Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

OCTOBER 1994

1945 Our 50th Year 1994

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Announcing The CQ Golden Anniversary Awards Program

K4ABT On Packet Nodes

Doug DeMaw Teaches The Fine Art of Soldering

Rev. Paul Bittner, WØAIH, Eau Claire, WI

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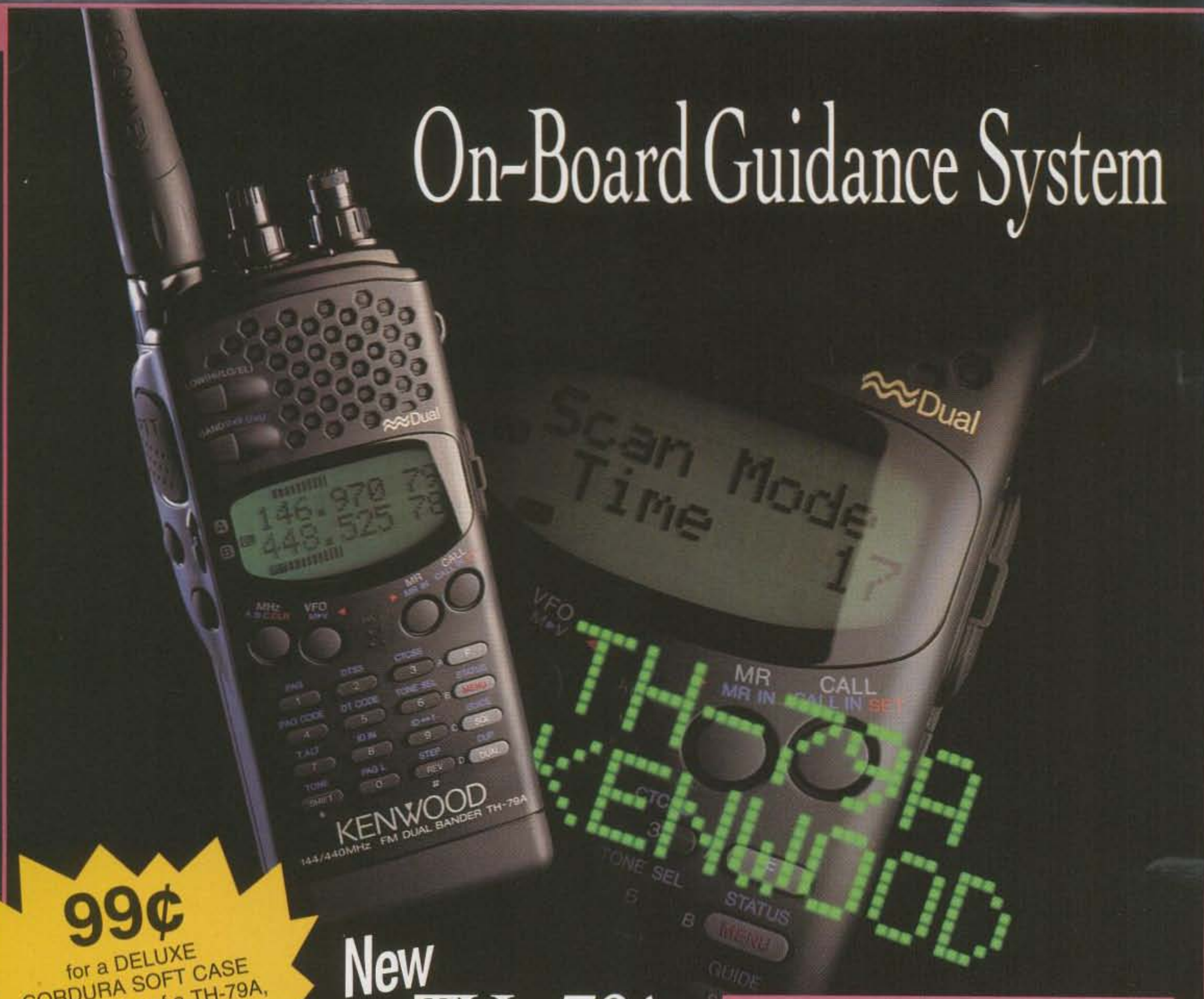
AMATEUR'S JOURNAL

On-Board Guidance System



99¢
for a DELUXE CORDURA SOFT CASE with purchase of a TH-79A, now through Dec. 31, 1994
See Kenwood dealer for details

New TH-79A
FM DUAL BANDER

Information at your fingertips. Everything you need to know about operating the new TH-79A FM dual-bander (144MHz/440MHz) can be viewed in its unique dot-matrix LCD with alphanumeric display. No need for the manual. In addition to this innovative guide function, the TH-79A sports a user-friendly menu system, providing easy access to the many powerful features of this slim-line handheld transceiver. Such as 82 non-volatile memory channels with ID, DTSS and page functions, and a DTMF memory function for auto-dial operation. Full-crossband duplex operation is available, as is the ability to receive two frequencies on the same band (VHF+VHF or UHF+UHF) simultaneously. And thanks to the FET power module, long hours of operation are possible on one charge. With the TH-79A, transceiver technology enters the 21st century.

Features

- 2.7W output (144MHz), 2W output (440MHz) from MOS FET power module and supplied 6V battery; 5W output using optional PB-34
- Dot-matrix LCD with menu/guide system
- 82 non-volatile memory channels with ID
- DTMF keypad with memory function
- DTSS (Dual-Tone Squelch System) with page
- Built-in CTCSS tone encoder/decoder
- Automatic band change
- Power-on call sign display
- Auto repeater offset (VHF)
- Input overvoltage warning
- 3-position output power control
- Auto power-off and battery save function
- Time-out timer
- Multiple scan modes
- Cross-band repeater function
- Page answer-back function
- Channel display function
- Wideband receiver coverage, including AM receive on the aircraft band*
- Modifiable for MARS/CAP use**

*Specifications guaranteed for Amateur bands only.
**Permits required. Specifications guaranteed for Amateur bands only.

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AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
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94ARD-1012

KENWOOD

BACK TO BASICS

CASH BACK SPECIAL OFFER !
See Kenwood dealer for details
(expires Nov. 30, 1994)

TM-241A
FM MOBILE TRANSCEIVER

Pure and simple, the concept reads like this: "rock-solid performance with straightforward operation, at an affordable cost". And Kenwood's TM-241A (144MHz) FM mobile transceiver symbolizes this perfectly.

Great looks and rugged construction are just the beginning. The TM-241A's user-friendly controls make mobile QSOs a snap, and a powerful 50-watt amplifier lets you work simplex with confidence or hit those distant repeaters. Reception specs are equally impressive: intermod characteristics have been improved* to reduce interference from strong adjacent band signals. Plus, there are 20 multi-function memory channels for programming combinations of frequency, sub-audible tone, and repeater offset.

So, if you're looking for true mobile performance, go back to the basics and reach for Kenwood's TM-241A.

Features

- 144-148 MHz TX, 118-174 MHz RX
- 50 watts RF output
- 20 multi-function memory channels
- Large LCD display with illuminated keys
- Full band scan, programmable band scan, memory scan with channel lock-out
- Time-operated & carrier-operated scan modes
- Built-in selectable CTCSS tone encoder
- Auto repeater offset
- Tone alert with elapsed time indicator
- DTSS for selective calling and paging (with optional DTU-2)
- Time-out timer
- Auto power-off with warning beeper
- Meets U.S. military standards for shock and vibration (MIL-STD 810C/D/E)*
- Modifiable for MARS/CAP use (permits required)

These specifications guaranteed for Amateur band only.
*Current K&K2 versions with serial number 5080000 or later.

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KENWOOD

94ARD-1011

Explore the Kenwood Dimension

The finest selection of communications equipment for the Amateur Radio enthusiast

H F T R A N S C E I V E R S

TS-950SDX •160m to 10m amateur band operation, 100kHz to 30MHz general coverage receiver •Built-in DSP (Digital Signal Processor) •MOS-type FET final section •Dual frequency receive •Menu system

TS-850S •160m to 10m amateur band operation, 100kHz to 30MHz general coverage receiver •DDS (Direct Digital Synthesizer) & digital PLL system •AIP (Advanced Intercept Point) system •IF slope tuning •Electronic message keyer circuit with weighting control

TS-450S/690S •160m to 10m amateur band operation, 500kHz to 30MHz general coverage receiver •6m amateur band and 50–54MHz general coverage receive (TS-690S) •DDS (Direct Digital Synthesizer) & digital PLL system •AIP system •IF shift function tuning •AF notch filter

TS-140S •160m to 10m amateur band operation, 500kHz to 30MHz general coverage receive •IF shift circuit •31 memory channels with multi-scan functions •Dual-mode noise blanker •Speech processor with audio compression amplifier

A L L - M O D E T R A N S C E I V E R S

TS-50S •Super-compact, 100-watt, 160m to 10m transceiver, 500kHz to 30MHz general coverage receiver •DDS (Direct Digital Synthesizer) with "fuzzy logic" control •AIP system •100-memory channels •CW reverse •Menu system

TS-790A •144/440MHz dual-band operation •1200MHz unit (option) •All-mode operation •Satellite communications with Doppler effect frequency correction •59 multi-function memory channels with lithium battery back-up

TS-60S •50MHz all-mode operation •Max. 90W RF output (SSB, CW & FM) •100 memory channels •DDS with "fuzzy logic" control •AIP, IF shift (SSB & CW) and optional 500Hz CW filter •Dual-menu system

TM-255A/455A •All-mode operation (TM-255A: 144MHz; TM-455A: 430MHz) •101 memory channels •DDS with "fuzzy logic" control •TF-SET (TX frequency set) function •DTSS selective calling with page •1200/9600bps packet terminal

F M M O B I L E T R A N S C E I V E R S

TM-742A/642A/942A
•Multi-band operation (TM-742A: 144/440MHz; TM-642A: 144/220MHz; TM-942A: 144/440/1200MHz) •Optional FM band units for TM-742A/642A (TM-742A: 28/50/220/1200MHz; TM-642A: 28/50/440/1200MHz) •Dual/triple receive capability •101 memory channels per band •Detachable display & control panels (option)

TM-733A •144MHz/440MHz dual-band operation •Dual receive on same band (VHF+VHF or UHF+UHF) •"6-in-1" programmable memory •72 memory channels •DTSS selective calling with page •1200/9600bps packet terminal •AIP system •Cross-band repeater function

TM-241A/331A/441A/541A
•Single-band operation (TM-241A: 144MHz; TM-331A: 220MHz; TM-441A: 440MHz; TM-541A: 1200MHz) •20 multi-function memory channels plus call channel •Multi-scan capability •Selectable CTCSS tone encoder •Multi-function microphone supplied

TM-251A/451A •Single-band operation (TM-251A: 144MHz; TM-451A: 440MHz) •41 memory channels (optionally expandable to 200) •Dual-band receive •Digital recording system •DTSS selective calling with page •1200/9600bps packet terminal

F M H A N D H E L D T R A N S C E I V E R S

CASH BACK SPECIAL OFFER !
On Selected Radios

See Kenwood dealer for details

(expires Nov. 30, 1994)

TH-79A •144MHz/440MHz dual-band operation •Compact, light design •Mos FET power Module •Dot-matrix LCD, Guide function & menu system for easy operation •Dual receive on same band •82 non-volatile memory channels in E²PROM •ID memory & DTMF memory •Built-in CTCSS encode/decode •Cross-band repeater function

TH-28A/48A
•Single-band transmit and dual-band receive (TH-28A: TX 144MHz/RX 144/440MHz, TH-48A: TX 440MHz; RX 144/440MHz) •Alphanumeric memory •Alphanumeric message paging •40 multi-function memory channels (non-volatile) •Tone alert system with indicator

TH-22AT/42AT
•Single-band operation (TH-22A: 144MHz; TH-42A: 440MHz) •MOS FET power module •Built-in DTMF keypad •40 memory channels in E²PROM (plus 1 call channel) •Multiple scan functions •Dual scan stop modes (CO & TO) •Channel Display function

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CQ The Radio Amateur's Journal

ON THE COVER: The cryptic message read "Weighs 1200 lbs., came out of a farm silo, takes 5½ minutes to turn the 40 meter beam." That's the way Rev. Paul Bittner, WØAIH, described this monster antenna rotator for us. No stranger to *CQ* covers, Paul is also no stranger to big-league contesting from his Eau Claire, Wisconsin QTH. (Photo by Larry Mulvehill, WB2ZPI)

OCTOBER 1994 **VOL. 50, NO.10**

FEATURES

DEPARTMENTS

ZERO BIAS

EDITORIAL

This month we present the results of our CQ World-Wide DX CW Contest for 1993. Judging from the number of participants, it is evident that there are still quite a number who enjoy operating and especially competing in this mode. For amateurs who hate contests and those who hate CW, there are enough for both of you to boil your bile. However, this time, unlike the SSB section, you have to be able to copy CW at some respectable rate in order to find out who you're mad at. So grin and bear it, and hopefully you'll look at it as a training exercise on the way to your Extra ticket.

Elsewhere in this issue you can read about some new operating and achievement activities sponsored by *CQ* to help us celebrate our 50th Anniversary starting in January 1995. In some sense it's been an amazing and remarkable 50 years, starting with the closing months of WW II. From surplus to satellite, from DC to digital all in one's lifetime takes in a lot of amateur radio territory. Although Dick has me beat by a few years, we've both been with *CQ* for over 30 of those 50 years, so it's been a continuing adventure into a wonderful way to have both a hobby and a career. George Jacobs, W3ASK, our Propagation Editor, comes the closest to being with *CQ* from day one. George's column this month is his 44th consecutive Contest Special, whereby he tells us what to expect for the upcoming CQ World-Wide. Besides the special operating activities, we'll be preparing special editorial material that will span those 50 years.

Speaking of the CQ World-Wide, I don't know about you, but I'm starting to get Contest Fever and am looking forward to this year's big event. The first request for logs came in at the beginning of August from Bob Alexander, GMØDEQ, for his club, the Cunninhame & District ARC, which will be operating G3USL. We try to get all of our log and award info out as soon as possible, but you have to give us a fighting chance to get the material to you on time. It's really up to you to send in early enough to allow sufficient time for the material to get back to you. Obviously, those requests with an SASE get answered first; it's simply easier for us to handle those.

"Real" Amateur Radio, The Way It Is!

