

Contact Requirements:

HF S5 – 7 QSOs, EU – 4 QSOs, DX – 2 QSOs.

VHF S5 – 6 QSOs, others 3 QSOs.

Send a copy of QSOs from your log, certified by two ops (GCR list) and 10 DEM or 5 $US to: Leopold Mihelic, S51MG, Beblerjev trg 3, SI-1122 Ljubljana, Slovenia (<leo.s51mg@siol.com>).

URL of the Month

Summer is here. Lots of Europeans take vacation much more seriously than Americans. Germans like to vacation on the seashores of the Baltic and North Seas, and there are lots of islands there. Here's the URL for the German Island award: <http://www.islandchaser.de/GIA/gia.htm>. Go get 'em!

I'm still looking for a letter describing your club or group's award. Please send a sample and a copy of your rules. Good publicity is practically guaranteed!

73, Ted, K1BV

Magic In The Sky

BY JEFF REINHARDT, AA6JR

New Views of Amateur Radio

Cleaning Up Our Act—Readers Respond

The "Magic" column in the March issue evoked some strong responses. You may recall I expressed the opinion there are some operators on 75/80 meters who seem to operate outside the rules, engage in boorish behavior, and/or use foul language. In the column I discussed clearly illegal operations, cited instances when the content of transmissions was objectionable (to me), and examined the potential consequences we could face as a result of this type of operation, such as the loss of valuable spectrum. I expressed the hope that peer pressure and a reexamination of one's own actions might return 75/80 meters to being a band on which civility is the rule, not the exception.

Note that I never advocated censorship, "thought police," or penalties for expressing one's opinions, but several have interpreted my words in that way. The following letters reflect the feelings of the ham community. I'm sorry I could not print all the responses. What you see below is a representative sample, and even most of these had to be trimmed for length. I did not edit for content, style, or grammar. My occasional replies to the letters are in *italics.*

To all (even those who disagree), thanks for sharing your thoughts. Warning! Some of the letters are strong. If you are easily offended, you may wish to turn the page to another story now. Okay, you were warned.

(Note from W2VU: While most letters were civil and polite, as we'd like to hear on the ham bands, there were one or two letter writers who insisted on using language that was offensive to me as editor of a publication read by all ages, just as we hear from a minority on the ham bands. While we did our best not to change the "flavor" of these letters, I have taken the liberty of replacing the offensive language with a similar word in parentheses.)

From Ray, KO4RN:

Last night I read your article and thought finally someone had the guts to say this publicly and in a national publication. Thank You! I couldn't agree with you more on every point you made. Like you, I busted my butt to get my ham license and I'll be blanked if I'm going to let these "Problem Children" dictate when I turn my radio on or off! It is a tremendous honor and privilege to be a ham and we should have kept it that way. Jeff, again a great article and know that there are thousands that agree. Best 73's.

From Jim, N3AWS:

You view these types as "bullies" and hence feel that the proper way to deal with them is to stand up to them. I, as a physician, view their behavior as more indicative of mental illness. Without having a particular case to use as an example, most of the ramblings I have heard on these types of nets strike me as irrational behavior more than the intimidation of a bully. But the difference in perception makes all the difference in how one would deal with the problem. Actually, there are probably *both* types represented on these nets, making a "one answer fits all" even less likely to be effective.

From Paul R. Spooner:

I think U had some valid things to say, and sure agree that it is great to live in a country where a person can speak his mind. I have joined into the discourse on 3913 and before that on 3905 for 15 years. Over that time I am sure the law has been broken many times, but generally I feel the people have been polite and behaved themselves well. Please note following: Most people do not swear, we do have a couple of regulars that express themselves colorfully. In this case their are laws to correct this problem. One problem is that our children hear much worse on Prime time TV. You are right about the (griping) concerning our Government. Jeff I will say that most of the complaints about Government are true and if you are not paranoid about what is going on in Washington, then you are not paying attention. The 10 min. ID is a very small thing and when you are having fun, sometimes the minutes slip bye. I am sure that everyone that talks on 3913 has been voice printed, so whats the big deal. Now this one really picks me Jeff. We can't talk about Politics and Religion? I mean you are really (teeing) me off, You really show ur colors on that comment. *(and you, yours—jr)* There are many varied personalities on Ham radio and We don't all agree on topics but we do give each other a forum for diverse opinions, and if religion or politics come up , we are allowed to express our own erroneous opinions. Now Jeff believe me a lot of people listen to 3813 and other such groups on 80 meters. We have a huge listening audience. We get letters from SWL and other interested people. We do have fun Jeff and can understand why you picked on us, for late in the evening you can always find us doin our thing on 3913 when the rest of band is dead. Where else could you listen man and learn so much useless information. I hope you didn't get paid for the article and please do list the call signs Jeff, just check with your lawyer first.

The lawyer says it's OK. The secrecy provisions of the Communications Act don't apply to ham bands. And not all SWLs are big fans. Read on.—jr

From Mike Cathcart, Branson, MO:

I read with great delight your wonderful column on amateur behavior and it's attendant problems on today's bands. I am not a licensed amateur, but a devoted shortwave monitor who has often been sickened by the amount of garbage to be heard on a daily basis. As such I have almost as much at stake in losing the bands as the hams do; I would lose the majority of bands that are accessible to my listening, as well as any future in transmitting as a ham (should that desire ever arise). That type of operator you mention is indeed the pariah of the airwaves, and your article (is 'expose' too strong a word?) is a much-needed and straight-talking act of defiance in the face of the loud, lunatic minority. I applaud your effort and hope that if and when a follow-up column is published, you might find yourself indeed publishing the names and/or callsigns of some of those idiots, as an embarrassment and humiliation to them. They deserve no better. This would also serve as a serious message to the general ham population, to wit: Decent, considerate operators unite, and bad operators

59045 Lake Lindero Drive, Agoura Hills, CA 91301
**e-mail: <aa6jr@cq-amateur-radio.com>*

have been given notice that the majority aren't going to take it lying down. Perhaps such a move seems overbearing to some, and an 'invasion of privacy' to others (namely, those who badmouth the 'gubmint' on the bands!) but I strongly feel the need to clean up the airwaves not only for those who talk, but for those who listen. There are more ears than mouths out there, and many of them are under 18, my friend! Again, kudos for the column and I hope to see more like it!

And I thought I was the only one who didn't understand why a guy will put garbage out on the airwaves with his call attached but not want his call sign published in a magazine! —jr

From Doyle, KB5YVW:

Just finished reading AA6JR's article, "Cleaning up Our Act." Well done. The kind of on-the-air conduct he describes is a greater threat to our hobby than all the antenna restrictions, the spectrum losses, our aging population, restructuring, CW wars, etc. I realize that such actions are really a reflection on the times in which we live more that an image of ham radio. Still to tolerate it in our midst means we agree, accept, or don't care. That's not the way most of the ham's I know feel. Thanks for taking a stand.

From Gary (no last name or call given):

After some initial interest and subsequent monitoring of the "offending" frequency cited in this article, it seems apparent that AA6JR may have acted out incorrectly in his estimation of his fellow hams. The information integrated into the article has caused the author to become the subject of some derision. The issues he mentions appear to have been taken at random from the entire 75/80 meter band over a prolonged period. Perhaps even including portions of 40 meters. On further reflection, *CQ* magazine may have been lax in applying proper journalistic discretion in publishing the article without regard for factual content. On a seperate note, AA6JR may have something going on in his personal life that is causing him to lash out against his fellow hams. Sensational journalism does not have a place in this hobby. It saddens me to see this spectre raise its ugly head when we have other, more important issues to address. Thank you for taking the time to consider my opinion.

The column identified activity on 75/80 only, observed over a period of several weeks and on a number of frequencies. One particular frequency was identified as being typical of the observed behavior. Thanks for publicly expressing concerns about my personal life. We've never met, have we?—jr

From Ron, N3YMX:

Just got finished reading your article on "Cleaning up our act." Thanks for the guts to write the article I'm sure that most of us feel the same way. I myself shy away from these bands because of them, but will as you said write these morons when I hear them trashing our bands. Thanks for the great article and hope you don't get "sumb**ch" too much by the morons.

Not too many bad words but I'm told I have something going on in my personal life!—jr

From Ed, WB9RJQ:

Thank you, thank you, thank you. Jeff, your article is long overdue. I admire you for putting in print what most of us feel. I admire you even more for listening to that crap on 75 meters long enough to get the information for the article! It makes me sick to hear most of what goes on down there. Quite frankly, I don't use 75 phone, and those guys you are talking about are the reason. Again, thanks for the article and thanks to *CQ* for printing it.

From Carl R. Soltesz, W8PFT:

Your "Magic in the Sky" article, "Cleaning Up Our Act," was hard hitting on Amateur Radio scofflaws and reprobates and their on-the-air activity. Illegal activities like use of obscene language and willful interference are absolutely unacceptable and these characters should feel the full weight of FCC sanctions. However, your comments regarding the on-the-air content expressed by these hams is out of line. Ham Radio is different things to different people. To these guys it is a means of communication: a rag chew—or perhaps in their case a tobacco chew. Nonetheless, it fills a need in their lives much as Ham Radio fills a broad range of needs to all hams and their communities. Those of us who are more educated and sophisticated should just move on down the dial or tend to our technical activities and not be troubled by their discussions. The bulk of the content that you have criticized is similar to that of Art Bell's syndicated radio show. It is supported by hundreds of stations and millions of listeners. It may not be as cultured and scholarly as we might like, but it is legitimate content. While the topics of "black helicopters" and "concentration camps" tilt toward the paranoid extreme, criticism of the government and debates regarding the proper rightful activities of the federal government versus state and individual rights has continued passionately since the founding of the Republic. My Smith and Wesson poster hangs with pride on the wall in my radio shack next to my certificates and awards from the ISA, IEEE, SME, AIP, NRA, MARS, ARRL, and others. I am seriously concerned about the overreach of the Federal government and I am a staunch supporter of state and individual rights. I support each individual's right to express his opinion, no matter how inarticulate it might seem. Best regards...

Carl, you articulate an excellent point, but the column never proposed censorship. It did raise issues about exercising self-restraint, civility, and operating within the letter and the spirit of the rules.—jr

From Mack, KA5JNL:

Jeff: Re: Cleaning Up Our Act.... I loved it, I loved it, I loved it! I, like you, want to get those bums to clean their act up or else get off the bands.... Thanks for writing it and kudos to *CQ* for printing it...

From Bob Alberti:

The storm gave me a good excuse to sit by the fire and read *CQ* this afternoon. I've always enjoyed your stuff, but you really hit the proverbial nail on the head this time! A beautiful statement of what seems to me the biggest single threat to the future of amateur radio. Thanks for saying what needs to be said about the bozos on 75. I'd like to shake your hand on that one! Well done. 73,

At least you didn't use the column to start the fire! Thanks.—jr

From Charles, N4LMY:

I read your article in this month's *CQ* with interest. The individuals who made some of the remarks certainly sounded like buffoons, but, some fellow remarked last week on the local repeater that the FCC was wrong to abolish the code as a licensing requirement, and that proficiency with it is indeed a test of merit. And a man on 75 remarked that we have the constitutional right to keep firearms. He went on to say that events of the previous 8 years were to the detriment of this right. I agree with the points made by both of these amateurs. Their thoughts were appropriate topics for discussion on the air, and were made without violating the conventions of decency and courtesy.73,

Charles: IMHO (Netspeak for "in my humble opinion"), the last three words of your letter are the best. —jr

Propagation

BY GEORGE JACOBS, W3ASK

The Science Of Predicting Radio Conditions

Decline in Cycle 23 Continues

The present solar cycle, the 23rd observed since accurate records have been kept, continues to decrease slowly, much as expected. The Royal Observatory of Belgium reports a mean sunspot number of 114 for March 2001. This results in a 12-month running smoothed sunspot number of 116 centered on September 2000. This is a drop of three points from the previous month's level. The cycle, which was stalled at 120 (±1) for six months, appears to have begun declining very slowly again. A smoothed sunspot number on the order of 111 is predicted for July 2001.

There was a corresponding very slight decline in the 10.7 cm radio solar flux level, as reported by Canada's Dominion Radio Astrophysical Observatory located at Penticton, BC. A level of 177 reported for March 2001 translates into a smoothed value of 176 for September 2000. This is a drop of three points from the previous month. A smoothed solar flux level of 175 is forecast for July 2001.

The various phases of a solar cycle, based on the 22 previously observed cycles, are arbitrarily defined as follows:

Phase	Smoothed Sunspot Range
Very Intense	Greater than 150
Intense	120 to 150
Very High	90 to 120
Moderately High	60 to 90
Moderately Low	30 to 60
Very Low	0 to 30

Cycle 23 is expected to remain in the High solar range for the remainder of 2001 and through at least mid-2002!

Sunspot Number vs. Solar Flux

Sunspots have been observed telescopically for more than 300 years, and daily records have been available since the mid-18th century. Today sunspots are observed telescopically each day by a worldwide network of more than three dozen solar observatories. While the telescope at each participating observatory is calibrated against a standard, results can vary among observatories, since the measurements strongly depend on observer interpretation and experience and on the stability of the Earth's atmosphere above the observing site. To compensate for differences, the daily international number is computed by the Royal Observatory of Belgium as a weighted average of measurements made from the network of cooperating observatories.

Shortly after the end of World War II, scientists found a relationship between radio energy emitted by the sun in the microwave range and sunspots. A worldwide network now measures this energy, called *solar flux*, on about a dozen different frequencies ranging from approximately 245 MHz to 15.4 GHz, or between approximately one meter and one centimeter in wavelength.

The solar-flux measurements are made at each observatory at the same local time each day. The measurements are more consistent, considerably less variable, and more objectively determined between observatories than is the case with telescopic viewing of sunspots. However, unlike the more than 200 years of unbroken daily telescopic observations of sunspots, continuous daily solar flux records go back only to February 1947.

In North America the Dominion Radio Astrophysical Observatory of Canada provides daily solar flux measurements made at 2800 MHz, or 10.4 cm.

During the high period of a solar cycle, solar flux and sunspot numbers are approximately related by:

SF = 73 + .9(SN)

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2001

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 6, 10-11, 15 17, 20, 23	A	A	B	C
High Normal: 1, 7, 9, 14, 16 21, 24, 27-28	A	B	C	C-D
Low Normal: 4-5, 12-13, 19, 22, 26, 31	B	C-B	C-D	D-E
Below Normal: 2, 8, 18, 25 29	C	C-D	D-E	E
Disturbed: 3, 30	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be good (B) on July 1st, fair-to-poor (C-D) on the 2nd, poor (D) on the 3rd, fair-to-good (C-B) on the 4th and 5th, excellent (A) on the 6th, etc.

July Propagation

With long hours of daylight and the sun high in the northern sky, HF propagation conditions are generally more stable during July than at any other time of the year.

Twenty meters is expected to be the optimum band for long-distance propagation during the month. The band is expected to remain open practically around the clock to one area of the world or another, with peak conditions forecast for several hours after local sunrise, and again during the late afternoon and early evening hours. Fifteen and 17 meters are forecast to open fairly frequently during the late afternoon hours, especially on more or less north-south paths. A few 10 and 12 meter openings should also be possible during the afternoon hours, mainly to southern and tropical areas.

During the hours of darkness, 20, 30, and 40 meters are expected to open to many areas of the world, but seasonally high static levels may often make DX reception difficult on 40 meters. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the

11307 Clara Street, Silver Spring, MD 20902
e-mail: <george@gjainc.com>

hours of darkness. Not many DX openings are predicted for 160 meters during July because of seasonally high levels of static and solar absorption.

This month's column contains detailed Short-Skip Propagation Charts valid for July and August 2001, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain forecasts for openings between 50 and 2300 miles. For detailed DX forecasts over greater distances refer to the DX Propagation Charts for July, which appeared in last month's column. For an assessment of day-to-day conditions expected during the month, see the Last-Minute Forecast, which appears at the beginning of this column.

Short-Skip Openings

July is generally the month in which *sporadic-E* ionization is most intense. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands, and on 6 and 2 meters as well.

Look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on the 20 meter band. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours, but openings could be possible at just about any time. Daytime openings on 40 and 30 meters should range between approximately 100 and 600 miles, increasing to between 250 and 2300 miles after sundown. Look for openings up to about 300 miles on 80 meters during the daylight hours, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

While no 160 meter ionospheric openings will be possible during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles, and at times somewhat beyond this range. Seasonally high static levels will at times make reception difficult on 40, 80, and 160 meters.

VHF Ionospheric Openings

Sporadic-*E* Season. Within the normal *E*-layer region of the ionosphere there frequently form "clouds" or "patches" of abnormally intense ionization which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E*- or *F*-layers. These clouds usually take the form of thinly ionized areas covering a rather small geographical region approximately 50 to 100 miles in diameter. They occur more or less at random and are relatively short lived, usually dissipating within a few hours. This sporadic ionization usually occurs about 60 miles above the Earth's surface at about the same height as the regular *E*-layer. For this reason it is called *sporadic-E*, or E_s.

Although sporadic-*E* ionization has been studied by scientists and engineers for more than 50 years, its nature and origin still remain largely a mystery. However, some general characteristics about sporadic-*E* behavior are known.

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible in the northern hemisphere for approximately 65% of the time on 15 meters, 35% of the time on 10 and 12 meters, and about 10% of the time on 6 meters. Two meter openings may also be possible during periods of intense sporadic-*E* ionization. While sporadic-*E* propagation can occur at any time of the day or night, it appears to peak between 8 and 11 AM and 6 and 8 PM local Standard Time.

Here's a tip that has worked out very well during the past years for determining when 10 and 6 meters will open for short-skip sporadic-*E* propagation. The geometry of skywave propagation is such that as the skip distance decreases on 15 (or 10) meters, the highest frequency (MUF) that will be reflected by the sporadic-*E* cloud increases. By observing the minimum skip distance on 15 (or 10) meters, the MUF in the direction of the skip can be determined from fig. 1 with fairly good accuracy, as can whether or not 10 (or 6) meters is open and what the minimum skip distances are on these bands.

As an example (fig. 1), the minimum skip heard on 10 meters in a southwesterly direction is observed to be 400 miles (it is the distance to the nearest skip station heard that counts in this case, not the farthest station heard). The intersection between 400 miles observed minimum skip distance and the 10 meter curve corresponds to an MUF of 60 MHz. This means that the MUF is high enough for 6 meter (50 MHz) short-skip openings in a southwesterly direction. The minimum skip distance on 6 meters can be found from fig. 1 by locating the intersection between the 60 MUF and the 6 meter curve. The resulting value of minimum skip distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than 500 miles away on 10 meters, or less than 350 miles on 15 meters, or less than 350 miles on 15 meters, the chances are very good that 6 meters will open in the same general direction as the minimum skip heard on these bands.