For years I've been sort of envious of the stations that appear on our covers. I know that Larry, WB2ZPI, takes great pictures, and the covers reflect what these stations really look like. On occasion I've even asked Larry if that is what the station really was like—neat, functional, everything in its place. My envy truly didn't have anything to do with the gear being shown (well, maybe a little), but it was more in the form of awe at how neat (and in a sense sparse) everything was. It's not that I don't trust Larry, but I do know that almost every amateur I've ever met more closely resembled Oscar Madison rather than the compulsive Felix Ungar from "The Odd Couple." We tend to have stuff, and our stuff has stuff, and as a matter of scientific fact, our stuff is a hidden energy source that simply attracts more and more stuff. Larry discretely smiles when I mention that I think all of the shacks he photographs have huge piles of stuff either in hallways or driveways waiting to come back into the shack after he leaves. Even though the rest of us think the same thing, he won't say for sure. All I know is that your significant other, whoever that is, looks at one of our covers and is probably beating on your head to neaten up, organize, and get rid of some really good stuff.

At the moment I'm toying with the idea of adding another calendar to our series. This one would feature the "real" amateur radio—the way it really looks, including the piles of stuff just outside of Larry's camera's view. I know and appreciate that *QST* had the strength and fortitude to lay the groundwork for this several years ago with their "Messy Shack Contest," but I feel that they too held back and staged a few shots that appear sort of neat (to the non-amateur). After all, children see these things, and we wouldn't want to completely frighten off the next generation of amateurs. However, if there's a knock at your door one day and Larry is there when you open it, you may hear, "Don't touch a thing; we're here to take a picture of your shack just the way it really is." Stand tall, be proud. You're a real amateur.

The Passing Parade

The other day Dave Ingram, K4TWJ, called concerning some material he was putting together for our 50th Anniversary issue. In the course of conversation he brought up some of the construction projects of the '50s featuring things built in little tin cans such as Sucrets® boxes. Sucrets® are those little throat lozengers that come in a rectangular tin box perfect for either storing small parts and hardware or for use as a chassis for one-tube rigs.

There were and I guess to some extent still are favorite projects and classic designs built around commercial packaging for food, medication, and tobacco. A lot of us have either seen the original or pictures of coils wound on Quaker Oats containers, which apparently was the right or adaptable diameter and self-insulated. A Prince Albert Tobacco can wedges nicely into an old-fashioned telegraph sounder for that just-right sound. All it took was one innovative amateur to come up with a use for one of these containers and everyone else followed suit, causing a rush on the product.

It also might have been that most amateurs tend to be on the frugal side and are also confirmed packrats. Therefore, the practice might have been based on "See, I told you that I'd find a use for that!" Whatever it was (and is), popular commercial packaging was always recycled (we were ahead of our time) into great amateur stuff. For amateurs, at least, sometimes technology and the economy move on divergent paths. Just when amateurs were getting used to smaller and smaller components and rigs, and when the opportunity for building a really neat and complex rig in one of these boxes became a distinct reality, the economy of manufacture took over and commercial packaging began to change. Little tin boxes and containers add a bit too much to the cost of the product in this very competitive age, so manufacturers have been phasing them out for some time now.

Recently there was a small article in *The New York Times* concerning this phenomenon. Two more products will be making a change in their long-standing traditional packaging. The first is Listerine®, which will be giving up their glass bottles in favor of plastic. The product notwithstanding, plastic just might be an easier thing to find a use for and certainly is easier to work with than glass. After some of the food combinations we tend to consume at hamfests, the product will still come in handy for most of us. The second, and this is where it hurts, is the announcement that the ever-popular Sucrets® box will become a thing of the past. Gone will be those great little tin boxes with their little snap-top covers. The company will switch to less expensive and more conventional (probably cardboard) packaging for their throat medication.

The quick-fix solution I guess is to speedily get to your local drug store and/or supermarket and buy up any remaining inventory. Prepare yourself, though, for curious looks from the check-out people (practice coughing a bit), resting assured that you have enough project/storage boxes to last a long time. The next best thing is probably to check local fleamarkets, garage sales, and antique shows to pick up some of these treasures. The prices may be higher than you expect (we're now talking about "collectables"), but it will be harder and harder to recapture the days when all of this stuff we call amateur radio had a certain look, personality, and character, complete with idiosyncrasies and personal touches that made it unique. No, I wouldn't want to relive all of those days entirely, knowing and enjoying what we have today, but now and then I still like to go back and visit the days when things were simpler and sometimes more fun.

Say, does anyone out there still use a beer-can vertical?

73, Alan, K2EEK

AEA is more than just great TNCs.

ST-1

SATELLITE TRACKING

- The ST-1 offers users hardware and software for automatic satellite tracking.
- Automatically controls Yaesu 5400/5600 Azimuth-Elevation rotors and can also be used with other rotors.
- Automatically tunes many transceivers including the FT-736, TS-790, IC-970, and the IC-475/275.
- Software included with the ST-1 is a completely resident program (TSR), so your computer isn't tied up when tracking.
- Software such as InstantTrack, QuickTrack, RealTrack, PG_AEA, PB and PG are compatible with the ST-1.
- Allows unattended operation on Packet satellites (PACSATS).

KK-1

KEYBOARD KEYER

- The KK-1 turns any PC-compatible keyboard into an easy to use Morse machine that shares the keyboard with your computer (cable provided).
- Computer is not necessary, the KK-1 works with the computer's keyboard.
- Loaded with features such as twelve nestable single keystroke message buffers (over 7900 characters total), short-term memory, message repeat, and extensive code practice (random character groups or words).
- This is the only keyer that allows you to send on the air with Farnsworth spacing.
- Adjust character formation speed and average sending speed together or independently, to make your transmissions easier to copy.

HamLink
RadioLink

REMOTE CONTROL

- Both HamLink and RadioLink control your Icom, Kenwood, or Yaesu radio while you are somewhere else.
- HamLink controls your ham station using a cell phone, air phone, or any touch-tone telephone!
- RadioLink controls your ham station from a VHF/UHF radio such as your handheld or mobile radio.
- Both units allow you to change bands and frequency, tune up or down, switch modes (AM/SSB/FM/CW), scan, run split VFO, or virtually any other radio feature from anywhere. (Radio must be computer controllable).

DM-1

MEASURE DEVIATION

- The DM-1 is a deviation meter for FM transmitters operating in the 144, 220, or 440 MHz amateur bands.
- Crystal controlled—no tuning required.
- Dual deviation ranges allow accurate measurement of voice, data, DTMF, and subaudible deviation.
- Accurate deviation adjustment insures faster throughput on packet.
- Automatic disable with low battery voltage ensures accuracy.
- Compact and battery powered for convenient use anywhere.
- Outputs for external digital or analog meters, and an audio output for monitoring through an external amplifier.

Call (800) 432-8873 for a complete catalog or information on a specific product. Contact your favorite amateur radio equipment dealer for best pricing.

Connect with us

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Lynnwood, WA 98036
(206) 774-5554

ANNOUNCEMENTS

• The following Special Events are scheduled for October:

K1MYL, from the 4th annual Westport Harvest Festival, Westport, Massachusetts; The Westport Hams (WHAMS); 1400–2100 UTC Oct. 15 & 16; operation in General portion of 80, 40, 20, 17, and 15 meter bands and Novice 10 meters and 147.45 simplex. For special QSL, send QSL and SASE to Leonard A. Moniz, K1MYL, 43 Kirby Road, Westport, MA 02790.

/RBRA, from 40th anniversary celebration of Raritan Bay Radio Amateurs, Sayreville, New Jersey; 40th anniversary of the club; 0000–2400Z Oct. 8; CW in the Novice CW subbands; phone in the lower portion of the General phone subbands 80–15 meters, as well as 10 meter Novice Phone subband. For certificate, send QSL and a 9 × 12 SASE to *Callbook* address of the station worked.

AA2KS, from site of "The Ghost of Long Valley" Long Valley, New Jersey; Piscataway ARC; to celebrate Halloween; Oct. 29; General portion of 40, 20, 15 meters and Novice 10 meters. For special QSL card send QSL and SASE to Piscataway ARC, P.O. Box 1233, Piscataway, NJ 08854.

W3XX, from the *U.S.S. Requin* submarine at the Carnegie Science Center, Pittsburgh, Pennsylvania; Breezeshooters ARC; 1400–2100Z Oct. 1–2; CW on 7.123 and 21.123; phone on 7.250, 14.250, 21.350, 28.460, and 146.52. For certificate and QSL card send QSL and an 8-1/2 × 11 inch SASE to Ron Berry, WB3LHD, 326 Sunset Drive, Bethel Park, PA 15102.

WA3DFU, from the "Almost Annual Delaware DXpedition," Warminster, Pennsylvania; Warminster ARC; 1200–2100Z Oct. 16; operation near 7225, 14275, and 28440, CW on request. Send SASE to WA3DFU, P.O. Box 113, Warminster, PA 18974.

KD4SS, from the midpoint of the 8th annual Roller Coaster Fair, Temple Hill, Kentucky; Mammoth Cave ARC; 1500Z Sept. 30 to 0400Z Oct. 2; lower portions of General subbands on 80, 40, 20, 15, 28.475, and 2 meters. For certificate, send 9 × 12 SASE and your QSL to Mammoth Cave ARC, P.O. Box 1062, Glasgow, KY 42142.

KD4ZY, from The Devils Courthouse (weather permitting), Transylvania County, North Carolina; The Transylvania County ARC; to celebrate Halloween; 2100Z on Oct. 31 until 0100 on Nov. 1; frequencies in use will be 7.234, 14.295, 21.365, and 28.335 SSB, and 146.52 FM simplex. For certificates, send a legal size of 9 x 12 SASE to Willis B. Casey, KD4ZY, 116 Campbell Drive, Pisgah Forest, NC 28768.

N4MAD, from 30th anniversary of Islands On The Air (IOTA) Fort Pickens, Santa Rosa Island (NA-142); SHARC of Pensacola; 1300–2000Z Oct. 8; SSB and CW on 40, 20, 15, and 10 (Novice subband, conditions permitting), and on the IOTA call-in frequencies of 14.260 and 21.260 MHz ±10 kHz. For a special QSL card send QSL with QSO contact number given and SASE to N4MAD.

W4TMN, from 213th anniversary of the surrender of Cornwallis at Yorktown, Virginia; Williamsburg Area ARC; 1200–0100Z Oct. 22; 28.350, 24.950, 21.350, 18.150, 14.270, 7.270, and 3.870. For certificate, send QSL and 9 × 12 inch SASE to Michael Conte, KD4HYT, 120 Crescent Dr., Williamsburg, VA 23188.

WD4JDB, from the 6th Annual Jack Daniels International Invitational Barbecue Cookoff, Lynchburg, Tennesee; the Alabama Goodtime Gang; 1100–0000Z Oct. 22; operation will be in middle of the General phone portion of 80, 40, 20, 15, and the Novice portion of 10 meters. Packet frequencies will be 145.01 and 145.05. For certificate send QSL and a 9 × 12 SASE to AGTG, P.O. Box 1624, Anniston, AL 36202.

KE5TC, from the WWII submarine *USS Batfish*, Muskogee, Oklahoma; 1400–2200Z Oct. 8–9; General 80–10 meter bands. For QSL send QSL and SASE to KE5TC, P.O. Box 436, Keota, OK 74941.

N5SUM, from inductions at International Space Hall of Fame & Museum, Alamogordo, New Mexico; Alamogordo ARC; 1500–2300Z Oct. 1; SSB on 28.475, 21.375, and 14.275, ± QRM; CW to be announced on the air. For more information, contact Bill Leehan, N5SUM, 505-437-9781, Event Chairman or via K5DI BBS in NM. To receive QSL picturing the Space Hall, send requests to International Space Hall of Fame, Attn: N5SUM, Route 2001 P.O. Box 533, Alamogordo, NM 88311-0533.

5-land, from celebration of Menasco Aerosystem's 38 years of operating in Texas; Menasco, Ft. Worth, Texas; Menasco ARC; Oct. 9–15; approximate middle of General portions of HF bands and local simplex frequencies on VHF. For certificate send 8 × 10 SASE and QSL or SWL report to Menasco ARC, 4000 South Highway 157, Euless, TX 76040-7012.

N5TBQ, from National Quality Month, Open House site of Alcatel Network Systems, Inc., Richardson, Texas; Alcatel ARA; 1500–2200Z Oct. 1; in General phone portions of 40, 20, 15, and 10 meters. For QSL, send contact report to Alcatel Network Systems, Inc., AARA, M/S 401-212, 1225 North Alma Road, Richardson, TX 75081-2206.

KA6SPQ, to celebrate 102 years of the Point St. George Light House, Crescent City, California; 1500–0600Z Oct. 22 and 23; operation in lower portions of the General subbands. For certificate and QSL, send SASE to KA6SPQ, Bill Wortell, 110 Cannon Drive, Crescent City, CA 95531.

W6ULI, in conjunction with the Fullerton Eagle Flight Celebration, Fullerton, California; Fullerton

(Continued on page 8)

Go Far With an Antenna From AEA

IsoLoop

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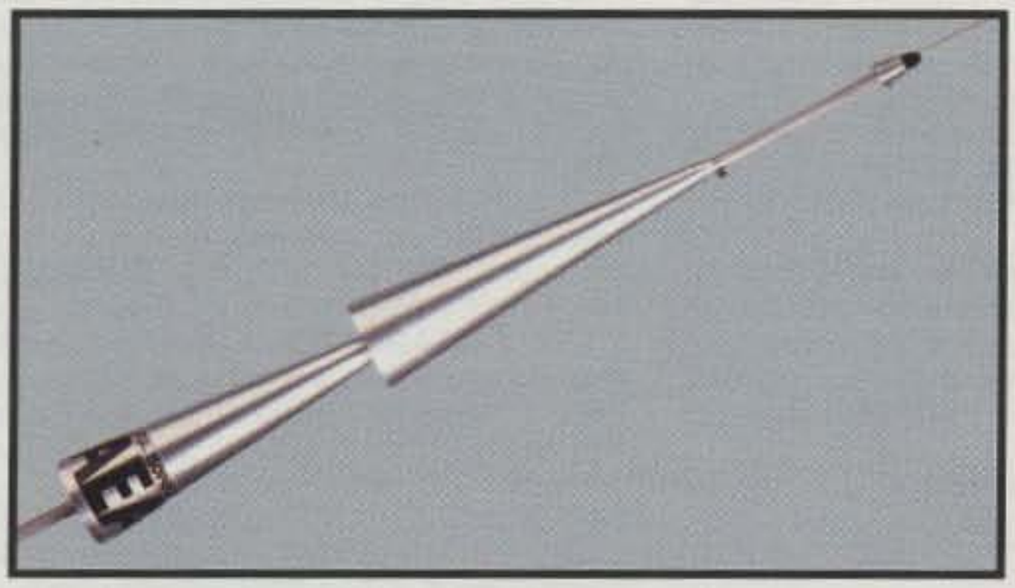

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ANNOUNCEMENTS

(from page 6)

Radio Club; 1600–2300Z Oct. 8; operation in General 40, 20, 15, and Novice 10 meters plus 147.975 and 147.330 repeaters. For certificate, send QSL and a 9-1/2 × 12 SASE to Fullerton Radio Club, P.O. Box 545, Fullerton, CA 92632.

KC7MF, from dedication of Green Valley Titan Missile Museum, Green Valley, Arizona; Green Valley ARC; 1600Z Oct. 14 to 2300Z Oct. 16; phone 3.860 (AM or SB), 7.230, 14.250, 21.330, 28.450 MHz; local 2 meter repeater 145.290 MHz (–600). For certificate send QSL and an 8 × 12 SASE to GVARC, 601 N. La Cañada, Green Valley, AZ 85614.

WB8PPH, Pumpkinfest, Circleville, Ohio; Teays ARC; 1500Z Oct. 19 to 0300Z Oct. 23; on 80, 40, 20, 15, 10 meter General phone subband, CW in 80, 40, 20, 15, and 10 meter General and Novice subband. For QSL send QSL and return postage for 9 × 12 certificate to Len Campbell, WB8PPH, 8951 SR 188, Cir–cleville, OH 43113.

W8NCK, from 172nd anniversary of birth of President Hayes, Rutherford B. Hayes Presidential Center, Fremont, Ohio; The Sandusky Valley ARC; 1600–2100Z Oct. 1 and 1700–2100Z Oct. 2; Novice and General subbands of 10, 15, 20, and 40 meters; 146.91 and packet on 145.09. For certificate send QSL and 9 × 12 SASE to SVARC, c/o Jerry Swartzlander, 120 S. Granville Blvd., Fremont, OH 43420.

NCØA, from Royal Gorge Bridge, Canon City, Colorado; Royal Gorge ARC; 1400–2100Z Oct. 22; lower portion of General 40, 20, 15 meter and Novice portion of the 10 meter subbands. For certificate, send QSL and a 9 × 12 SASE to Chuck Ward, NCØA, 1011 Harrison Ave., Canon City, CO 81212.

WEØU, KØRW, WKØI, and **WBØB**, from 100th Anniversary of Snake Alley, Crookedest Street In The World, West Burlington, Iowa; James Madison Middle School students and IA-IL ARC; 1400–2400Z Oct. 6–9; phone 3.898, 7.238, 14.263, 21.325, 28.303 ±5 kHz. For certificate send 9 × 12 inch SASE to Larry Newby, WBØB, P.O. Box 185, West Burlington, IA 52655-0185.

KØRW, during the Trans-Mississippi Trolley Fall Foliage Runs; Iowa Radiosport Society; 1400–2100Z Oct. 15; lower portion of General 40, 20 and/or Novice 10 meter phone subbands. For certificate, send QSL and SASE to P.O. Box 68, Burlington, IA 52601-0068.

NØCWP, from annual Pumpkinfest, Anamosa, Iowa; Jones County ARC; 1500–2000Z Oct. 1; lower 50 kHz of General subbands. For certificate send confirming QSL to Jim McClintok, NØCWP, Box 462, Morley, IA 52312.

KOØW, from Nowhere, Kansas, in conjunction with Baldwin City Maple Leaf Festival; Oct. 15; 1500–2200Z; General 40, 20, 15, Novice 10 meters, also /Railroad Mobile aboard the Midland Historical Railway caboose enroute between Baldwin City and Nowhere. For certificate send 9 × 12 SASE to Ken Baker, KOØW, 1017 Forest Drive, Olate, KS 66061.

Ø-land, from Satern Emergency Services Seminar, Kenosha, Wisconsin; Oct 14–16; digital activities are also planned. For commemorative QSL card, send your card, SASE, and name of operator worked to Al Shaver, NH2Z, Apt. #608, 84-265 Farrington Hwy., Waianae, Hawaii 96792 or directly to op contacted.

The "Viamão DX-Club," Brazil; an annual meeting to debate and talk about general radio subjects; 1200 AM to 1100 PM Oct. 9; 21.300 kHz on 15 meters; 14.200 kHz on 20 meters. To receive a commemorative QSL send QSL and SASE to Viamão DX-Club, Caixa Postal 101, Viamão-RS-Brasil, CEP: 94400-970.

• The following hamfests, etc. are slated for Oct.:

Oct. 1, **North Central Indiana Hamfest**, Miami County Fairgrounds near Peru, Indiana. For more information, contact the North Central Indiana Hamfest c/o Cass Co. ARC, P.O. Box 1092, Logansport, IN 46947.

Oct. 1, **Fly-In/Drive-In Hamfest**, Binghamton Regional Airport, Binghamton, New York. For more information, call Dick Wilson, KB2LDY, at 607-648-2748. (Exams.)

Oct. 1, **Third Annual Hamfest and Electronics Swapmeet**, Kitsap County Fairground, Bremerton, Washington. For more information, send SASE to NKARC, P.O. Box 2268, Silverdale, WA 98383-2268.

Oct. 1–2, **Greater Louisville Hamfest/ARRL Kentucky State Convention**, Commonwealth Convention Center, downtown Louisville, Kentucky. For more information send requests to P.O. Box 34444-Q, Louisville, KY 40232-4444.

Oct. 1–2, **Boxboro '94**, Host Hotel & Conference Center, Boxboro, Massachusetts. Contact Mel Cole, WZ1Q, P.O. Box 8, Prides Crossing, MA 01965. (Exams Sat. Oct. 1 0900 & 1300Z; Sun. Oct. 2 0900Z; contact Dexter Wheeler, W1TUM, P.O. Box 312, Danvers, MA 01923 [508-774-1765].)

Oct. 2, **Huntington ARS Hamfest**, PAL Club, Huntington, Indiana. For more information, contact Chris Richardson, N9QVI, P.O. Box 284, Huntington, IN 46750 (219-356-0319). (Handicapped accessible; VE exams.)

Oct. 2, **"Ham Radio Roundup,"** Missile Park, San Diego, California. For more information, contact Harry A. Hodges, WA6YOO, 619-743-4212.

Oct. 2, **Independent Radio Association of Springfield's Annual Hamfest,** Springfield, Ohio. For information, call Ron, KB8JTD at 513-964-8618.

Oct. 2, **The Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Flushing Meadow Park, Queens, New York. For more information (call at night only), contact Charles Becker, WA2JUJ at 516-694-3955; or Arnie Schiffman, WB2YXB at 718-343-0172.

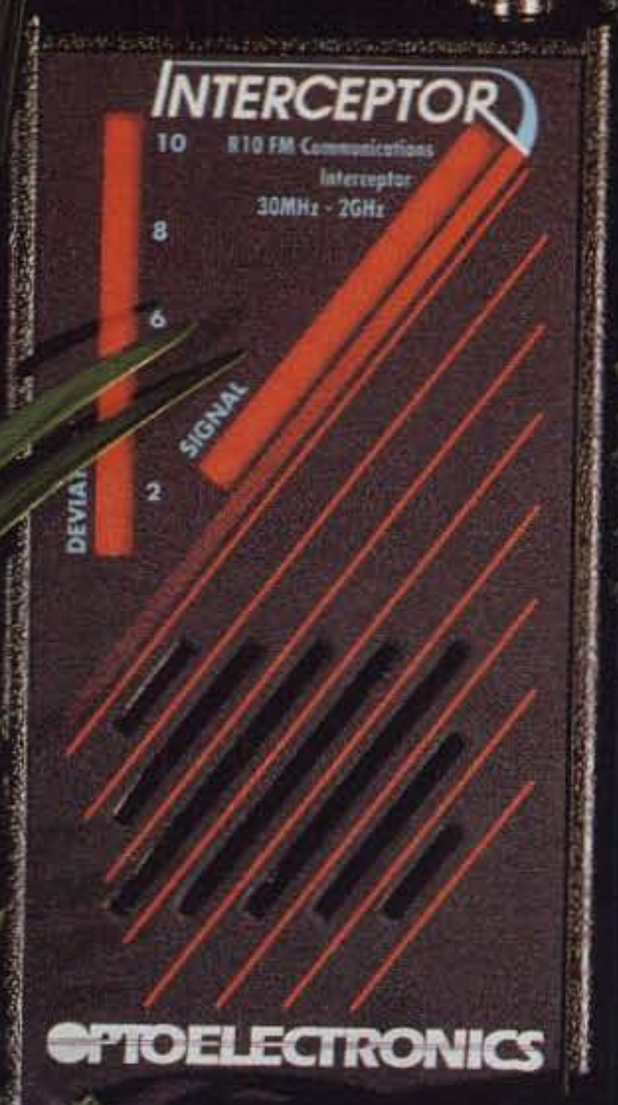
Oct. 6–9, **First National Hamfest**, Costerisan Lake, Bakersfield, California. For more information, contact K.C.C.V. ARC, Inc., P.O. Box 743, Bakersfield, CA 93302 (805-366-1276). (Exams.)

Oct. 7–9, **AMSAT 25th Anniversary Annual Meeting and Space Symposium**, Holiday Inn, Orlando, Florida International Airport. For information, contact Steve Park, WB9OEP, 12122 99th Ave., N., Seminole, FL 34642 (813-391-7515). Internet: SKPA@QMGATE.ECI-ESYST.COM.

Oct. 7–9, **RSGB 1994 International HF & IOTA Convention & IOTAs 30th Birthday Party**, Beau-

(Continued on page 150)

YOU CAN'T HIDE



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MODEL	A270-10S	
Frequency, MHz	144-148	430-450
Forward Gain, dBd	10	10
No. Elements	5	5
Front to Back Ratio, dB	20	18
SWR 1.2:1 Typical		
2:1 Bandwidth, MHz	≥4	≥10
Power Rating, Watts PEP	350	350
3dB Beamwidth, Degrees		
E Plane	52	52
H Plane	60	60
Boom Length, ft (m)	6.17 (1.9)	
Longest Element, in (cm)	40.3 (102.4)	
Turning Radius, ft (m)	6 (1.8)	
Mast Size Range, in (cm)	1.25-2 (3.2-5.1)	
Wind Load, ft^2 (m^2)	.725 (.07)	
Weight, lb (kg)	1.8 (.81)	

MODEL	AR-270		AR-270B		ARX-270U/N
Frequency, MHz	144-148 / 430-450		144-148 / 430-450		144-148 / 430-450
Gain, dB	3.7	5.5	5.5	7.5	9 12
SWR 1.2:1 Typical					
2:1 Bandwidth, MHz	>4	>15	>4	>15	>4 >20
Power, Watts FM	250	250	250	250	200 200
Horizontal Radiation Pattern, Degrees	360	360	360	360	360 360
Height, ft, (m)	3.75 (1.13)		7.7 (2.3)		16.5 (5)
Mast Size Range, in	1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)
Radial Length, in (cm)	6.75 (17.1)		20 (51)		20.5 (52.1)
Wind Load, ft2 (m2)	0.27 (0.03)		0.47 (0.044)		0.95 (0.088)
Weight, lb (kg)	2 (0.9)		2.4 (1.09)		5 (2.3)
Construction style	High strength aluminum		High strength aluminum		Fiberglass enclosure

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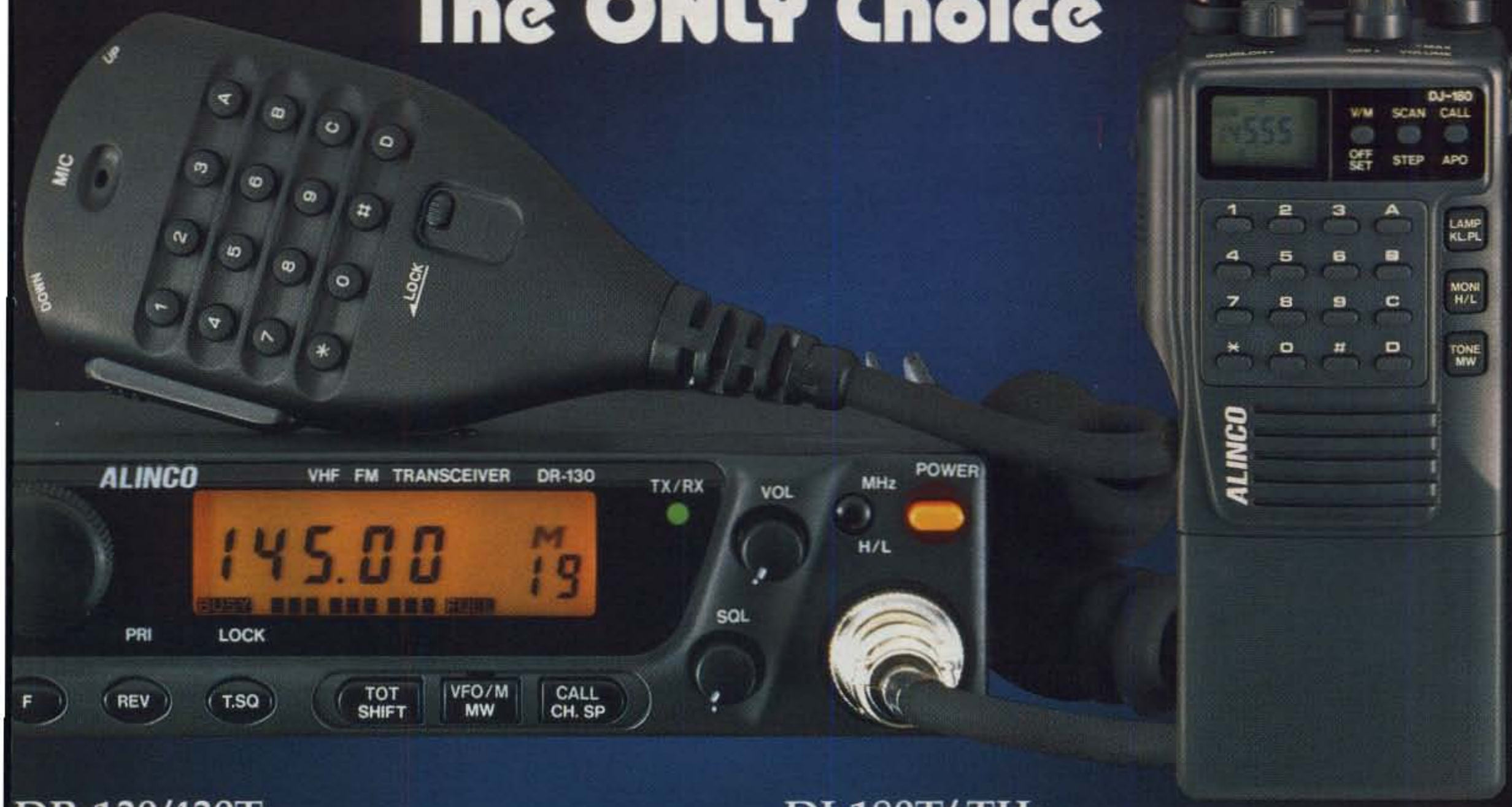

DR-130/430T:

Power Play

The DR-130T packs a big punch. This compact radio delivers 50 Watts of cool running power, and offers the durability and reliability that Hams have come to expect from ALINCO. The DR-430T is a 70-cm version of the same radio, and can supply 35 watts of output power.