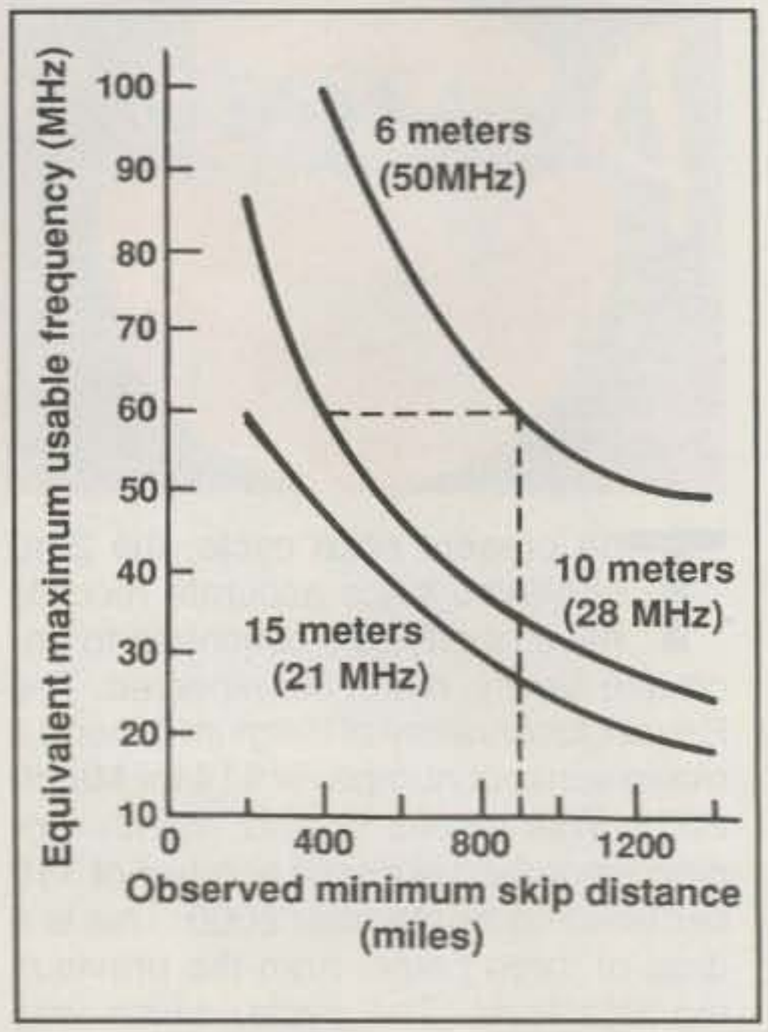


*Fig. 1– Graph describing the correlation between sporadic-*E *openings on the 10 and 15 meter bands and possible 6 meter openings at the same time. The example shows a minimum skip distance of 400 miles observed on 10 meters. From the graph, 6 meters should be open with a skip distance of greater than 900 miles.*

Aurora. During peak and near-peak periods of sunspot activity, the number of solar flares emanating from large sunspots increases dramatically. During April 137 solar flares were reported, with at least 36 rated as *m* (medium class) and 5 as *x* (major class). During periods of low solar activity this amount of solar flares is not seen in an entire year!

High-energy radiation associated with *m*- or *x*-class solar flares usually produces severe geomagnetic storms which often disrupt HF communications and also cause widespread auroras. Since near-peak sunspot conditions are expected to continue for the next several months, expect *m*- and *x*-class solar flares to continue to occur during July.

Check the Last-Minute Forecast at the beginning of this column for those days during July that are likely to be Below Normal or Disturbed. These are

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Charts
July & August 2001
Local Daylight Savings Time
At Path Mid-Point

Band Meter	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1)* 10-14 (0-3)* 14-18 (0-1)* 18-22 (0-2)* 22-08 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-20 (3-2) 20-22 (3-1)* 22-08 (1-0)*
15	*Nil*	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 20-22 (0-2)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)	08-10 (2)* 10-14 (3)* 14-18 (2-3) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-18 (1-4)* 18-22 (1-3)* 22-00 (1-2)* 00-07 (0-1)*	07-10 (2-4) 10-18 (4) 18-22 (3-4)* 22-00 (2-4)* 00-02 (1-3)* 02-07 (1-2)*	08-10 (4) 10-16 (4-3) 16-00 (4) 00-02 (3) 02-07 (2) 07-08 (4-3)
40	08-10 (2-4)* 10-15 (3-4) 15-20 (4)	08-10 (4) 10-12 (4-3) 12-17 (4-2)	09-10 (4-1) 10-12 (3-1) 12-17 (2-1)	09-18 (1-0) 18-19 (3-0) 19-20 (3-1)
80	06-12 (4) 12-16 (4-3) 16-00 (4) 00-06 (3-4)	07-08 (4-2) 08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4)	07-08 (2-1) 08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-19 (2-0) 19-20 (2-1) 20-21 (3-1) 21-22 (3-2) 22-05 (4) 05-06 (4-3) 06-07 (4-2)	07-19 (0) 19-20 (1-0) 20-21 (1-0) 21-22 (2-1) 22-04 (4-3) 04-05 (4-2) 05-06 (3-1) 06-07 (1-0)
160	18-19 (0-1) 19-20 (1) 20-22 (3-2) 22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0) 10-18 (0)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1) 22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1) 09-19 (0)	21-22 (1) 22-01 (2-1) 01-04 (2) 04-06 (3-2) 06-07 (1) 07-08 (1-0) 08-21 (0)	21-23 (1-0) 23-01 (1) 01-06 (2-1) 06-07 (1-0) 07-21 (0)

* *Predominantly sporadic-E openings.*

HAWAII
July & August 2001
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	13-16 (1)	06-09 (1) 09-12 (2) 12-16 (3) 16-18 (2) 18-20 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-06 (2) 06-08 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)**
Central USA	12-14 (1) 14-16 (2) 16-17 (1)	05-06 (1) 06-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (4) 04-06 (3)	20-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)** 22-00 (2)** 00-02 (1)**
Western USA	10-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	05-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-05 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)** 20-22 (2)** 22-02 (3)** 02-03 (2)** 03-04 (1)**

ALASKA
July & August 2001
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	NIL	21-00 (1) 00-02 (2) 02-03 (1)	12-15 (1) 22-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-10 (1)
Central USA	NIL	20-00 (1) 00-03 (2) 03-05 (1)	13-16 (1) 22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-09 (1)	08-12 (1)

West-ern USA	01-04 (1)	17-22 (1) 22-00 (2) 00-02 (3) 02-04 (4) 04-05 (2) 05-06 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-06 (4) 06-08 (3) 08-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)**

***Indicates best time for 80 meter openings. Openings on 160 meters are most likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
#See explanation in "How To Use Short-Skip Charts."
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter openings, use the preceding Short-Skip Propagation Chart.

predicted to be the best times to expect auroral-type propagation. Better yet, check <www.spaceweather.com> for real-time aurora alerts and other useful geomagnetic and ionospheric data.

Meteors. The best chance for meteor-scatter openings will be during the last week of July, when the *Delta Aquarids* shower is expected to intensify. It should peak on July 28 with approximately 25 meteors an hour entering the Earth's atmosphere. Several minor showers may permit meteor openings when they maximize. These are the *Pegasids*, which should peak on July 9; the *Phoenicids* on July 13; the *Draconids* on July 16; the *Piscis Austrinids* on July 27; and the *Alpha Capricornids* on July 30. During the peaks of these showers expect between three and five meteors an hour to enter the Earth's atmosphere. Although not expected to peak until mid-August, the *Perseids*, a major meteor shower, may be intense enough to permit some meteor-scatter openings during the last week of July.

Trans-equatorial Openings. The possibility of 6 meter trans-equatorial openings is generally at its lowest level during July. Since it is the middle of winter in the southern hemisphere and MUFs are at their highest, some type of TE may be possible through a combination of *F*-layer reflection in the southern hemisphere and sporadic-*E* reflection farther north. If such openings were to occur at all, they would favor the Caribbean and Central American areas and perhaps the southern tier states. The best time to check would be during the late afternoon and early evening hours, and when sporadic-*E* is observed in a southerly direction. The most likely direction for TE openings would be towards deep South America, with the path crossing the equatorial region at or near a right angle.

For a more complete review of VHF propagation, see N6CL's informative "VHF plus" column here in *CQ*.

A very informative discussion of grey-line propagation and a review of ionospheric propagation principles appeared in "Using The Grey Line—How to Hear Stunning DX Out of Nowhere!" by Ian Poole, G3YWX, in the June 2001 issue of *Popular Communications,* another publication of CQ Communications.

Looking Ahead in CQ

Here are some of the articles we're working on for upcoming issues of *CQ:*

- SSB Results, 2000 CQ World-Wide DX Contest—in the *August* issue!
- "*CQ* Reviews: Ten-Tec Jupiter Transceiver," by K1BQT
- "A Motorized Clothesline Antenna," by VA2ERY
- "Ham History Web Server," by N8PB

Plus:

- "Electricity Everywhere," by W6BNB
- "Add Scanning to Converted CB Rigs," by WB9YBM
- "The Station Controller," by AF1US
- "Transforming a Transformer," by VE3ERP

Do *you* have a ham radio story to tell? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com>.

50th Anniversary and Dayton Award

I want to thank the more than one hundred readers who took the time to send me congratulatory e-mail, snail mail, and telephone messages on the occasion of my 50th anniversary as Propagation Editor of *CQ* and my selection as the "The Radio Amateur of the Year" by the Dayton Amateur Radio Association and the 2001 Hamvention.

As I have said many times before, it has been this feedback from readers that has added to the fuel to sustain my writing this column for more than 50 years. My grateful thanks.

73, George, W3ASK

Number groups after calls denote the following: QSOs, QSO points, Mults, Final Score. Bold is certificate winners.