These rigs offer 12 additional CTCSS tones (50 total) for compatibility with any repeater system. 20 memory channels are included, but if more channels are needed, simply plug in the optional EJ-19U module, and 100 memory channels will be available. All memory channels can store 'odd split' frequencies, and also store CTCSS encode/decode status.

A 1750Hz tone burst feature is included, and the LCD display has two modes: 'Commercial Display' which shows only the channel number, and 'Amateur Display' which shows channel numbers and frequency. The simple layout of the front panel offers maximum operating efficiency with no confusion, and a built-in Time Out Timer (TOT) can be programmed from 30-450 seconds.

DJ-180T/ TH:

Survival of the Fittest

The rugged DJ-180T features an ergonomics design that fits in your hand like a glove. Excellent sensitivity and great sound make this the radio of choice for demanding operators. The DJ-180TH (High power version) comes with a 12V battery and delivers 5 watts of solid output power.

Ten memory channels come standard, and the unit can be upgrade to 50, or even 200 memory channels with the optional plug-in chips. The DJ-180T comes standard with CTCSS encode and decode, and also has an Automatic Power Off (APO) feature that extends battery life.

Odd Splits! This radio can store repeater offsets from 0 to 15.995 MHz. A different offset can be stored in each memory channel, and most other functions can also be stored independently in each memory channel.

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Results of the 1993 CQ World-Wide DX CW Contest

BY BOB COX*, K3EST

Did you ever wonder just how much 10 meters weighs? Well, this year we found out. *CQ*'s Editor, Alan, K2EEK, kept track of the number of pounds of logs we shipped out to the log checkers in the 1992 and 1993 WW Contests, and the answer is about 300 pounds! There were 300 less pounds of logs for the 1993 contest compared to 1992. That amount was the decrease in log pages on 10 meters as the sun calms down for a few years. Still there were surprises. VS6WO commented that there was a short opening to the east coast US on 10 at 1200Z long path. After looking through over 2600 CW logs this year, we still got the feeling that yes the sunspot number was down and yes 10 meters is like 160, so now we can concentrate on the other bands. Concentrate is just what people did—over 70 countries on 160 for several stations, over 115 countries on 80, over 150 on 40! The challenge is who will be the first to break 100 countries on 160 in one weekend! It could happen this cycle.

For the first time in any international DX contest we could determine how many records were set. For those of you who think everyone enters to win for the world or their continent, think again. This year on CW 305 new all-time records were set by outstanding operators from Albania to Yugoslavia. That's about a new record for every 8.6 log submissions! On reviewing the scores, the records appeared to fall into two categories which reflected a healthy attitude: operators who competed against their score from the previous year and operators who competed against a friend/competitor within their country. If you operated the required 12 hours for a single operator, you might have been eligible for one of the more than 900 certificates we handed out on each mode! So to sum up the CQ WW CW: over 240 countries from all zones, over 22,000 participants, 2638 log submissions, 305 all-time records, over 900 certificates, and 48 trophies = Fun, Challenge, and Skill.

Enough about the contest as a whole. Let's look at those outstanding individual efforts.

The Gibraltar ARS club meeting produced this photo. I guess you have worked a few of these guys. Front (left to right): ZBØE, G3MRC and XYL, ZB2X, and ZB2AZ. Rear (left to right): ZB2BL, LA9SN, and ZBØZ.

All Band

A cool breeze blew across the barren landscape. Looking at the brown dirt, blue sky, and blue water, it seemed like a strange place to strive for world recognition. The villas were at a QTH as barren as the moon. The only hint of success lay in the blue ocean, which filled the eyes for 270 degrees. Here was the place he had choosen so carefully years before. Here was the QTH of EA8EA.

The operator was busy adjusting his internal clock to start at 0000Z. He would wake up just before the bell rang. The operator on this adventure was Ville, OH2MM, a prenatal physician whose other passion is the competition of the CQ WW. When the final bell rang, his well thought-out plans allowed him to repeat as world champion.

Second place went to the SSB champion, John, W2GD, pushing the keyboard and paddle at P4ØW. Over on the "rock," Jorma, ZB2X (OH2KI), was surely in the right place, as he not only ran away from the competition in Europe, but vaulted himself to a new European record. Three northern Europeans broke into the top ten group: OH1AF, OH6WZ, OZ1LO.

It was a real horse race in the USA. Finally, after it all settled out, Tom, K1KI, operating from his new QTH on the Connecticut border, edged out Jeff, K1ZM/2, whose towers can see the Hudson river. All the top 10 scores reflect months of preparation and years of practice. Lest you think that it takes lots of towers and aluminum, check out KT3Y's score. Phil did it with no towers or aluminum, only trees and wire.

High Bands

Ole sol where are ye? That was the groan that ushered in the sunspot low. First to take a beating from a lack of a complexion problem on the sun was 28 MHz. The entire drop in the number of logs submitted can be attributed to 10. Only the country of Uruguay figured out that low sunspot is good. CV5A, who was #1 in the world, and CX5BW #2 far outdistanced any other entry. No northern hemisphere operator broke 100K. The closest was S51AY hotly pursued by K4XS. Two low-power stations broke into the high-power top six! As I recall from the last two cycles, there will come a time when 160 will beat 10. If you can speak Spanish or Portuguese, you will probably triple your QSOs on 10.

Knowing what to do when the sun shuts down, Bob, K4UEE, headed south to guide ZPØY to a new World's record on 21 MHz. It was a squeaker, but Bob's extra low number of errors in his log helped his victory. Not that far behind was ZD8VJ, who left ZD8 after giving everyone thousands of QSOs from the island of turtles, birds, and log periodics. As if it were not enough to be the executive secretary of the ARRL, Dave, K1ZZ, also proves the fact that a photographic memory for calls proves there are no unique QSOs. Dave finished as the top USA 15 meter score and lowest unique rate of any high-power log. Congratulations. Putting the famous club station GW8GT to good use, G4IFB keyed to top European honors.

Twenty meters once again demonstrated that you can be almost anywhere and have a chance to come out in the top scores. Marko, OH6DO, traveled to the rain forests of Suriname to put PZ5JR into the number one spot. Meanwhile, Bob, KQ2M, was traveling north on interstate 95 to settle down into a chair at KM1H's QTH. Bob finished second over Yale professor Dave, K2SS/1. Out west Gary, VE7NTT, enjoyed putting CH7SZ on the band. Gary had the most accurate log of all the top competitors. In Europe OH2MAM traveled over to the country of 10,000 islands to key OHØDX to victory over perennial top scorer Tine, S5ØA.

*1816 Poplar Lane, Davis, CA 95616

TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND
World
EA8EA (Opr. Ville Hillesmaa, OH2MM)
Donor: Albert Kahn, K4FW
W9IOP Memorial

World Low Power
Felipe J. Hernandez, NP4Z
Donor: Slovenia Contest Club

World Single Operator Assisted
John Sluymer, VE3EJ
Donor: Snake River Contest Club

World QRPp
7Z2AB (Opr. David Franks, K2XR)
Donor: Gene Walsh, N2AA

U.S.A
Thomas Frenaye, K1KI
Donor: Frankford Radio Club

Canada
David Goodwin, CH2ZP
Donor: Canadian DX Association

Caribbean/C.A.
TI1C (Opr. Larry Tyree, N6TR)
Donor: Larry Brockman, N6AR

Europe
ZB2X (Opr. Jorma Saloranta, OH2KI)
Donor: Edward Bissell, W3AU

Africa
ZD8Z (Opr. James Nieger, N6TJ)
Donor: Gordon Marshall, W6RR

Asia
JY8VJ (Opr. Bernd Laenger, DL1VJ)
Donor: Japan CQ Publishing Company Ltd.

Japan
Satoshi Hara, JH5FXP
Donor: Japan Crazy Contesters Club

Oceania
NH6T (Opr. Ward Silver, NØAX)
Donor: Maui Amateur Radio Club

South America
P40W (Opr. John Crovelli, W2GD)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World—28 MHz
Ariel Vazquez, CV5A
Donor: Joel Chalmers, KG6DX

World—21 MHz
ZPØY (Opr. Robert Allphin Jr., K4UEE)
Donor: Don Busick, K5AAD
N5JJ Memorial

World—14 MHz
PZ5JR (Opr. Marko Myllymaki, OH6DO)
Donor: North Jersey DX Assn.
W2JT Memorial

World—7 MHz
C41A (Opr. Ivo Bezer, 5B4ADA)
Donor: Alex M. Kasevich, VP2MM

World—3.5 MHz
John Devoldere, ON4UN
Donor: Fred Capossela, K6SSS

World—1.8 MHz
Richard Kline, 4X4NJ
Donor: Kenneth Byers, Jr., K4TEA

USA—28 MHz
Wilbert Kollenbaum, K4XS
Donor: CQ Magazine

USA—21 MHz
David Sumner, K1ZZ
Donor: Wayne Carroll, W4MPY

USA—14 MHz
KM1H (Opr. Robert Shohet, KQ2M)
Donor: Northern Illinois DX Association

USA—7 MHz
John Kenny, W1RR
Donor: Jan Perkins, N6AW
W6AM Memorial

USA—3.5 MHz
Robye L. Lahlum, W1MK
Donor: CQ Magazine

USA—1.8 MHz
Norman L. Rivers, W1BYH
Donor: Peter Hutter, WW2Y

Canada—14 MHz
CH7SZ (Opr. Gary Caldwell, VE7NTT)
Donor: Radio Amateurs of Canada

Caribbean/Central America—7 MHz
FG5BG (Opr. Bruce D. Lee, KD6WW)
Donor: Snake River Contest Club

Europe—28 MHz
Arpad Berke, S51AY
Donor: Southern New England DX Club

Europe—21 MHz
GW8GT (Opr. G. T. Hinson, G4IFB)
Donor: Robert Naumann, KR2J

Europe—14 MHz
OHØDX (Opr. Jukka Kulha, OH2MAM)
Donor: Maud Slater
G3FXB Memorial

Europe—7 MHz
S50S (Opr. Drago Turin, Jr., S59UN)
Donor: Ivo Pezer, 5B4ADA/T93A

Europe—3.5 MHz
SN3A (Opr. Czeslaw Dubicki, SP3HLM)
Donor: Frankford Radio Club
K3VW Memorial

Japan—21 MHz
Tadao Katsuta, JH7DNO
Donor: DX Family Foundation

MULTI-OPERATOR
SINGLE TRANSMITTER
World
J6DX (Oprs. K9BQL, N9AG, W8OK, W8QID, WB8ENR, WD8IXE)
Donor: Anthony Susen, W3AOH

U.S.A.
KC1XX (Oprs. KC1XX, AD1C, KM3T)
Donor: Douglas Zwiebel, KR2Q

Canada
CH9DH (Oprs. K2NJ, VE1DH, VE1DX, VE1IW, VE1WH)
Donor: Eastern Canadian DX Assn.

Caribbean/Central America
ZF2WW
(Oprs. G3SXW, K5VT, K7GE, KC7V)
Donor: No. Nevada DXC

Africa
CR3W (Oprs. DJ2YE, DK3KD, DL1EK, DL5BWE, DL5JQ)
Donor: Ralph Bellas, Jr., K9ZO

Europe
IQ4A (Oprs. I4VEQ, I4LCK, I4IND, I4EAT, I4IKW, I4TJE, I4PVP, IK2NCJ, IK4DCT, IK4DKO, IK4DWK, IK4DZF, IK4QJH)
Donor: Friends of K3AO
K3AO Memorial

Oceania
DX1HB (Oprs. JA1KJK, JA1WLN, JR1NHD, 7K1CXV)
Donor: Junichi Tanaka, JH4RHF

MULTI-OPERATOR
MULTI-TRANSMITTER
World
EA9EO
Donor: Hazard Reeves, K2GL Memorial

U.S.A.
W3LPL (Oprs. W3LPL, WB2EKK, WR3E, W3EKT, N3GB, AI3M, K3NA, KF3P, KE3Q, K3RA, W3ZZ, W4BQF, KO7V, KE9A)
Donor: Bob Ferrero, W6RJ
N6RJ Memorial

Europe
HG73DX (Oprs. HA1TJ, HA1TD, HA1DAC, HA1DAE, HA1AH, HA1YA, HA1YU, HA1WD, HA5GF, HA5IW, HA6WX, HA5AWH, HA5ML, HA5CCC, HA5FM, HA7VB, HA7RY, HA5OM, HA5TI, HA5WE, HA6NF, HA6OQ, HA6NY,HA6ON, HA6ND, HA6PX)
Donor: Finnish Amateur Radio League

World—SSB/CW Combined
HG73DX: 34,272,663
Donor: Ehrhorn Technological Operations

CONTEST EXPEDITIONS
World Single Operator
PYØF (Opr. Jose Carlos Cardoso Nunes, CT1BOH)
Donor: Yankee Clipper Contest Club

World—Multi-Operator
AHØK (Oprs. AHØK, JE1JKL, JP1OGL, JE2JCV, JL2TZC, JJ3OLZ, JR7OMD, JE7BIZ, JA8RWU, JA9VDA)
Donor: Bill Schneider, K2TT

SPECIAL SINGLE OPERATOR AWARD
World—All Band Under 18 years old
Darrel R. Craig, Jr., BV/KK6BB
Donor: Radio Bookstore

CLUB
World, Combined SSB/CW
Frankford Radio Club: 356,679,629
Donor: CQ Magazine
W1WY Memorial

Non-USA SSB/CW
Rhein-Ruhr DX Association: 97,403,030
Donor: Northern California Contest Club
N6AUV Memorial

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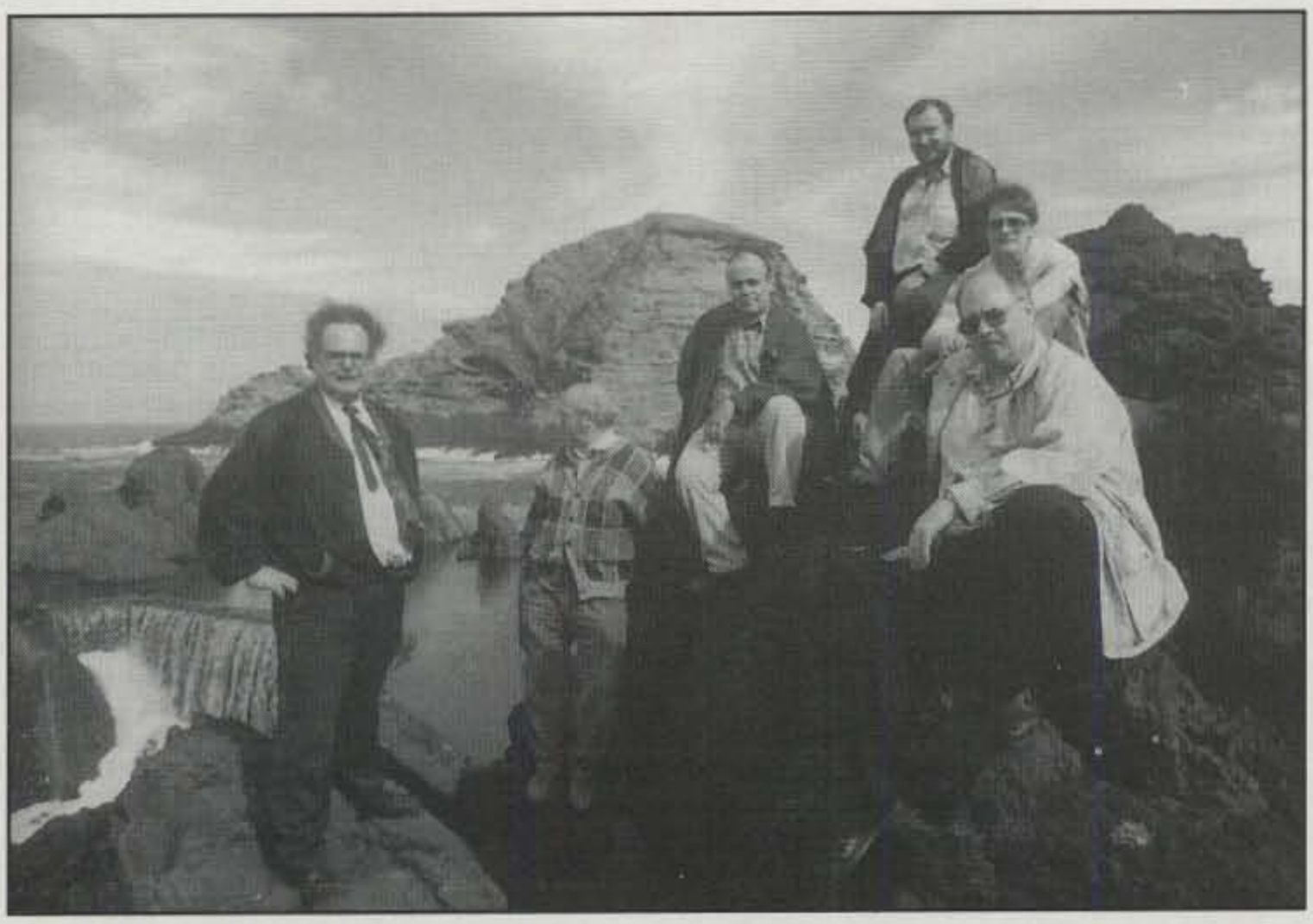

The "Rocks of Madeira" provide the background for the CR3W crew. Left to right are DL1EK, DJ2YE, DK3KD, DL5BWE, SWL-Jurgen, and DL5ZQ.

Low Bands

On 7 MHz two humanitarians who work for the United Nations gave us all good multipliers. Thanks to Ivo, C41A (T93A), who finished first, and Carl, OH6XY, stationed in southern Croatia, who operated PJ9Y to a second-place finish.

Over in Europe Drago, S59UN, camouflaged as S50S, took top honors from beautiful NE Slovenia (the sunny side of the Alps!). Second place went to San Francisco lawyer and all-around great operator Tom, N6RA, operating from ED6XXX. He commented on how many top-gun US guys got his call wrong on the first attempt.

Engineer and experimenter W1RR led the way in the US over Maryland's K3WX with AH2F operating. Both put out terrific signals. Special mention is made of the outstanding zone total of Ken, N6RO, ED6XXX, and UB4HO. Thirty-nine is tough on 20 meters, let alone on 40.

Some fireworks were produced on 3.5 MHz with John, Mr. Low Bands, ON4UN, running away from Jerzy, SP3HLM, operating from SN3A. Of note is UN2L, who finished fifth in the world. This is none other than Willy, UA9BA (ex-UW9AR, UZ9AYA, UK9AAN). Willy speaks better English than I ever will. Another European effort of note was the DXpedition of OH1VR and OH2BBF to Market Reef in November! Shades of icebergs! Seppo and OH2BBF proved that determination overcomes almost everything. Thanks, guys. USA top honors went to W1MK, who once again showed that it is good to be a W1. Second place went to consistent 80 meter buff WE3C.

Of course, the action on 160 meters was in Europe. There are over 60 countries on top band on that continent alone. So if you can work Europe and it counts for three points, then you are in the right place. That is where Riki, 4X4NJ, found himself. Operating with a vertical, he edged out GW3YDX, who did a terrific job from within Europe. Over in North America VO1NA took the bronze medal. In the US it was a real battle between W1BYH and WB9Z out Illinois way. It was nice to see "Mr. Neat Log" (KH6CC) come in number seven for the band. The top three scores on 160 were all very close, and from three different continents. And the top seven included a fourth!

Low Power

Check out the World low-power all-band Top Scores box. You cannot imagine a better mix than what you see. The top five stations were from five different continents! Walking away with the top slot was NP4Z. Over one million points separated him from EL2PP (I8NHJ at the key), who finished second. The real fight was over second through sixth place. Congratulations to EL2PP, NH6T, with Ward NØAX, A71CW, and RB5QDP for jobs well done. Running low power is very much fun!

It was another close battle for low power all band with K2ZJ in New York state coming out the winner over K2SG in northern New Jersey. John used a pair of Kenwoods to accumulate about 120 more mults than Tony. And despite Tony's nearly 300 QSO advantage, it wasn't enough to turn the tide. It is really amazing just how different their breakdowns are, and yet how close these two scores are (about a 3% spread).

The top ten low-power scores are representative geographically of the continent of Europe. RB5QDP from the southeast Ukraine showed what 100 watts can do if it's pushed. Second went to Franc, S59AA, operating club station S5ØL high on a mountaintop.

QRP

In the QRP category it was 7Z2AB winning for the world. This gave operator Dave, K2XR, a QRP victory on both modes. Using a two-element 40 at 18 meters, Dave's 5 watts plowed a hole in the band to net more than 900 QSOs. And with over 500 QSOs on both 10 and 15, he won easily. It was also interesting to see how many stations "worked" 7Z1AB. Try listening instead of watching packet. And as for the many stations who worked ZZ2AB, you blew it big time! Of course, your computer software put the QSO in zone 11! Taking second spot for the world and first place USA was super QRPer Randy, AA2U. As a testament to Randy's skill and a clear indication of the changing solar cycle, Randy worked 81 countries on 40 meters alone. Not bad for 5 watts in 48 hours!

Assisted

Winning on both modes in any category is not easy. Yet that's what John, VE3EJ, managed to make look easy. John's secret is not to

TOP SCORES

WORLD

SINGLE OPERATOR HIGH POWER

All Band

EA8EA	12,703,752
P4ØW	11,139,048
P4ØN	10,640,385
PYØF	10,591,744
TI1C	9,123,817
ZD8Z	9,086,940
6V6U	8,949,808
9Y4H	8,262,560
HD9N	7,915,320
7Q7OO	7,173,846

28 MHz

CV5A	940,532
CX5BW	660,500
S51AY	77,405
K4XS	66,600
F5NBX	42,360
HK3YH	37,962

21 MHz

ZPØY	1,869,978
ZD8VJ	1,650,663
ZX5CW	1,108,242
KP2A	964,960
9Y4VU	937,284
CX3ABE	652,795

14 MHz

PZ5JR	1,278,083
KM1H	1,001,035
OHØDX	834,912
K2SS/1	801,534
CH7SZ	814,506
VE1ST	790,444

7 MHz

C41A	1,307,944
PJ9Y	1,050,966
FG5BG	992,654
S5ØS	950,400
ED6XXX	929,660
OM3RM	736,016

3.5 MHz

ON4UN	630,568
SN3A	471,138
OM3NA	393,231
UN2L	366,938
OJØ/OH1VR	346,875
W1MK	340,431

1.8 MHz

4X4NJ	157,896
GW3YDX	154,376
VO1NA	148,050
OY9JD	128,847
DK6WL	107,464
GIØKOW	77,142

LOW POWER

All Band

NP4Z	3,948,966
EL2PP	2,594,032
A71CW	2,484,460
NH6T	2,461,536
RB5QDP	2,279,600
NP2I	2,202,228
S5$L	1,921,198
K2ZJ	1,904,654
K2SG	1,845,006
TM6GG	1,640,712

28 MHz

VK4XA	125,386
PY2NQ	114,400
LW4DIR	61,248
T93M	37,694
9A2LH	19,275
S59ZA	16,948

21 MHz

CX6VM	622,544
N8II	324,144
LU4FD	294,372
U5WF	251,482
HA8RH	225,776
EC8AXM	224,640

14 MHz

VO5SF	273,060
YL2GN	261,702
UV3HD	257,040
K9KU	231,768
JH7JVJ	223,250
JR2BNF/1	167,356

7 MHz

4N7N	609,738
ZL7FD	432,200
CH7AHA	384,300
UAØJQ	354,311
TA2BD	297,528
RAØFA	273,921

3.5 MHz

S59CAB	147,486
HA8FW	122,580
YTØT	120,712
UAØSMM	82,368
RA1ZA	75,636
HA8IB	74,918

1.8 MHz

HA8EK	67,014
UA9AT	47,334
SP2FOV	37,329
SV2BFN	34,740
SP9GDB	25,048
DL3JSW	23,754

QRP

All Band

7Z2AB	2,757,770
AA2U	763,156
G4BWP	685,500
K5RX	602,268
K1CGJ	560,604
JA6GCE	420,549
UB4FXX	382,872
SM3CCT	333,132
KW2P	318,108
KA1CZF	314,632

ASSISTED

All Band

VE3EJ	6,073,614
4X/S59PR	5,677,000
K3WW	5,056,464
K1DG	4,560,150
K5NA/2	4,490,980
4U1ITU	4,026,308
W2UP/3	4,007,604
DK3GI	3,737,205
W1PH	3,528,104
AA2DU/1	3,510,573

MULTI-OPERATOR SINGLE TRANSMITTER

J6DX	11,691,029
4M5I	11,222,746
L4ØF	10,236,352
VP9AD	9,323,424
ZF2WW	8,385,030
V31KF	8,023,006

MULTI-OPERATOR MULTI-TRANSMITTER

EA9EO	27,553,203
AHØK	21,029,060
HG73DX	15,619,392
W3LPL	15,338,424
K1AR	15,020,460
9A1A	14,107,510

EUROPE

SINGLE OPERATOR HIGH POWER

All Band

ZB2X	6,129,904
4O7AV	3,784,480
G4BUO	3,651,156
DL2NBU	3,156,673
OZ1LO	2,819,322
OH1AF	2,569,424
S51BO	2,546,440
OH6WZ	2,264,990
DL6RAI	2,152,254
EO5U	2,098,759

28 MHz

S51AY	77,405
F5NBX	42,224
SP5DDJ	10,792
OH5PA	3,225

21 MHz

GW8GT	601,160
TM2O	545,160
S58A	500,066
G3KDB	481,712
9A5Y	480,655
EA2IA	448,043

14 MHz

OHØDX	834,912
S5ØA	779,640
IB9T	747,775
IT9A	742,417
OK5A	735,301
S51AW	600,682

7 MHz

S5ØS	950,400
ED6XXX	929,660
OM3RM	736,016
LX4B	708,247
OK1AYP	662,375
OH7MA	651,672

3.5 MHz

ON4UN	630,568
SN3A	471,138
OM3NA	393,231
OJØ/OH1VR	346,875
OM3PA	336,950
LY3BS	322,432

1.8 MHz

GW3YDX	154,376
OY9JD	128,847
DK6WL	107,464
GIØKOW	77,142
9A2TW	67,456
IT9ZGY	66,992

LOW POWER

All Band

RB5QDP	2,279,600
S5ØL	1,921,198
TM6GG	1,640,712
GJ/K2WR	1,097,580
OH3LIM	984,948
G3SWH	916,158
S52OP	863,330
F5JCB	847,735
DL4YBM	793,230
OZ8AE	774,237

28 MHz

T93M	37,694
9A2LH	19,275
S59ZA	16,948

21 MHz

U5WF	251,482
HA8RH	225,776
S51QZ	217,722
IT9AF	175,161
DL1YAW	155,832
SP5JTR	142,155

14 MHz

YL2GN	261,702
UV3HD	257,040
OH6LBW	160,140
UB4IBF	140,280
UB3IQ	136,680
IR6A	133,875

7 MHz

4N7N	609,738
PA3AAV	217,605
SP2FAP	120,612
RA3LB	6,875
OK1XW	6,572
OK1BMW	5,661

3.5 MHz

S59CAB	147,486
HA8FW	122,580
HA8IB	74,918
HA8RJ	72,300
SV2BOH	70,092
RB5PE	58,256

1.8 MHz

HA8EK	67,014
SP2FOV	37,329
SV2BFN	34,740
SP9GDB	25,048
DL3JSW	23,754
ES1AR	23,040

ASSISTED

All Band

4U1ITU	4,026,308
DK3GI	3,737,205
DJ2YA	2,356,200
SP9NLK	106,425
OH4ML	93,800
I6MU	79,076
DL2MEH	2,067,000
DJ4AX	1,642,576
S56A	1,553,664
G3XTT	1,502,501
DL1HCM	1,410,347
DJ3NY	1,329,952
G3TXF	1,301,300

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	7,510,110
UW2F	7,192,076
TM9C	6,340,554
Z3ØM	6,281,040
LZ9A	5,881,572
IR2W	5,734,058

MULTI-OPERATOR MULTI-TRANSMITTER

HG73DX	15,619,392
9A1A	14,107,510
UR8J	10,622,640
RU1A	8,113,152
US7I	7,492,578
R6L	6,836,960

USA

SINGLE OPERATOR HIGH POWER

All Band

K1KI	5,603,364
K1ZM/2	5,579,164
K5ZD/1	5,569,200
N2NT	5,019,948
K3ZO	4,959,360
N6BV/1	4,941,490
N2LT	4,892,272
K4VX/Ø	3,832,281
W2SC/1	3,784,710
KT3Y/4	3,695,880