RESULTS 2001 CQ WW RTTY DX CONTEST

SINGLE OP, ALL BAND, HIGH POWER

P43P	**1798**	**6076**	**552**	**3,353,952**
EMØI (UT2IZ)	**1694**	**4832**	**524**	**2,531,968**
UP5P (UN5PR)	**1478**	**4831**	**483**	**2,333,373**
JH4UYB	**1337**	**4198**	**489**	**2,052,822**
VA3DX	**1272**	**4222**	**474**	**2,001,228**
HK3WGQ	**1253**	**4080**	**463**	**1,889,040**
UA9CLB	**1263**	**4386**	**427**	**1,872,822**
K4GMH	**1404**	**4157**	**438**	**1,820,766**
UA4LCQ	**1358**	**3725**	**468**	**1,743,300**
UA9CDV	1150	3917	431	1,688,227
W1ZT	**1235**	**3416**	**454**	**1,550,864**
K1AM	1202	3235	447	1,446,045
ND5S	**1184**	**3166**	**440**	**1,393,040**
HA3LI	**1009**	**3251**	**416**	**1,352,416**
LY3BH	**1046**	**3260**	**413**	**1,346,380**
WØETC	**1232**	**2944**	**443**	**1,304,192**
YU7YG	**1029**	**3016**	**412**	**1,242,592**
DKØEE (DL4MDO)	**969**	**3107**	**380**	**1,180,660**
SK4TL (SM4RGD)	**1031**	**2841**	**415**	**1,179,015**
KZ6D (K6AW)	**1225**	**2629**	**445**	**1,169,905**
NW2B	**1071**	**2902**	**401**	**1,163,702**
W2YC	1027	2948	394	1,161,512
OH2LU	**995**	**2791**	**404**	**1,127,564**
S56A	**936**	**2819**	**394**	**1,110,686**
SM5FUG	864	2810	388	1,090,280
US9QA	987	2746	385	1,057,210
WW7OR (W7GG)	**1097**	**2429**	**432**	**1,049,328**
RX9JM	898	3006	349	1,049,094
RA3ANI	950	2714	362	982,468
K7WM	1073	2368	407	963,776
I1COB	**886**	**2664**	**359**	**956,376**
W1RY	913	2465	373	919,445
NW6S	921	2396	379	908,084
I4GHW	863	2498	361	901,778
HA8IE	830	2309	390	900,510
UA4CJJ	963	2500	341	852,500
RD4M (UA4LU)	907	2300	364	837,200
K7ZUM	974	2084	400	833,600
G5G (GØLII)	**751**	**1912**	**434**	**829,808**
I2EOW	779	1885	433	816,205
KA2D	809	2221	348	772,908
TA7I	**674**	**2668**	**282**	**752,376**
W4UK	870	2020	361	729,220
RZ1AZ	786	2142	336	719,712
JA1BWA	**723**	**2046**	**347**	**709,962**
K3DUG	**753**	**2162**	**327**	**706,974**
NX4W	848	2004	349	699,396
OK2BXW	**706**	**2117**	**330**	**698,610**
ZL2AMI	**632**	**2158**	**315**	**679,770**
IK2RZP	689	1943	344	668,392
OM3RM	**693**	**1803**	**353**	**636,459**
PY2NY	**640**	**2017**	**309**	**623,253**
WØHW	780	1786	331	591,166
LA7CL	**629**	**1879**	**308**	**578,732**
AM3RH (EA3RH)	**699**	**1780**	**320**	**569,600**
VR2BG	**642**	**1720**	**331**	**569,320**
K3WW	609	1765	318	561,270
RX3VM/4	673	1723	300	516,900
DK1WI	566	1625	284	461,500
NA6E	783	1520	301	457,520
WA8RPK	**630**	**1511**	**300**	**453,300**
W9KEN	**724**	**1388**	**325**	**451,100**
W7CT	644	1397	297	414,909
K5ZD	475	1541	268	412,988
W6IWO	733	1363	289	393,907
KY5I	566	1333	295	393,235
DL8NBE	500	1647	233	383,751
AD6KA	636	1279	276	353,004
EU1SA	**428**	**1405**	**250**	**351,250**
N5RXF	678	1319	265	349,535
VE5CPU	**578**	**1452**	**236**	**342,672**
I1WBW	503	1454	233	338,782
F2AR	**437**	**1358**	**222**	**301,476**
N2BJ	410	1123	262	294,226
K8YE	432	1101	257	282,957
CQ2CEC (CT1BNW)	**429**	**1095**	**250**	**273,750**
JA7IC	**385**	**1168**	**234**	**273,312**
OK2PCL	449	1118	244	272,792
DU3NXE	**412**	**1234**	**207**	**255,438**
DL6JZ	391	1180	209	246,620
UAØCW	358	1003	235	235,705
W6KNB	456	1009	232	234,088
K6HGF	570	968	238	230,384
DF3IAL	397	983	228	224,124
N2FF	366	1020	219	223,380
K1RO	332	967	216	208,872
VE6YR	**402**	**1012**	**201**	**203,412**
KE5OG	492	909	220	199,980
WAØSXV	335	787	252	198,324
W1SRD	436	848	210	178,080
GI4KSH	**251**	**965**	**184**	**177,560**
RA3BB	311	809	201	162,609
IK4WMH	303	838	191	160,058
F8BQQ	272	826	189	156,114
KF9YR	342	765	199	152,235
W3FV	270	754	180	135,720
IKØPHW	266	757	165	124,905
RW9WA	241	875	142	124,250
DK8EY	236	774	160	123,840
RV1CC	198	635	156	99,060
W2JGR/Ø	293	626	156	97,656
4U1WB (AJ3M)	246	631	143	90,233
W3GQ	228	520	164	85,280
DL7UFN	203	572	143	81,796
VE9MY	**198**	**514**	**150**	**77,100**
W6JOX	235	464	133	61,712
SP4TXT	186	461	130	59,930
W7DPW	204	377	147	55,419
N8BJQ	163	399	122	48,678
KØBX	150	381	112	42,672
K5AM	191	341	119	40,579
LZ2PL	90	216	69	14,904
W6IHG	86	208	71	14,768
K7ZO	36	88	27	2376