28 MHz

K4XS	66,600
K7QQ	34,675
K5LZO	34,316
W3GN	31,233
AH9B/W5	11,501
W9GIL	9,331

21 MHz

K1ZZ	574,224
K1RU	531,139
WZ3Q	406,512
N4CT	382,950
K8OQL	318,525
W6YA	310,453

14 MHz

KM1H	1,001,035
K2SS/1	801,534
KN6M/5	451,520
K9BGL	407,160
NQØI	321,328
WA8DXB	308,256

7 MHz

W1RR	706,660
K3WX	542,300
N6RO	505,938
WA4CTA	382,776
K4JPD	380,281
NW6N	341,348

3.5 MHz

W1MK	340,431
WE3C	218,163
W9LT/8	204,472
K4PI	192,384
N4CC/9	137,372
WA4PGM	105,462

1.8 MHz

W1BYH	48,552
WB9Z	46,314
W1CKA	36,992
KVØQ	28,161
K4TEA	27,115
W2FCR	19,610

LOW POWER

All Band

K2ZJ	1,904,654
K2SG	1,845,006
KC1SJ	1,326,332
WS1E	1,085,750
KM1X	933,282
WA2SRQ	975,460
KX3Y	838,000
K5KLA	837,936
W6JTI	820,017
N5AW	725,642

28 MHz

KV8Q	14,941
KQ1V	13,054
N6EE	11,041
WDØAVV	9,900
KB5JJB	7,803
KK4SM	7,446

21 MHz

N8II	324,144
N4MO	217,750
WB4TDH	208,925
W9HLY	144,493
NI5M	124,344
WV5S	111,684

14 MHz

K9KU	231,768
KA7T	120,640
KB9S	118,560
W9JOO	76,035
KD5IA	65,988
WIØR	60,770

7 MHz

N4IJ	127,020
K9MMS	58,206
KJØB	55,836
K9UIY	55,045
KO9Y	48,124
NI6G	47,124

3.5 MHz

W8WEJ	1,326

1.8 MHz

W2VO	11,832

ASSISTED

All Band

K3WW	5,056,464
K1DG	4,560,150
K5NA/2	4,490,980
W2UP/3	4,007,604
W1PH	3,528,104
AA2DU/1	3,510,573
KC1F	3,147,934
K2WK	3,135,485
K2SX/1	2,845,845
NN3Q	2,430,792

MULTI-OPERATOR SINGLE TRANSMITTER

KC1XX	7,900,138
K1TR	7,311,372
K2WI	6,138,420
WD8LLD	4,334,180
KS9K	4,167,336
AG6D	3,274,992

MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	15,338,424
K1AR	15,020,460
N2RM	13,729,504
K3LR	12,919,728
KY3N	9,268,352
KY1H	8,812,000

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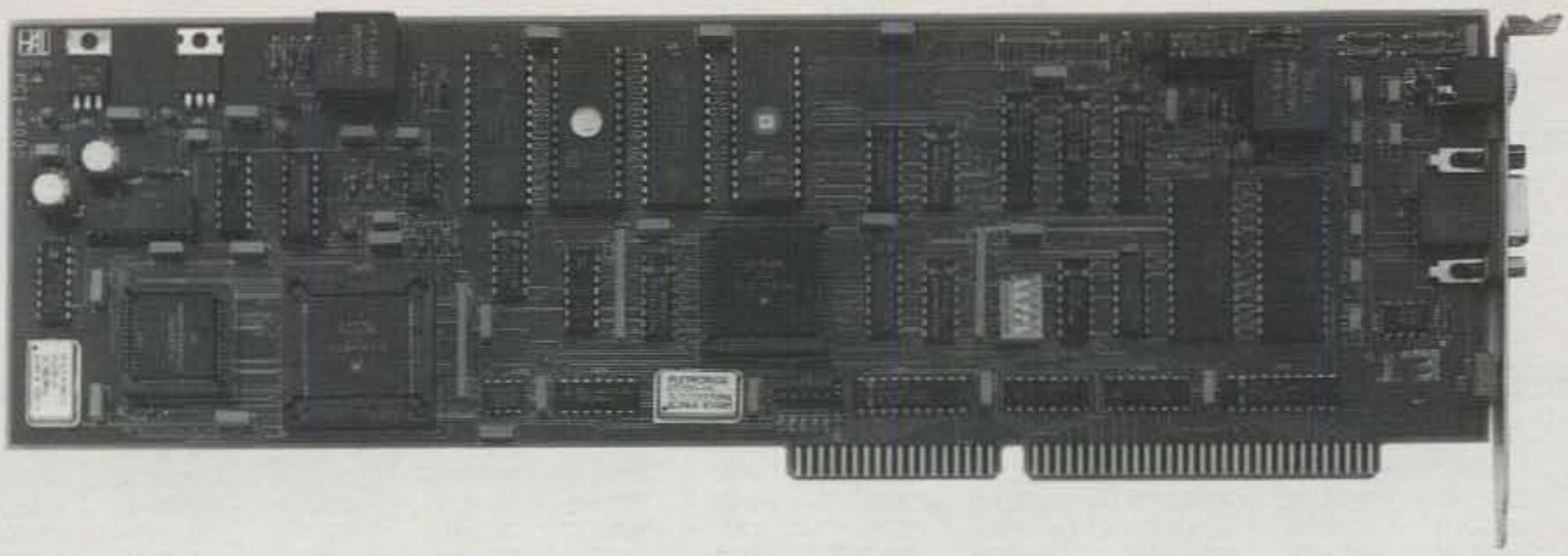

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BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
EA8EA	214/15/52	1008/27/85	1504/28/82	1265/32/101	1922/31/99	570/25/80
P4ØW	280/16/42	734/21/66	843/26/86	1318/33/94	1411/34/109	1297/29/81
P4ØN	91/12/37	601/20/64	1427/29/90	1087/33/88	1773/33/103	1053/27/59
PYØF	55/12/22	254/19/55	1049/26/86	1193/31/100	2259/31/110	1126/25/87
TI1C	271/14/42	852/27/78	1415/28/91	1268/35/82	1771/31/93	768/24/62
ZD8Z	104/12/24	238/21/44	499/26/64	1199/33/97	2511/33/112	818/26/78
6V6U	36/8/19	316/17/53	1028/26/76	1481/34/107	1869/31/111	512/22/70
9Y4H	313/12/37	634/24/77	865/29/90	1157/31/88	998/26/82	989/20/49
HD9N	38/10/15	128/17/50	1075/27/84	730/34/92	2067/32/115	711/25/66
7Q7OO	5/4/4	68/15/28	530/23/65	824/31/90	2099/34/108	1104/27/93

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K1KI	210/13/61	375/23/84	789/33/125	848/36/110	586/38/95	59/20/48
K1ZM/2	141/20/65	587/24/88	666/31/108	793/35/110	690/29/96	43/16/30
K5ZD/1	111/13/53	340/21/77	804/32/111	940/33/104	772/29/102	60/18/37
N2NT	127/16/55	488/26/80	630/29/92	846/36/116	596/27/91	71/21/47
K3ZO	49/12/37	432/26/75	639/34/105	894/37/108	603/31/100	105/21/54
N6BV/1	118/13/40	413/19/60	780/27/98	862/35/110	859/28/92	42/13/30
N2LT	58/13/41	333/23/74	626/33/104	983/37/112	674/29/95	53/18/37
K4VX/Ø	72/18/42	291/26/77	482/35/114	496/37/111	647/32/105	73/19/41
W2SC/1	47/12/28	287/15/64	611/28/97	686/35/101	761/26/89	46/17/31
KT3Y/4	75/14/41	301/18/70	734/29/97	635/33/97	435/28/82	76/18/43

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

J6DX	85/11/34	611/22/77	1742/34/109	1429/32/108	1882/32/117	1431/28/87
4M5I	108/9/33	425/17/65	1551/33/105	1390/36/117	1716/31/106	861/21/49
VP9AD	263/12/30	526/21/77	2117/36/122	1295/34/111	1475/29/103	199/20/59
ZF2WW	30/14/28	686/22/71	1768/30/102	1576/36/122	1590/31/96	1590/31/96
V31KF	139/11/25	496/21/73	1651/31/98	1363/33/118	1636/27/95	315/22/45
IQ4A	59/10/58	203/31/106	1515/37/132	1057/39/131	862/38/121	168/30/78

USA MULTI-OPERATOR SINGLE TRANSMITTER

KC1XX	73/18/68	695/26/103	931/37/139	855/37/132	741/33/126	86/24/74
K1TR	61/14/57	538/27/99	789/36/132	1058/38/134	691/33/121	75/25/70
K2WI	87/19/68	634/28/104	576/34/130	660/36/132	709/31/125	60/23/59
WD8LLD	65/18/53	204/27/88	462/34/126	791/35/128	529/31/116	63/24/60
KS9K	47/14/41	202/30/91	690/37/137	636/37/126	520/31/110	46/17/41
AG6D	15/12/13	161/24/48	980/37/97	788/36/103	338/29/79	37/19/35

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

EA9EO	685/13/61	1731/21/82	3013/38/142	2670/39/137	2305/38/140	645/30/96
AHØK	288/21/28	1134/29/77	1901/36/120	2759/40/130	2268/38/120	1096/34/81
HG73DX	818/16/71	2087/35/111	2119/38/143	2084/40/144	1381/38/126	291/29/73
W3LPL	180/20/68	1072/33/118	1702/38/152	1600/37/150	1245/34/132	358/25/81
K1AR	172/24/82	862/33/116	1568/38/150	1709/39/156	1140/36/134	172/27/82
9A1A	856/18/69	1690/33/106	2553/36/132	1549/39/128	1426/38/132	223/30/69

USA MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	180/20/68	1072/33/118	1702/38/152	1600/37/150	1245/34/132	358/25/81
K1AR	172/24/82	862/33/116	1568/38/150	1709/39/156	1140/36/134	172/27/82
N2RM	224/20/75	893/31/113	1635/38/148	1653/38/149	855/35/128	314/24/82
K3LR	183/22/72	751/34/111	1149/38/148	1556/38/154	1254/35/141	208/24/75
KY3N	131/17/65	602/29/104	1135/38/142	1242/38/142	675/30/121	174/24/74
KY1H	196/19/71	665/25/98	985/37/131	1350/38/139	743/31/122	130/24/65

become mesmerized by the computer screen. Sure packet is useful, but a good operator has worked 50% of the call outs already and just a few QSOs equals that J7 on 20. Who would have guessed who would be second? A US station? A European station? No, 4X/S59PR was a clear winner of the silver medal. Bob left 4X and was headed to 9X5 when the fighting broke out. Now he is back in S5-land.

Always a welcome signal in the contest, TU2MA and his daughter pose for the camera.

Multi-Single

Operating in a straight north-south line, the teams of J6DX, 4M5I, and VP9AD went at each other antenna to amplifier. Everyone was watching to see who would emerge the winner. The group in the middle from the Southwest Ohio DX Assciation came out on top. They took full advantage of 10 meters (check out the Band-By-Band Breakdown table). The guys from beautiful Bermuda were looking for any 10 meter QSOs. The 4M5I crew was also hurting on 10, but fought their way to second place in the world. The three stations are to be applauded for their outstanding efforts.

Over in Europe the top scores were scattered throughout zones 14 and 15. Operating from atop Monte Capra, the crew from IQ4A was the winner. Their shack is a cave built into the mountain. Besides their great enthusiasm for the CQ WW, maybe their advantage was that within 200 meters was a four-star restaurant! Remembering the visit of the Bavarian Contest Club in the SSB test, the fine crew of omnipresent UW2F pushed their keys to the second-place slot.

In the USA, KC1XX, no longer a K1EA clone but a viable life force in their own right, took top honors from second-place K1TR.

Multi-Multi

Operating in honor of EA9EO, the Grupo de Concursos de Ceuta put on quite a show. Taking top world honors is never easy in this category. Far out in the Pacific AHØK was putting together a crew of JA's to operate from the Diamond Hotel rooftop. They probably could not be more geographically separated, EA9EO and AHØK, but they both were driven by the same thing—the excitement of the CQ WW to construct winning stations.

Operating from several mountaintops, the two top scores in Europe, HG73DX and 9A1A, both did an outstanding job. Both of these stations' operating crews contain very dedicated, enthusiastic contesters.

The weather on the east coast was severe rain and wind the weekend of the contest. This affected all the operations in some way, from QRN to lost elements to loss of commercial power. Mother Nature's actions were as important as the rarified regions of the atmosphere. When it all settled out, Frank's W3LPL team came out on top. Frank's station is located on rolling, grass-covered hills interspersed with islands of forest in central Maryland. His station was built by him and his crew and is a contester's dream QTH. Second place went to the crew at K1AR using K1EA's QTH. N2RM's fine crew located in an intimate shack in the New Jersey pine barrens was all set to try for the top spot when that storm knocked out AC for four hours on Sunday morning.

Another fierce battle took place out in Col-

orado, where the new crop seems to be aluminum production. Fighting to a virtual dead heat were KØRF and AA6TT/Ø. With crews coming from all across the west US, both teams built the Colorado competition to a healthy level. In the end KØRF was declared the winner.

Even farther out west was the station of N6DX. Darrell's crew always shoots for top honors from the west coast. By the way, check out the 40 meter country totals for the USA multis (see the Band-By-Band Breakdown). Wow!

Team Contesting

It has been said before, but it bears repeating. We all should give a round of applause to the Southern California Contest Club. Each year they field two teams in this category. But they are not just any teams. These guys travel from the security of their homes to the far corners of the world to help their team and help all of us have a more interesting contest. Congratulations to SCCC Team #1 for a well-deserved victory.

Finishing second with a team from just one country and propagation area is tough. But that is what the Yankee Clipper Contest Club Captains accomplished. What a great job!

Clubs

If anybody wants to start a contest or DX club, they should definitely write a letter to the Frankford Radio Club to inquire as to how to set up the club and keep their members interested. The FRC has been a dominant force in all phases of contesting for 50 years, and they still are going strong. Most observers of the results have no idea what planning and effort it takes to get over 345 and 256 million points for the FRC and Yankee Clipper Contest Club, respectively. I think that during the next sunspot cycle the FRC or YCCC will break one-half billion points!

The DX club scene is dominated by the country of Germany. Two of the most active European contest clubs are the Rhein-Ruhr DXA and the Bavarian Contest Club. They have a long tradition of excellence. This year's winner was the RRDXA with a score very close to the 100M mark. The third-place winner was from the new country of Slovenia. These guys are beyond enthusiastic. Congratulations to all the members of all the clubs listed in the club box.