SINGLE OP, ALL BAND, LOW POWER

AA5AU	**1567**	**3774**	**497**	**1,875,678**
ZX2B (PY2MNL)	**1256**	**3742**	**482**	**1,803,644**
VP5JM	**1237**	**3613**	**437**	**1,578,881**
WT4I	**1346**	**3306**	**449**	**1,484,394**
LY6M (LY1DS)	**1081**	**3227**	**429**	**1,384,383**
NQ4/KL7Q	**1201**	**2991**	**438**	**1,310,058**
N2WK	**1150**	**3072**	**426**	**1,308,672**
UF3CWR (RZ3AZ)	**1174**	**3126**	**412**	**1,287,912**
RZ9OU	**929**	**2809**	**378**	**1,061,802**
VE2AXO	**940**	**2662**	**382**	**1,016,884**
KI6DY/Ø	**1118**	**2480**	**406**	**1,006,880**
LV5V (LU5VV)	**864**	**2584**	**387**	**1,000,008**
3Z9U (SP9UNX)	**914**	**2701**	**367**	**991,267**
S51MM	**858**	**2614**	**366**	**956,724**
AD1C	**925**	**2511**	**381**	**956,691**
LTØH (LU3HY)	839	2569	367	942,823
UW5U (UX1UA)	**911**	**2536**	**368**	**933,248**
S57U	845	2513	368	924,784
K3GP	**925**	**2215**	**396**	**877,140**
RA3WA	**883**	**2574**	**339**	**872,586**
4Z5CP	**769**	**2651**	**316**	**837,716**
YU7AM	**809**	**2526**	**327**	**826,002**
YV5AAX	**738**	**2397**	**344**	**824,568**
OD5YJ	**774**	**2660**	**303**	**805,980**
F5JKK	**784**	**2219**	**362**	**803,278**
LZ9R (LZ3YY)	**857**	**2399**	**334**	**801,266**
UT7I (UT2IO)	839	2184	345	753,480
W4UEF	771	2224	330	733,920
ON4AME	**715**	**2230**	**323**	**720,290**
DL1YFF	**739**	**2061**	**341**	**702,801**
RZ9CX	742	2275	305	693,875
EA8/DJ1OJ	**680**	**2053**	**333**	**683,649**
DK3GI	**662**	**2057**	**321**	**660,297**
SV/OK1YM	**734**	**2235**	**292**	**652,620**
FK8VHN	**633**	**1878**	**333**	**625,374**
AM5RM (EA5RM)	**696**	**1876**	**325**	**609,700**
AN4CI (EA4CI)	787	1931	315	608,265
MMØBQI	**674**	**1678**	**332**	**557,096**
KE4KWE	766	1723	320	551,360
RA9XF	596	1936	282	545,952
YU7NW	632	1711	312	533,832
UA3SAQ	**655**	**1821**	**291**	**529,911**
ER6A	640	1800	291	523,800
SM5UFB	**636**	**1784**	**291**	**519,144**
RUØLL	576	1655	303	501,465
SM6WQB	572	1684	294	495,096
W3MEL	623	1570	313	491,410
RV3QX	623	1642	297	487,674
OH4BB	**615**	**1704**	**283**	**482,232**
KØBJ	689	1533	314	481,362
VE6RAJ	**655**	**1693**	**280**	**474,040**
EA9CD	**512**	**1535**	**308**	**472,780**
IK2XRW	**606**	**1668**	**280**	**467,040**
YL1ZF	**643**	**1631**	**283**	**461,573**
EY8MM	**548**	**1620**	**283**	**458,460**
RU3AT	571	1696	270	457,920
YO3APJ	**535**	**1562**	**292**	**456,104**
AN1BAF (EA1BAF)	585	1578	289	456,042
VA6MM	669	1661	274	455,114
NH6XM	**581**	**1911**	**236**	**450,996**
SM6SRW	532	1688	262	442,256
JL6HKJ	**555**	**1533**	**288**	**441,504**
KØIDT	666	1417	310	439,270
YL2KA	521	1728	253	437,184
SM3ETC	556	1558	278	433,124
YO3JF	589	1419	304	431,376
OM1II	**540**	**1669**	**258**	**430,602**
ZC4JP	**490**	**1667**	**257**	**428,419**
KL7AC	**631**	**1502**	**279**	**419,058**
F5PSI	509	1634	256	418,304
RA3LBW	527	1530	272	416,160
RW3TN	566	1361	292	397,412
YO8FZ	521	1505	262	394,310
DJ3NG	**468**	**1486**	**264**	**392,304**
AM3GIP (EA3GIP)	507	1587	247	391,989
SN2E	467	1615	239	385,985
UY3QW	538	1563	242	378,246
ON4BCJ	489	1370	274	375,380
RN3ZQ	499	1383	266	367,878
V31SN	**508**	**1330**	**270**	**359,100**
DF7ZS	494	1337	267	356,979
SM7BHM	483	1492	236	352,112
CT4MS	**493**	**1319**	**265**	**349,535**
K8VT	**574**	**1328**	**262**	**347,936**
YL2NN	486	1458	238	347,004
USØKW	472	1526	226	344,876
F/KF6EDK	490	1383	241	333,303
DL8NFU	485	1328	250	332,000
DL2AL	468	1333	246	327,918
UA3LAF	511	1344	243	326,592
N9CK	**504**	**1171**	**277**	**324,367**
DK7ZT	435	1321	245	323,645
SM5LNS	532	1311	245	321,195
NA2M	492	1213	259	314,167
NØAJ	482	1163	266	309,358
7SØZ (SMØNZZ)	443	1223	248	303,304
AC6JT	**600**	**1197**	**244**	**292,068**
RV6BO	473	1267	229	290,143
DM5GI	398	1276	222	283,272
VE3BUC	**435**	**1228**	**228**	**279,984**
KØCIE/5	527	1110	238	264,180
DL4MFP	391	1090	237	258,330
VE2OWL	425	1160	218	252,880
4L1BR	**363**	**1181**	**210**	**248,010**
KF2XF	428	987	250	246,750
AA8TC	402	979	252	246,708
K5IID	438	1033	238	245,854
DL7VOG	393	1020	238	242,760
VK4UC	**355**	**1178**	**205**	**241,490**
WK6I	458	959	246	235,914
YO8FR	501	1022	240	234,280
KC4HW	412	965	242	233,530
LX1JH	**398**	**1096**	**213**	**233,448**
DL1ZBO	373	1177	198	233,046
VE7QO	**442**	**1047**	**222**	**232,434**
I1BAY	378	1120	207	231,840
DF3IS	388	978	236	230,808
UU9JQ	381	991	222	220,002
K9BJM	412	936	230	215,280
OK2VP	**360**	**1058**	**202**	**213,716**
SN2D	359	1140	187	213,180
AL7BB	391	1032	206	212,592
FG/DF4OR	**438**	**1023**	**206**	**210,738**
K1US	392	891	236	210,276
JA1XRH	360	1056	194	204,864
JR3RIY	**332**	**934**	**219**	**204,546**
K6EID	312	969	208	201,552
AKØ0A	375	868	230	199,640
W9IL	345	871	229	199,459
SP8FHJ	332	1018	195	198,510
IT9JOF	**351**	**997**	**199**	**198,403**
OK2PEF	343	1003	197	197,591
4X6UU	298	1122	176	197,472
SP3RBG	344	1011	195	197,145
SM2EKN	420	893	220	196,460
IK2QCF	334	910	214	194,740
RW3LB	348	993	194	192,642
UA3TN	396	903	211	190,533
GUØSUP	**298**	**799**	**238**	**190,162**
SM7ATL	317	923	205	189,215
UA4FX	378	879	213	187,227
ON4KGL	348	873	214	186,822
SP9LKS	305	928	201	186,528
SP7DQR	325	840	221	185,640
UA3XBB	338	905	201	181,905
BV2WM	**355**	**881**	**206**	**181,486**
N4AN	379	845	214	180,830
UA9AX	290	1051	169	177,619
EW1EA	**313**	**942**	**188**	**177,096**
N1MGO	387	883	200	176,600
OZ5MJ	**315**	**888**	**197**	**174,936**
OK2BMC	323	899	188	169,012
OK1OX	320	877	192	168,384
N5XUS	421	781	212	165,572
DL1EJD	298	788	210	165,480
ES1BH	301	904	183	165,432
N3UN	323	815	202	164,630
DK4IO	300	829	198	164,142
OM3PR	281	931	176	163,856
IØKHP	266	894	183	163,602
N3FR	315	814	199	161,986
WA6BOB	451	860	187	160,820
WA2LXE	390	871	182	158,522
DL2RR	292	867	178	154,326
ED1ZH	300	859	176	151,184
S57AW	291	848	173	146,704
DL4RCK	273	763	192	146,496
DH5WB	317	754	194	146,276
AN2BNU (EA2BNU)	284	834	165	137,610
JA1BUI	280	782	172	134,504
JA1XUY	290	829	162	134,298
W4AUI	340	701	190	133,190
AN5YJ (EA5YJ)	300	711	187	132,957
IK1ZFO	279	754	176	132,704

W1TO	297	754	173	130,442
SP2EXE	234	774	163	126,162
OZ9AG	270	655	187	122,485
F6FTB	250	744	164	122,016
OK1AXB	237	715	170	121,550
RX3RZ	250	742	161	119,462
N8YYS	229	652	178	116,056
RWØBG	250	665	171	113,715
LZ2MP	217	667	170	113,390
HA3VAM	237	708	160	113,280
N3NZ	295	614	178	109,292
UT4EO	239	688	155	106,640
AA5VN	297	564	189	106,596
WN3C	249	656	162	106,272
N8KR	248	609	174	105,966
WN1OTV	272	652	162	105,624
K3OK	265	655	161	105,455
SP3XR	233	692	151	104,492
AA9RR	276	600	174	104,400
UA4WNH	253	686	152	104,272
UA9APA	192	729	139	101,331
W3DSX	208	645	154	99,330
LY2IJ	254	627	157	98,439
OK2CMW	198	666	144	95,904
SP3NUN	222	656	146	95,776
SP5CCC	222	659	142	93,578
UA4WNJ	241	576	160	92,160
VA3SB	221	572	160	91,520
RAØANO	214	585	154	90,090
HB9DBK	**219**	**585**	**151**	**88,335**
WO6M	274	575	153	87,975
DJ3IW	172	568	154	87,472
SM7FTG	225	656	130	85,280
UX3MR	253	554	153	84,762
JA2UJ	**217**	**621**	**135**	**83,835**
DH7DJ	216	541	154	83,314
LZ1MC	215	564	145	81,780
NWØL	209	500	160	80,000
LA5YW	202	561	138	77,418
ES2NA	197	609	127	77,343
XE1YYD	**247**	**552**	**136**	**75,072**
EA5FSC	192	512	146	74,752
KEØLY	196	490	152	74,480
SP1NQV	204	576	128	73,728
GM4SQT	**216**	**508**	**143**	**72,644**
SM3CER	188	569	126	71,694
WB5QLR	276	511	139	71,029
DL5YAS	186	521	134	69,814
GØURR	**198**	**456**	**153**	**69,768**
IK3ASM	161	576	119	68,544
RW3DY	193	549	124	68,076
N9LYE	233	482	141	67,962
LZ2PI	172	528	123	64,944
N6TQS	238	464	137	63,568
IK2BCP	155	496	128	63,488
OM6RU	191	462	137	63,294
OZ6EI	178	490	126	61,740
W5BBR	205	427	144	61,488
DM5JBN	168	438	132	57,816
JA6BIF	**159**	**454**	**125**	**56,750**
DJ2IA	159	451	119	53,669
MØCFV	168	415	128	53,120
N9QQK	195	379	132	50,028
IV3KSE	146	434	114	49,476
DL3AYJ	155	404	122	49,288
KE6QR	156	320	148	47,360
WB7QBO	188	395	119	47,005
K8MD	155	385	122	46,970
KE1AU	148	369	125	46,125
KSØM	181	368	117	43,056
LA5TFA	**167**	**395**	**109**	**43,055**
JF2SKV	155	445	96	42,720
N8KM	150	409	103	42,127
VA6RA	192	444	91	40,404
DL3JPN	137	362	111	40,182
K6BIR	188	366	106	38,796
WB9BSH	152	319	119	37,961
WA9AFM/5	188	372	102	37,944
W4TIJ	173	327	116	37,932
WA9ALS	146	359	104	37,336
YT1Z (YT1WN)	122	405	92	37,260
DL3ARK	136	370	100	37,000
DH9FAJ	144	351	105	36,855
IK5EEL	122	368	99	36,432
JA1BHK	122	348	104	36,192
OK2WH	136	340	106	36,040
DL4SDT	127	349	102	35,598
N3TG	149	311	114	35,454
W8IDM	156	335	104	34,840
OZ6TL	133	349	99	34,551
KL9A/WU7	**152**	**370**	**92**	**34,040**
LZ2JE	120	332	100	33,200
RA1QIX	127	312	106	33,072
AM3AYP (EA3AYP)	129	314	101	31,714
DL2RTJ	108	360	85	30,600
YO4UQ	134	304	100	30,400
RA4AFZ	122	350	86	30,100
TF3VS	**116**	**295**	**96**	**28,320**
UT5UML	118	298	94	28,012
HB9DCM	109	303	91	27,573
WD9EWK/7	118	270	90	24,300
OM7JG	89	324	74	23,976
OA4EI	**103**	**298**	**79**	**23,542**
HA5BSW	109	253	93	23,529
W3FQE	107	258	90	23,220
K3MZ	102	254	87	22,098
EA1FAS	99	276	80	22,080
SP4CQU	87	266	76	20,216
UA4LDP	102	249	81	20,169
N3SOK	110	239	83	19,837
DJ1ARJ	94	284	68	19,312
W2MKW	100	231	83	19,173
DL5ZB	83	270	63	17,010
N3JIX	93	235	71	16,685
WE4V	98	217	75	16,275
HL2AMO	**85**	**231**	**70**	**16,170**
IZØBXZ	93	199	77	15,323
AE4EC	96	187	80	14,960
DL5JWL	83	199	75	14,925
UA9XEN	65	243	60	14,580
S5ØU	89	214	68	14,552
W6IT	103	201	71	14,271
JT1BG	**130**	**346**	**40**	**13,840**
KØXU	83	191	70	13,370
EA2AVM	69	216	61	13,176
AA1SU	95	180	67	12,060
SP1/DL5CE/P	74	198	58	11,484
EA5IL	70	177	61	10,797
I7WTV	67	177	59	10,443
AD6PC	90	152	68	10,336
ZS1JY	**63**	**187**	**53**	**9911**
KC7WUE	77	157	63	9891
PAØWRS	**63**	**166**	**59**	**9794**
IK2WYI	65	171	57	9747
OE1KTS	**60**	**188**	**49**	**9212**
W6ISO	83	142	64	9088
WØRY	74	146	59	8614
N2LEB	60	154	51	7854
SL4ZAE	62	148	51	7548
N4JN	56	143	52	7436
K9RRB	58	132	50	6600
ON4KMB	46	142	43	6106
UR5FCM	50	155	39	6045
NS8O	56	125	45	5625
N7PWZ	52	100	43	4300
UA3QIX	45	92	42	3864
JK2VOC	40	102	31	3162
W5KI	35	78	33	2574
XE1ZTW	34	82	31	2542
EA4BNQ	34	74	34	2516
PAØEHF	29	90	27	2430
W1CSM/4	31	73	29	2117
AN3BO (EA3BO)	31	72	29	2088
JH1TUX	28	77	25	1925
SP5OXJ	26	73	25	1825
JQ1UXN	24	67	21	1407
PU2NYV	22	60	21	1260
Z31GX	12	43	10	430
IK2REA	33	33	11	363

SINGLE OPERATOR

10 METERS

LU6FAZ	**645**	**1919**	**373**	**715,787**
LU8EKC	**648**	**1916**	**372**	**712,752**
RN6BN	**759**	**1804**	**386**	**696,344**
LW7EIC	**610**	**1807**	**365**	**659,555**
HG1W (HA1YA)	**621**	**1622**	**370**	**600,140**
WS7I	**654**	**1441**	**374**	**538,934**
AN7FTR (EA7FTR)	**644**	**1533**	**330**	**505,890**
W7TI	606	1348	358	482,584
VE4COZ	**566**	**1471**	**313**	**460,423**
4U1ITU (OM1AM)	**545**	**1457**	**310**	**451,670**
AK6R	**563**	**1190**	**323**	**384,370**
DH6LS	**478**	**1230**	**310**	**381,300**
ON7NQ	**485**	**1299**	**289**	**375,411**
VE1AOE	**479**	**1201**	**279**	**335,079**
W5FR	**456**	**1088**	**284**	**308,992**
NT6K	500	1023	286	292,578
K8AA	**400**	**1076**	**271**	**291,596**
JA1SJV	**337**	**950**	**249**	**236,550**
GØNWY	**252**	**665**	**171**	**113,715**
UR5FD	**243**	**616**	**184**	**113,344**
UV5U (UX1UA)	249	649	173	112,277
SW2A (SV2AEL)	**244**	**584**	**178**	**103,952**
KB5KYO	251	574	181	103,894
DJ6TK	224	579	177	102,483
VP9GE	**212**	**544**	**161**	**87,584**
JH1OAI	194	553	157	86,821
LZ1CF	**200**	**490**	**157**	**76,930**
RA2FB	**204**	**460**	**164**	**75,440**
SM5FNU	**180**	**460**	**154**	**70,840**
LY2CG	**168**	**429**	**135**	**57,915**
UT6I	179	405	132	53,460
IZ2AVK	**150**	**397**	**119**	**47,243**
AM1CXH (EA1CXH)	150	327	115	37,605
RWØLZ	**118**	**327**	**103**	**33,681**
KB7RTA	134	285	108	30,780
OK2PMS	**121**	**335**	**90**	**30,150**
RK6AWJ	130	295	97	28,615
OH2GI	**107**	**285**	**91**	**25,935**
OK1DCP	109	290	88	25,520
VY1MB	**124**	**268**	**93**	**24,924**
I7PXV	79	216	64	13,824
YO9HP	78	199	65	12,935
HC1JQ	73	219	59	12,921
LW5DR	67	194	63	12,222
OZ1IRJ	65	180	62	11,160
CX6VM	64	182	56	10,192
F6EAS	50	132	43	5676
DL5NAV	34	83	33	2739
UA6LP	35	89	30	2670
OM1AVV	31	88	30	2640
7M4POL	18	52	18	936

15 METERS

9A5W	**894**	**2319**	**475**	**1,101,525**
EO6F (UXØFF)	**931**	**2286**	**456**	**1,042,416**
AC1O	**758**	**1829**	**391**	**715,139**
T94MZ	**715**	**1784**	**391**	**697,544**
RN3OA	**722**	**1729**	**396**	**684,684**
ON7UI	**637**	**1637**	**387**	**633,519**
LZ2K (LZ2VL)	**621**	**1536**	**365**	**560,640**
K9USA	**602**	**1491**	**355**	**529,305**
W7WW	**654**	**1409**	**367**	**517,103**
RDØC	**514**	**1380**	**319**	**440,220**
W9HLY	486	1204	318	382,872
EA9AK	**461**	**1386**	**270**	**374,220**
EC2ADR	**491**	**1156**	**296**	**342,176**
SN2X (SP2DWG)	**452**	**1152**	**288**	**331,776**
CN8KD	**379**	**1136**	**247**	**280,592**
WQ6/GØAZT	**464**	**958**	**290**	**277,820**
W4LC	**396**	**997**	**270**	**269,190**
SM6BSK	**366**	**902**	**257**	**231,814**
LZ2JA	395	908	239	217,012
W9ILY	347	819	255	208,845
JA3EVZ	**314**	**878**	**233**	**204,574**
JA2BY	**293**	**815**	**223**	**181,745**
USØYA	305	705	213	150,165
UTØH (UT1HT)	272	631	192	121,152
DL6UAA	**232**	**577**	**173**	**99,821**
OK2SG	**150**	**363**	**131**	**47,553**
IT9NVA	**160**	**371**	**126**	**46,746**
UN9FD	**132**	**358**	**113**	**40,454**
JR1KSK	**133**	**366**	**109**	**39,894**
EC3AHT	141	332	120	39,840
VE6JY	**146**	**364**	**108**	**39,312**
IK2DHU	**130**	**333**	**107**	**35,631**
EA4BQG	121	298	110	32,780
DL2RUG	116	301	100	30,100
YO2BZV	90	210	74	15,540
DL5AKF	82	190	70	13,300
RN2FA	77	193	68	13,124
OM7PY	60	148	55	8140
SP9JCN	34	88	32	2816
AD6G	22	37	21	777
JR4GPA	18	47	16	752
LZ4BU	5	15	5	75

20 METERS

DJ7AA	**895**	**2205**	**468**	**1,031,940**
9A7R	**771**	**1894**	**439**	**831,466**
9A8A	782	1903	416	791,648
OH2BP	**720**	**1704**	**392**	**667,968**
CT1AOZ	**660**	**1596**	**377**	**601,692**
CX7BF	**511**	**1518**	**315**	**478,170**
IT9RZR	**475**	**1076**	**287**	**308,812**
WW4KY (K4WW)	**456**	**976**	**296**	**288,896**
SN7N (SP7PS)	**432**	**990**	**277**	**274,230**
SM3LBP	**419**	**972**	**280**	**272,160**
PT2BW	**330**	**982**	**233**	**228,806**
YU7AE	**386**	**847**	**260**	**220,220**
DN1JC	356	785	242	189,970
UA3LEO	**342**	**740**	**230**	**170,200**
ES4RD	**329**	**771**	**214**	**164,994**
VE7FO	**290**	**713**	**170**	**121,210**
UT2AU	**249**	**548**	**184**	**100,832**
EU1MM	**235**	**540**	**178**	**96,120**
RUØBB	**200**	**539**	**164**	**88,396**
RW9MZ	190	516	152	78,432
YBØECT	**184**	**546**	**137**	**74,802**
SV1DPI	**214**	**461**	**155**	**71,455**
LX9EG (LX1NO)	**195**	**421**	**152**	**63,992**
RA3DRA	193	418	136	56,848
GØNUP	**196**	**407**	**138**	**56,166**
VA3XRZ	**161**	**391**	**133**	**52,003**
WG7Y	**212**	**302**	**136**	**41,072**
GM4CXM	**142**	**321**	**119**	**38,199**
JH1RFM	86	242	84	20,328
U1BB	92	193	82	15,826
VA7BM	90	186	75	13,950
YO3III	81	171	76	12,996
7K4QOK (JR2BNF)	69	191	62	11,842
K4GMA	55	120	52	6240
JA8AGI/1	45	117	43	5031
W4XDX (W1KCD)	55	84	39	3276
9V1XE	1	2	1	2