Comments

As we prepare for the 1994 CQ WW DX Contests remind yourselves of several bookkeeping requirements. If you are low power or QRP you must follow rule XI.11, which says, "QRPp and low power stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration."

A reminder is also in order that for all categories, all transmitters and receivers must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. This does not mean that the property can be separate pieces of land scattered all over a country (or world). It means one piece of land located in one area. All antennas used by the entrant must be physically connected by wires to the receivers and transmitters used by the entrant. The intent of this statement is to prevent distant receiving/transmitting sites. You cannot have a transmitter using the same call as the main station located somewhere other than the entrant's QTH. Of course, entrants in the multi categories can use information from packet, etc. As long ago as the 1960s the USA east coast multis were trying to use a west coast receiving site to hear JA's. What it demonstrated was that the distant receiving site heard stations calling the east coast station, but the signals were not audible to the main station!

On another topic, remember that all sent and received exchanges are to be logged. If you use CT, for example, there is no sent column in the log! On the summary sheet it says only "All reports sent were 59(9), unless otherwise indicated." This statement is okay, but add your zone to the end. The problem arises when it is not clear what the entrant's zone is. It saves us time if you put your zone number somewhere on the summary sheet.

About 60% of the logs we get are computerized. Please send a disk with your log. If you use CT, name the file your call.BIN. The files that we want are your .BIN, .CON, and BRK files. If you use N6TR, send us your .DAT file.

Believe it or not two of the top USA all-band scores could have been disqualified for not following rule XI. 6. This rule says, "Use a separate sheet for each band." Do not send your paper log as a continuous log. Use a separate log on each band. It makes it very, very difficult to analyze a log if the bands are all mixed together. On the disk do not send your .ALL

file or .160, .80, etc., as your only disk files. Send your .BIN or .DAT files.

Rule XI.9 states "All entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made." All other entrants are encouraged to submit cross-check sheets. This requirement becomes critical when we are looking to see if you worked a station. It takes seconds to check the cross-check sheet, but a long time if there is no sheet. Please follow the rules.

A reminder that you should avoid working stations below 7040 on SSB. Many stations cannot legally operate below 7040. Do not encourage them to make a quick QSO at 7030.

Now for some interesting facts. The average number of hours of operation for the top scores in several categories was: World All Band 42 hours (range = 47.8–39), for low power it was 34 hours (range = 41.5–28); for USA All Band 39.5 hours (range = 39.5–33), for assisted 39 hours (range = 41–33). Of course everyone who enters the contest operates as long as he or she can. The single-band categories are a way of putting in less hours while still trying to be competitive.

Here are some statistics about logs received during the 1993 CW CQ WW. Total 2638 logs: High Power (36.5%), Low Power (34.9%), Assisted (9.2%), Multi-Single (6.6%), Check Logs (6.6%), QRP (4.6%), Multi-Multi (1.6%).

Congratulations to Lucien, F8TM, for entering the contest as many of his 86 years as possible. And congratulations to entrants in the new under-18 trophy category: BV/KC6CNV, BV/KK6BB, JM2RUV, UB4EYT, and YL2GVW. This year we raised the age limit to 21 and younger. Remember to write your age on the cover sheet if you enter this category.

Finally, let's look at unique rate (see the table). Let's make the assumption that uniques equals broken call. Of course not all uniques are miscopied/sent calls, but it is our experience that over 90% are really copying/transmitting errors. What are some reasons for your unique rate? (1) When your rate goes up maybe you make more mistakes, thereby creating more uniques. (2) You are multi; perhaps you can locate where operator changes took place—more uniques. (3) You are located in a propagationally unique location; for example, YV, HK stations on 40 during the day at PJ1B or VK/ZL's at VK9LI, or UA9 stations from a UN7 on 160. You can probably think of more reasons. If you do, let us know. I guess over the years almost everyone has heard of uniques.

Well, here is an excerpt from our log-checking output for the CW contest: 1993 CQ WW CW 393 station logs, 643034 QSOs, 48788 calls, 19344 common, 29444 unique. What this means is:

393 station logs—393 disks were used to create the CW master data base;

643,034 QSOs—the 393 disks contained this many QSOs;

48,788 calls—the total number of different calls in master data base which can be broken down into 19,344 common (39.6%)—more than 1 person worked the call; 29,444 unique (60.3%)—only 1 person has that call in the log.

Thanks

Thanks to the members of the CQ WW Contest Committee for their dedication to making the

AVERAGE % OF STATIONS WORKED ON EACH CONTINENT*

		AF	AS	EU	NA	OC	SA
USA	1.	3.1	4.7	74.8	10.9	1.4	4.4
	2.	2.5	5.9	74.8	5.8	1.8	4.4
	3.	3.6	4.2	65.5	15.7	2.3	8.6
	4.	5.1	5.3	53.0	22.1	2.9	11.1
	5.	5.2	16.7	36.2	24.7	4.0	12.2
	6.	3.3	50.0	12.1	21.0	5.5	8.6
	7.	3.1	41.5	20.4	21.5	4.9	8.7
	8.	4.7	7.0	54.4	20.9	2.9	10.8
	9.	3.3	10.8	52.9	20.5	3.7	8.9
	10.	7.9	19.0	28.5	29.3	3.9	11.4
EUROPE							
Zone 14							
South		35.8	1.6	44.3	7.2	1.5	0.5
North		33.3	2.5	55.4	6.9	1.4	0.3
Zone 15							
South		30.5	2.0	59.2	5.9	1.7	0.5
North		34.1	1.0	51.6	11.9	0.9	0.5
JAPAN		0.9	10.4	27.0	53.0	5.3	2.7

**Each number is the average of the top 10 disks from that area.*

USA HIGH POWER ALL BAND TOP TEN 5-Ø CALL AREAS

K4VX/Ø	3,840,165
K5GN	3,519,425
N5RZ	3,069,627
K8GL	2,869,867
W9RE	2,854,551
K5MR	2,550,274
W6EEN	2,452,719
NN7L	1,773,550
K4XU/9	1,619,622
K9MA	1,544,358

USA LOW POWER ALL BAND TOP TEN 5-Ø CALL AREAS

K5KLA	837,936
W6JTI	820,017
N5AW	725,642
K9QVB	687,420
WD5K	584,775
KZ6E/Ø	564,465
WUØA	452,184
K5DX	443,156
WAØRJY/7	372,354
K9MK/5	362,595

TEAM CONTESTING

1. **Southern California Contest Club Team #1:** 45,194,836. By ZD8Z (N6TJ), 9Y4H (K6NA), PYØF (CT1BOH), HD9N (WN4KKN), TI1C (N6TR).
2. **YCCC Captains:** 23,123,773. By K5ZD, N6BV, W2SC, K1KI, W1WEF.
3. **Southern California Contest Club Team #2:** 17,715,234. By 7Q7OO (N6AA), 4S7/N6ZZ, PZ5JR (AB6NJ), XE1/AA6RX, ED6XXX (N6RA).
4. **Salt City DX Contest Team:** 2,173,348. By K2ZJ, AA2PQ, NA2Q.
5. **Black Hole Contesting Conspiracy:** 1,203,840. By XM4VV.

Entering the low power category can be a lot of fun, as KA4IKH demonstrates.

USA CLUB SCORES

Frankford Radio Club	356,679,629
Yankee Clipper Contest Club	245,281,206
Southern California Contest Club	79,024,747
Potomac Valley Radio Club	76,424,748
Northern California Contest Club	73,917,616
North Texas Contest Club	69,349,589
SE DX Club	47,713,285
North Coast Contesters	43,596,978
Mad River Contest Club	32,028,613
Society of Mid-west Contesters	30,534,591
North Florida DX Association	24,032,168
Northern Alabama DX Club	18,030,883
SW Ohio DX Association	16,938,033
Southern California DX Club	16,463,595
Mile High DX Association	15,708,013
Texas DX Society	15,592,555
Western Washington DX Club	15,422,788
Kentucky Contest Group	14,861,537
Minnesota Wireless	11,188,205
Salt City	10,440,466
Rochester DX Association	8,677,704
Oklahoma DX Association	8,164,848
Central Virginia Contest Club	7,765,501
Western Florida DX Ring	7,610,350
Kansas City DX Club	7,578,754
Eastern Iowa DX Association	7,420,777
Hoosier Contesters	7,044,110
Order Boiled Owls	5,766,995
South Florida DX Association	5,490,566
Western New York DX Association	5,308,007
San Diego DX Club	4,522,718
Northern Ohio DX Association	3,748,569
Grand Mesa	3,384,007
Eastern TN DX Association	3,181,972
Long Island DX Association	3,150,478
Mississippi Valley DX Contest Club	2,883,223
Four Lakes ARA	2,563,912
Lone Star DX Association	2,479,994
Central Arizona DX Association	1,880,635
Northern New Jersey DX Association	1,823,209
Carolina DX Association	1,778,072
Fox Cities ARA	1,683,333
Wisconsin-Illinois ARC	1,633,166
Ocean Montauk	1,435,937
Shasta RC	1,396,246
Murphy's Marauders	1,355,365
Albany ARA	1,246,108
Blackhawk DX Club	1,167,759
Amarillo DX Society	1,144,897
SE MI DX Association	1,142,126
South Jersey RA	1,115,256
Arrowhead	836,968
Left Coast Contest Club	834,508
Northern Shenandoah RC	814,420
River City Contesters	810,866
Dauberville (W3)	685,161
Northern California DX Club	527,932
Amer Red Cross	302,939
Great South Bay	259,899
Wichita ARC	252,050
Sterling Park ARA	215,133
West Park RC	204,444
Red Wood Empire RC	110,344
WY DX Contest Club	8,560

DX CLUB SCORES

Rhein-Ruhr DXA	97,403,030
Bavarian Contest Club	75,443,141
Slovenia Contest Club	41,764,984
LNDX (F)	36,995,008
Hungarian DX Club	35,837,994
Croatian DX Club	32,945,194
Chiltern DX Club (G)	29,415,917
Monte Capra Radio Club (I)	20,503,965
Kiwi Contest Group	18,593,566
Kaunas Univ Tech Radio Club	17,837,416
Araucaria DXC (PY)	16,860,185
Ukrainian Contest Club	16,807,446
Alaska DXA	15,145,758
Taganrog Contest Club (UA6)	14,758,382
Delta Mike Contest Club (I)	13,994,258
OH-DX-Ring	13,378,688
Oudemaas Contest Group (PA)	12,269,262
Alpha Fox (OH)	9,772,306
Brescia DX Group (I)	9,140,142
Vojvodina Contest Club (YU)	9,096,492
Eastern Canada DX Association	6,214,780
YV Dxperts	4,956,250
Top of Europe Contesters (SM)	4,526,183
Japan Crazy Contesters	4,504,822
Bavarian DX Group	4,428,378
Regina ARA	4,267,080
Kiel Canal Contest Club	4,051,582
Moscow Radio Club	3,947,152
Danish DX Group	3,898,582
LYNX (EA)	3,882,140
Fraser Valley Contest Club	3,716,734
SP DXC	3,699,834
Noviomagnum (PA)	3,478,725
BC DX Club (VE7)	2,662,079
ARARM (XE)	2,490,174
Tupy DX Group (PY)	2,482,590
Radio Team Finland	2,393,744
Cordoba Radio Club	2,332,893
Santa Catarina (PY)	2,109,194
South German DX Group	2,054,680
Irkutsk Radio Club	1,874,845
OH3NE	1,625,033
Calgary ARA	1,412,706
LA DX Group	1,386,616
SP Contest Club	1,169,924
Sevilla Contest Club	1,159,833
Maui ARC	1,145,290
Marianas AR Club	776,325
Perugia Contest Club (I)	744,441
Zlin Contest Club (OK)	703,050
Santa Barabara Contest Club (I)	622,817
Fairs Europe (UB)	616,630
Fox Contest Club (YU)	501,087
OM3KUN	346,018
Western Siberia DXC	305,792
URVO (EA)	299,061
Domazale (S5)	188,970
Czech Contest Club	122,921
Latvian ARA	119,044
Tallinn Radio Club	39,036
SP QRP Club	17,492

contest fun and a fairly judged event. The hard working log checkers are K1DG, K3EST, K6NA, KR2Q, KRØY, N3ED, N6AW, W2RQ, W3ZZ, W7EJ, and WA8YVR. A big thank you to N6TR, who created the ever-changing software used to check the logs, and to the keeper of the data bank and all around advisor, N6AA.

Special US gurus who we lean on more than once a contest season are K3ZO and N2AA. Special DX advisors who help us keep an international point of view are CT1BOH, DL6RAI, G3SXW, I2UIY, JE1CKA, OH2BH, OH2KI, OH2MM, OK2FD, PY5EG, SM3SGP, UA9BA, and S50A. Thanks to K1AR for our great trophy program and certificates.

Finally, thanks to Mike, W9RE, who over the years has put a lot of time in checking logs. Business calls him at this time. We hope to have his talents back again soon.

Congratulations to all the entrants and winners. CU in 1994!

73, Bob, K3EST

DX QRM

We suffered a lot from flu and having no beam on 40 meters. But most of all we learned a lot and we'll be back again after some antenna work! . . . *OH6NIO*. This is the first time that I work QRP in the CQ WW DX Contest. I did enjoy it very much and I was really surprised that I could make 5 QSOs with the US on 80 meters and some other interesting DX QSOs on 80 and 40 meters with 5 watts only. It is very difficult and often impossible to work rare multipliers with 5 watts because of big pileups caused by packet cluster announcement. With some Russian prefixes I had problems to find out the appropriate DXCC country . . . *DK5WL*. It's nice to work QRP, but the next time I'll prefer the kilowatt . . . *DL6RDR*.

Thanks for running the contest; enjoyed it although the band conditions are deteriorating for QRP DX. Could not get into Oceania, Central America, or Alaska, even though I could copy the stations . . . *GM4HQF*. With my QRP station I preferred to work in quality/multipliers and not in quantity! . . . *ISØLYN*. The max output power used in the contest was 4.8 watts (measured by Daiwa NS-660 PWR Meter) . . . *JA1YNE*. Tower still cranked down from storm, rain water in TH3-traps, what can you do? Just have fun for a few minutes! . . . *DJ2HH*. The polar cap absorption wiped out the band on the first day. Almost no Europe or Japan. Otherwise it was fun . . . *VE6JY (Opr. VE6WQ)*.