40 METERS

9A6A	**531**	**2488**	**318**	**791,184**
RA6AZ	**513**	**2270**	**307**	**696,890**
EO1I (UT1IA)	**391**	**1640**	**240**	**393,600**
UT2II	370	1592	237	377,304
US2YW	344	1566	233	364,878
OK2CLW	**345**	**1507**	**228**	**343,596**
RU6AV	274	1166	199	232,034
EU1DX	**252**	**1136**	**185**	**210,160**
AF4Z	**271**	**994**	**184**	**182,896**
RV9BB	**201**	**1144**	**153**	**175,032**
OK2VYG	217	916	159	145,644
RA3WMW	209	862	142	122,404
W3SE	247	752	155	116,560
T94DO	**192**	**796**	**132**	**105,072**
S54A	**152**	**680**	**124**	**84,320**
SM6FUD	128	562	102	57,324
8S3A (SM3DXC)	78	330	66	21,780
DJ2YE	52	218	50	10,900

80 METERS

S54E	**433**	**1862**	**252**	**469,224**
9A3ØY (9A5AZ)	**411**	**1762**	**233**	**410,546**
S51DX	388	1594	228	363,432
UW2N (UT5NM)	**310**	**1262**	**200**	**252,400**
UX1IL	293	1188	184	218,592
9A7P (9A5AEI)	293	1190	178	211,820
RZ3BW	**269**	**1072**	**172**	**184,384**
YL2GC	**262**	**1080**	**169**	**182,520**
EU1AZ	**236**	**988**	**155**	**153,140**
S51AY	242	968	155	150,040
OK2PHI	**193**	**784**	**136**	**106,624**
T95DKA	92	372	74	27,528
TA7J/9	64	364	60	21,840

MULTI-2

HC8N	**3486**	**12333**	**682**	**8,411,106**
YL4U	**2137**	**6312**	**573**	**3,616,776**
UT9F	**1992**	**5928**	**516**	**3,058,848**
S53S	**1835**	**5464**	**547**	**2,988,808**
OH7N	**936**	**2355**	**410**	**965,550**
WB8SKP	**529**	**1137**	**243**	**276,291**

Ops Multi-2

HC8N: N5KO, W6OTC, N4GN, K7PN. **YL4U**: YL2KF, YL3DW, YL3GDJ, YL2KL. **UT9F**: UT9FJ, UR5FEO, UR5FJF, UR5FFC, UR5FEL, UR5FCZ, US-F-55, US-F-3000. **S53S**: S50N, S50M, S57IIO, S57LWG, S58DX. **OH7N***: OH7MN, OH7UE, OH7KNM, OH7JJT. **WB8SKP**: WB8SKP, KA8CVE, KC8GKK, WD8OWA

** Moved from submitted class due to rule infractions.*

MULTI-SINGLE

HG1S	**1734**	**5572**	**536**	**2,986,592**
RK3AH	**1762**	**5147**	**531**	**2,733,057**
AH6OZ	**1630**	**5568**	**473**	**2,633,664**
Z38M	**1564**	**4950**	**479**	**2,371,050**
MW2I	**1554**	**4524**	**491**	**2,221,284**
LY8X	**1473**	**4553**	**477**	**2,171,781**
KP2D	**1477**	**4145**	**476**	**1,973,020**
RW9C	**1256**	**4558**	**413**	**1,882,454**
HG5C	1292	3852	448	1,725,696
OL5Q	**1076**	**3706**	**424**	**1,571,344**
SP5ZCC	**1113**	**3302**	**437**	**1,442,974**
UY8IF	**1226**	**3501**	**405**	**1,417,905**
LZ2UF	**1076**	**3157**	**358**	**1,130,206**
RK3RWL	1073	2896	384	1,112,064
KJ7TH	**1101**	**2356**	**417**	**982,452**
VE3FJB	**891**	**2607**	**374**	**975,018**
VE5RI	**977**	**2553**	**379**	**967,587**
RK9CZO	860	2808	343	963,144
KR6RF	**1154**	**2403**	**400**	**961,200**
EA2RCA	**914**	**2634**	**348**	**916,632**
J43BSF	**922**	**2378**	**355**	**844,190**
SP1MHV	**717**	**2280**	**330**	**752,400**
UZ4E	697	2111	303	639,633
AE4RO	**705**	**1666**	**333**	**554,778**
LU4DRC	**536**	**1584**	**285**	**451,440**
F5KQN	**476**	**1280**	**257**	**328,960**
LY5W	390	1220	226	275,720
YU7AL	**402**	**1147**	**227**	**260,369**
SP4KSY	363	1148	189	216,972
F8CHR	341	962	192	184,704
LA1K	**313**	**727**	**200**	**145,400**
SN6U	239	629	163	102,527
F6KWP	180	503	125	62,875
SP1PLA	134	322	112	36,064

Ops Multi-Single

HG1S: HA1TJ, HA1DAE, HA1DAC, HA1DAI. **RK3AH**: RK3AH, RU3FM, RX3DCX, RA3ATX, UA3ASZ, RV3BA. **AH6OZ**: AH6OZ KH6ND AH7R. **Z38M**: Z31GX, Z31JA, Z32XA, Z32XX, Z32PT, Z33F, Boko, Igor & Vladimir. **MW2I**: GW4JBQ, GW5NF. **LY8X**: LY2BIL, LY2BKF. **KP2D**: KP2N, NP2E, NP2W, NP2DJ, NP2DZ, WP2S, W5TTY. **RW9C**: UA9CGA, RW9CF. **HG5C**: HA5LV, HA5MA, HA5WE, HA5WU. **OL5Q**: OK1HRA, OK1FFU, OK1FLC, OK1VSL. **SP5ZCC**: SP5UAF, SQ5BPM, SP5LCC, SQ5EBL. **UY8IF***: UY8IF. **LZ2UF**: LZ2UF, LZ2AU. **RK3RWL**: RN3RC, RK3RX, UA3RSO, RZ3RC, UA3RJH. **KJ7TH**: KJ7TH, KW7N. **VE3FJB**: VE3FJB, VE3IJM, VE3NDA, VE3ALH, VA3CW. **VE5RI**: VE5CJR, VE5FN, VE5WI, VE6EZ, VE6VAC. **RK9CZO**: RX9CAZ, RA9CDH, RX9CGR, RA9CDF. **KR6RF**: N6DE, N6EE, W6XK. **EA2RCA**: EC2AFA, EA2CBY, EA2BFM, EA1OZ & Gloria. **J43BSF**: SV1CIB, SV3BSF. **SP1MHV**: SP1MHV, SQ1FTD. **UZ4E**: UR4EYN, Igor, Alex, Andy. **AE4RO**: AE4RO, AE4SW. **LU4DRC**: LW1DTZ , LW6DKO. **F5KQN**: F5PFT, F5PGO, F5SNZ, F5SNY. **LY5W**: LY1DR, LY1FW. **YU7AL**: YU7AL, YZ7EM, 4N7RGH. **SP4KSY**: SQ4TY, SQ4NR, SQ4CCG, SQ4IND. **F8CHR**: F8CHR, F5TEF. **LA1K**: LA5GKA, LA5LKA. **SN6U**: SP6NVK, SP6OPE. **F6KWP**: F5IVX, F5RKL, F-11734, F4CSJ. **SP1PLA**: SQ1FTB, SP1 22014.

** Moved from submitted class due to rule infractions.*

MULTI-MULTI

RKØAXX	**2822**	**9875**	**622**	**6,142,250**
W4GKM	**1318**	**3344**	**444**	**1,484,736**
JA6ZPR	**880**	**2518**	**395**	**994,610**
EA4ART	**817**	**2198**	**333**	**731,934**
KE6YTT	**934**	**1688**	**312**	**526,656**
SV1DKL	**612**	**1722**	**280**	**482,160**
RW2F	**99**	**345**	**80**	**27,600**

Ops Multi-Multi

RKØAXX: RAØAM, RUØAB, RUØAM, RWØAR, RUØAT, RUØAAB, RUØAFA, RVØAR, RVØAU, RVØAX, RAØALM, UAØAGI, UAØANW, UAØWW. **W4GKM**: W4GKM,W4RRE. **JA6ZPR**: JH6JSR, JR6CKX, JR6CKY, JJ1RJR. **EA4ART***: EA4OI, EA4AZJ. **KE6YTT***: KE6YTT, KE6YTW, KR6E. **SV1DKL***: SV1DKL, SV1DNW. **RW2F**: RN2FA, UA2FX.

** Moved from submitted class due to rule infractions.*

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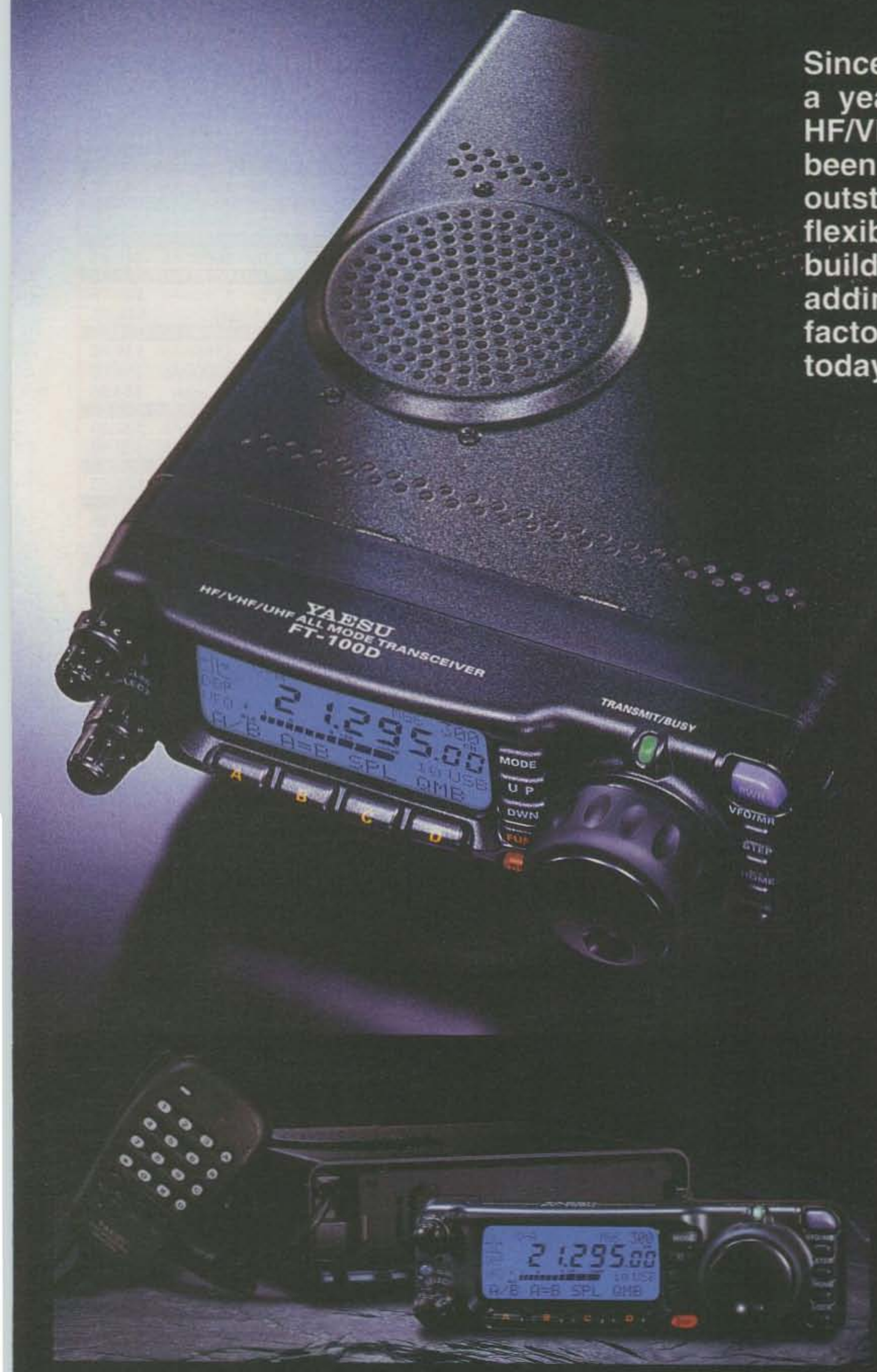
MOBILE DX MASTER



Since its introduction over a year ago, Yaesu's FT-100 HF/VHF/UHF Transceiver has been widely acclaimed for its outstanding performance and flexibility. Now the FT-100D builds on this success story, adding the convenience of factory-installed modules for today's Ham on the go!

FT-100D HIGHLIGHTS

The FT-100D is a high-performance, ultra-compact transceiver operating on the 160-10 meter HF bands, plus the 50, 144, and 430 MHz VHF/UHF bands. Known for its outstanding receiver performance, the FT-100D's easy-to-access DSP system is the cornerstone of the outstanding receiver capability. Providing Noise Reduction, Auto-Notch, and Narrow-Bandwidth Filter selection, the DSP system also includes a Microphone Equalizer for the transmit side.

The new and enlarged speaker of the FT-100D (ϕ66 mm) provides spectacularly clean audio output, to help you dig out those weak signals.

Whether at home or away, the fantastic new FT-100D is The Choice of the World's Top DX'ers. Step up to the FT-100D, and enjoy the thrill of the sunspot peak in style!

MICRO MOBILE

FT-100D

Ultra-Compact HF/VHF/UHF Transceiver

YAESU

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The Ultimate Backpacker!

Ham Radio in the Great Outdoors: It's the Best with Yaesu's FT-817!

FIELD

CAMPING

HOME

Actual Size

Bring Ham Radio along on your next hiking, camping, or business trip with Yaesu's amazing new FT-817 Multimode HF/ VHF/ UHF Portable Transceiver!

- **ULTRA COMPACT:** Measuring just 5.3"x 1.5"x 6.5" WHD (135 x 38 x 165 mm) and weighing about 2 1/2 pounds (1.17 kg, including the supplied antenna and alkaline cells), the FT-817 is small and light enough to take along wherever you're going.
- **WIDE FREQUENCY COVERAGE:** 160-10 meters on HF, plus the 50, 144, and 430 MHz Amateur bands. Plus FM Broadcast, AM Aircraft, and Public Safety receiver coverage.
- **MULTIMODE DESIGN:** Ready for action on SSB, CW, AM, FM, FM-Wide (Rx), 1200/9600 bps Packet, and Digital, including dedicated USB and LSB PSK-31 configurations.
- **5 WATTS POWER OUTPUT:** Using a new-technology all-band MOS FET power amplifier, the FT-817 provides 5 Watts of power output when using a 13.8 Volt DC source. When using Alkaline batteries or the optional FNB-72 Ni-Cd Battery Pack, power is automatically set to 2.5 Watts; via Menu, this can be changed to 0.5 Watt, 1 Watt, or up to 5 Watts.
- **WIDE CHOICE OF POWER SOURCES:** The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.
- **TWO ANTENNA PORTS:** A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.
- **OPTIONAL COLLINS® MECHANICAL FILTERS:** An optional filter slot is provided, accommodating either the YF-122S (2.3 kHz) 10-pole SSB filter or the YF-122C(500 Hz) 7-pole CW filter. You get "base station" performance even from a mountain top.
- **INCREDIBLE MEMORY RESOURCES:** You get a total of 208 memories, including 200 "regular" memories which may be separated into ten groups of up to 20 channels each. And you can append an Alpha-Numeric "Tag" to each memory to aid in channel identification.
- **A CW OPERATOR'S DREAM MACHINE:** You get a built-in Electronic Keyer with adjustable weighting, adjustable CW Pitch, CW Normal/Reverse frequency tuning, and you can even use the microphone's UP and DOWN keys to send CW via the Keyer.
- **BUILT-IN CTCSS AND DCS:** The built-in CTCSS and DCS Encoder/Decoder systems provide you with the versatility you need for repeater access or selective calling.
- **DUAL - COLOR LIQUID CRYSTAL DISPLAY:** Select from Blue or Amber display illumination, which can also be switched off to conserve battery life. And while you're away, the Spectrum Scope will provide you with a visual record of activity ±5 channels from your current operating frequency.

ALL MODE PORTABLE TRANSCEIVER

FT-817

HF/50/144/430 MHz Multimode Transceiver

YAESU

Choice of the World's top DX'ers

Vertex Standard
US Headquarters
17210 Edwards Road,
Cerritos, CA 90703 (562)404-2700

For the latest Yaesu news,
Visit us on the Internet: http://www.vxstd.com

See the exciting new FT-817 at your Yaesu Dealer's showroom today!

SAVE $150 IC-706MKIIG

SAVE $180 IC-706MKIIG + AH-4

SAVE $200 IC-706MKIIG + AT-180

Limited time offers. See dealer for details.

"With the addition of yet another band (70 cm), more power on 2 meters and the incremental improvements made with each new version of this popular transceiver, perhaps the '706 has reached its zenith. There's not much left to improve."
-*QST*, July, 1999

MORE BANG. LESS BUCKS.

"An impressive transceiver for HF, 50 MHz and 144 MHz work. With loads of those features desirable to the serious HF operator *and* all modes at 100W on both 6 and 2 meters, the IC-746 is a fine choice in a mid-priced rig."
-*QST*, September, 1998

Limited time offer. See dealer for details.

SAVE $200 IC-746

The IC-706MKIIG & IC-746

For a limited time, you can save a bundle on two of ICOM's most popular radios. The IC-706MKIIG, the best selling, most versatile compact multi-band rig ever made, is loaded with features yet small enough to take with you – it's as home in a car as in a den or shack. The IC-746 offers real HF performance *plus 6 and 2 meters.* Enjoy 100W of power on all bands and big rig features like adjustable IF-DSP and Twin Pass Band Tuning (even faint signals can't hide!). Visit your authorized ICOM dealer today, and SAVE!

IC-706MKIIG. Proven Performance.

HF/6M/2M/70CM • HF & 6M @ 100W, 2M @ 50W, 70CM @ 20W • 107 Alphanumeric Memory Channels • CTCSS Encode/Decode with Tone Scan • Auto Repeater • All Mode with DSP • Plug-n-Play Filters • Remote Head Operation*

IC-746. Real HF Performance.

HF/6M/2M • HF, 6M & 2M @ 100W • 102 Alphanumeric Memory Channels • CTCSS Encode/Decode with Tone Scan • Auto Repeater • IF-DSP & Twin Pass Band Tuning • Full Duty Cycle • Internal Antenna Tuner • PC Controllable*

*Optional equipment required.

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