Dream come true: a contest where I was operating from a house far away from crowds with almost 2000 square meters of yard. A lot of QSOs and no neighbors TVI? . . . *YV3AJ*. My first CQ WW contest on CW more than 20 years only on phone! I cannot yet compete with the skilled operators for top positions and you may find some wrong calls due to copying difficulties (between D and B, S and H, Hi!). Very good conditions with Stateside, but I am not satisfied with the number of multipliers. It is interesting to compare this log with my "phone contest log" and see how CNDX changed! . . . *IV3PRK*.

It was for me a weekend packed with interruptions, work, and other distractions that threw my hopes of a good score away. Also the bands were very noisy, at least here at my QTH. Had a great time in the contest and thanks to all who took the time to work me under the least desirable conditions. Nice to see most of my friends again on the air. TNX for the great time and 73 . . . *WP4IIW*. This contest was the best ever. It is sure lot of fun ever for small pistol like me! . . . *VE2GHI*. It was very pleasant contest, but not propagation in my side. I am 17 years old . . . *LZ3HI*. Quite amazed at the high-speed operations. It is nice to have met many old timers during the contest. Poor propagation . . . *BV2A*.

Oh no! Terrible band conditions. And it's going to get worse. Too bad we can't replace the sunspots with dirty sunglasses . . . *OH2BC (OH6EI)*. I am ham since only September 1992. It was my second contest and happy to make more than 1000 QSOs. I am 21 years old . . . *F5TFS*. Fell asleep at operating position the last 6 hours of contest. Woke up 15 minutes after contest was over. Performance below expectation but will be back again next year to better this year's score. Thank you all the stations from Japan for the points. If only 5000 of the licensed hams from Japan are able to QRV in every contest, it would make many contesters happy, especially those outside the Asian continent. Thank you *CQ* magazine for the fine contest . . . *9M6HF*.

I am a new amateur bitten by the contest bug. Look forward very eagerly to be taking part in many contest. The rules of *CQ* contest are very simple and easy to understand and observe . . . *VE3DSN*. After several years on 28 MHz in CQ WW DX Contest, attending low power class on 3.5 is a challenge! . . . *OH3TY*. One of the fun contests where a small pistol (90 watts G5RV/dipole & Zepp) can fire some effective bullets! (Zone 29 helps of course!) . . . *VK6HG*. The VF1L callsign marks the 235th anniversary of the final destruction of the fortress of Louisbourg by the English conquerors. Today the Fortress has been one-third restored and is a major attraction for visitors from around the world to Cape Breton Island. The call is terrific on CW! . . . *VF1L (VE1AL)*.

Another of these wonderful times when my high terrain QTH prevents any paths to South America or Africa. Normally, can usually find an Antipodal path to LU, but never heard any from that area . . . *HL9UH*. Three days myself in mountain valley, don't talk with people, but 937 hours on amateur radio—beautiful contest . . . *OL1CW*. I put up dipole on Friday, repaired it on Saturday, neighbors cut it down on Sunday! . . . *IK2AIT*. During the contest we did not have electricity in Sarajevo, so I worked off a 12 volt battery . . . *T97T*. Amazing long path 10 meters operating at 1230Z Sunday yielded zones 4, 5, 8, and 9 . . . *VS6WO*.

USA QRM

We did our best, but K1AR beat us anyway. But it wasn't bad showing

ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	AL7CQ	409,812	21	9K2ZZ	5,014,159
2	VO2AC	97,510	22	4S7/N6ZZ	4,575,420
3	W6EEN	2,315,619	23	JT1BH	302,771
4	K4VX/Ø	3,832,281	24	BV2A	101,640
5	K1KI	5,603,364	25	JH5FXP	2,655,594
6	XE1/AA6RX	3,758,225	26	XU7VK	501,650
7	TI1C	9,123,817	27	DU3HF	140,742
8	VP5RX	5,205,519	28	9M6HF	1,258,104
9	P4ØW	11,139,948	29	VK6HG	282,240
10	HD9N	7,915,320	30	VK2AYD	652,795
11	PYØF	10,591,744	31	NH6T	2,461,536
12	XR1X	1,302,525	32	ZL7FD	432,200
13	CV5A	940,532	33	EA8EA	12,703,752
14	ZB2X	6,129,904	34	No Entry	
15	4O7AV	3,784,480	35	6V6U	8,949,808
16	EO5U	2,098,759	36	ZD8Z	9,086,940
17	UN7LZ	1,382,256	37	7Q7OO	7,173,846
18	RWØAB	1,005,975	38	ZS6EZ	6,924,175
19	UAØZDA	355,040	39	No Entry	
20	JY8VJ	7,164,512	40	JW8XM	384,354

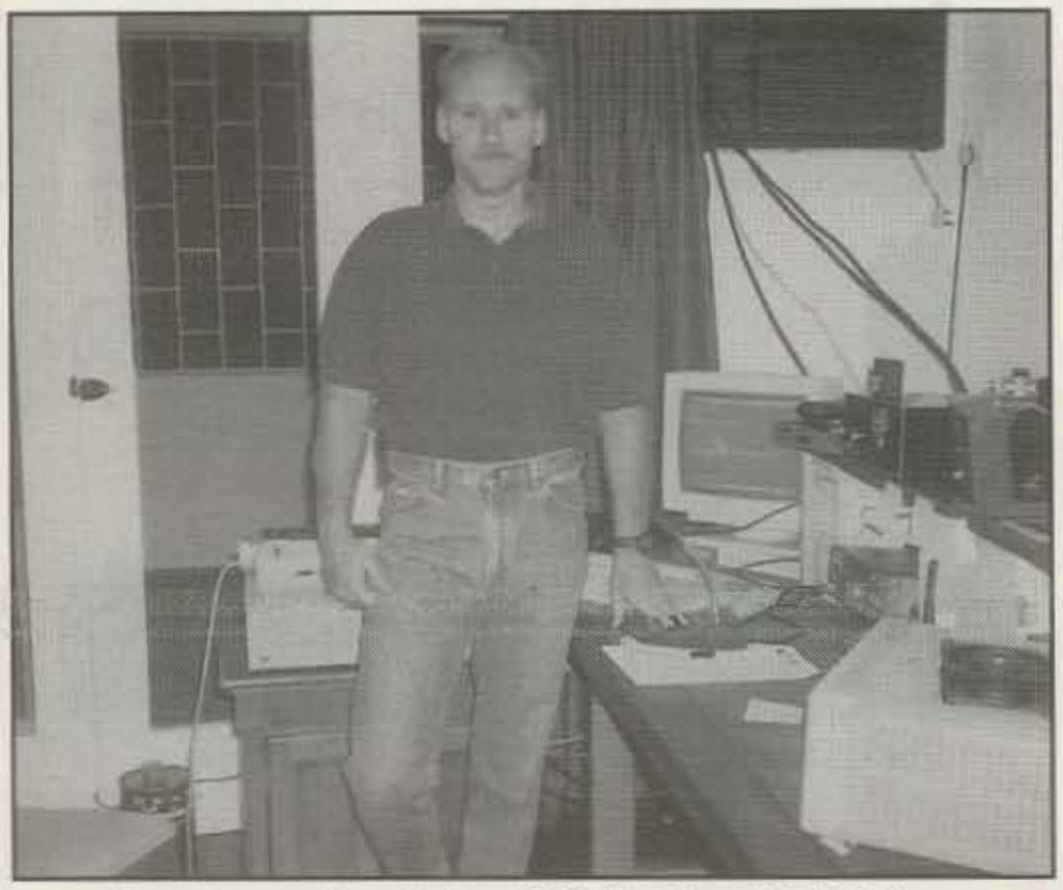
for two old guys! About 42 hours of operating time each. Not the preferred way to run a multi-multi, but we couldn't be competitive with only two ops in the multi-single category, so we just turned it loose and did our best! . . . *N3RS*. Stateside stop calling "CQ" all the time! One "W1" was calling "CQ" on top of a JW on 40 CW! . . . *W3SOH*. Heard very few JA's. The bands were in great shape, but I tuckered out before they did . . . *NJ9Z*. Although I operate 90% CW, this was my first serious effort in the CQ WW CW Contest. Not a single European or Japanese station heard here in the black hole on 10 meters. It's hard to believe I'll have to wait until the next century before 10 meter QSOs become a significant part of my total score again. I think I should just move to the Caribbean! . . . *KDØZR*.

Lost part of Saturday AM with blown up antenna switch on 14 MHz, and struggled with RF in computers all weekend. A major station rebuild is in order. We'll be back again next year! . . . *K8CC*. Never could generate a decent run, so I was reduced to seeing how quickly I could break through pileups! . . . *WA6CTA*. Darn! TVI in shack and I missed the winning field goal in the Giant's game! (US—football). But worked a new multiplier. Bittersweet success. Hi, Hi! . . . *WR2G*. Too many poor fists! CW weighing vy poor! Too many transmitters and not enough receivers. Life's too short for QRP . . . *NØAFW*. Well, 10, 15 was not too good here for me, and then I was battling a rain storm that left me with no power and also heavy winds. Had to cut the contest short . . . *NP2Q*.

With 5 watts it's Search & Pounce all the way. I very quickly discarded any notion of calling "CQ" and running stations! . . . *W6ZH*. Nicest way to pick up 12 new countries on 80 toward 5BDXCC . . . *AA1M*. I really enjoy the CW version of this contest much better than the Phone—more of a challenge. It's absolutely amazing. Not that many years ago a 100k score would have been significant for single band 80 meters. Now I doubt it even gets mentioned. I find it very difficult to commit to the number of hours and techniques that are needed to produce a really winning score and probably never will. I'm still working split, rarely run them, don't use computer, don't use a logger, don't listen to the packet DX cluster, still use my 1948 (75A4) receiver, and you know what? Thoroughly enjoy digging them out by myself . . . *K2RR/1*.

Everything broke down except the computer! . . . *N2UN*. After the first 24 hours, the transformer in the linear went out, so I swapped it out for a linear I built when I was 15 years old (over 16 years ago) and which had not been used (not even plugged in) for over 10 years. The Heathkit SB-200 worked very well . . . *N6JKQ*. Lost entire Saturday morning EU run with antenna frozen pointing south due to overnight sleet! . . . *W8FN*. Ten meters was lousy, but 80 and 160 were spectacular on Saturday night—Europeans all over the place, coming in as loud or louder than most of the east coast USA stations. For once I thought I'd finally come out of the "Black hole" . . . *NSØB*. Great contest; even snagged a new one. Biggest problem: Stations that only sign every 10 minutes! . . . *W7QDM*.

Great contest! I couldn't believe I was working eastern Europe on 40 meters with only a vertical; then I QSYed to 80 and heard ON4UN calling CQ and worked him on first try! Fantastic conditions, good antennas on the other end! . . . *W6RCL*. Thirty-one hours of operation. I was told it could be done, I was shown it could be done, I proved to myself



The voice and key behind C91J is John, WA4WKY.

Tom, YL2PP, passes his best to all "boys and gals" who like the CQ WW DX Contest.

that it could be done, and I did it myself . . . *KY2T*. Wow, Murphy visited me big time for this test. Loss of power, antennas, rigs, and switches just about put me out of business (and green stamps). I thought I had everything ready for the contest, but Murphy definitely had everything ready for me . . . *K8FC/2*.

Great weekend. Got the Quad up before the cold front hit Texas on Thanksgiving. First time I've had a directional antenna. What A Hoot! Made up for poor 10 meter openings with a good evening on 15. Now if I could just learn to copy the 40 wpm from the computer crowd . . . *N5XUS*. What a blast! Swarming pileups, even with low-power here, made for some hot times. Low bands especially good on Saturday night, even from the middle of the Pacific (plus Thanksgiving turkey on the beach! Ahhh.) . . . *NH6T*. When will the current "bear market" in the solar cycle end? . . . *K7FEF*.

STATION OPERATORS
Multi-Operator Single Transmitter

4M5I: KØPP, KE7X, WM2C, WS4E, YV5DTA. **9A1CED**: 9A3NE, 9A4KK, 9A4OO, 9A4UU, 9A4WW. **9A5D**: 9A2FK, 9A2TL, 9A3DU, 9A4DU, 9A3VM, 9A7DKV, 9A3AM, 9A7AOQ, 9A3ID, Nik, Niksa, Gogo. **AAØNC** & KBØEBH. **AB2E** & KC3NE, KE3GA, NU3Y, WE3E, WT3Q. **AD1S/5** & N5CE. **AG6D** & AA6KX, K2MM, KG6LF, N4TQO, N6IP, WA6BXH. **CH9DH**: K2NJ, VE1DH, VE1DX, VE1IW, VE1WH. **CR3W**: DJ2YE, DK3KD, DL1EK, DL5BWE, DL5JQ. **DFØDF**: DK9FE, DL1AWI, DL5AWI, DL1APW, DL5ZBD, DL2ZAE. **DFØHQ**: DL3DXX, DL3OI, DL5ANT, DL5AXX, DL7UTA, DL8WAA. **DFØRR**: DL7AKC, DL7ALM, DL7PV, DL7VOA. **DFØRU**: DL2RUM, DK2OC, DL7UBA, DL7AFV, DL7UTM, DL7VTM, DL7LV. **DF3CB** & DL1MFL. **DF3QG** & DJ1FC, DK2TI. **DKØFFO**: DL2BWM, DL7UGN, DL5BTE, DL2BQJ. **DKØMM**: DJ7IK, DJ8WL, DJ9CB, DL8OBC, T94DX. **DKØTZ**: DF5EN, DL1SBF.

DLØSSB: DL1EFO, DL1EFD, DK7FP, DL9XY. **DLØTUD**: DL6UEG, DL8DYL, DL8WOW. **DLØWU**: DF5JB, DF7YE, DH5JT, DJ8UV, DK5EZ, DL4DAB. **DX1HB**: JA1KJK, JA1WLN, JR1NHD, 7K1CXV. **DX3H**: 4F3AAL, 4F3CW, DU3BRA, DU3CWX, DU3FBB, DY3CWI, DU3CWU, DY3CWD. **ED3KU**: EA3AIR, EA3AVV, EA3DU, EA3FER, EA3KU, EA3QH. **EI7M**: EI3DP, EI4BZ, EI6BT, EI5HB, EI6GF. **ER7Z**: ER5AA, ER5AL. **F5KBJ**: F6BQY, F6IIE, F6HBR, F6AXX, F5LDY, F5JY, F5OBK, F5OTZ, F5PHW, F5JNT, F5HEW, F5IBZ, F8VQ, FA1RPW. **FH/DL5XU** & DL9AWI. **FJ/F8UFT**: F6DXB, YL/GØYE, F6HWU. **FYØEK**: FY5GB, FY5FO, FY5GJ, FY5CG, FY5FY. **GØFOS**: GØCLY, GØLUJ. **G3LNS** & G3NKC, G3VHB, G4JGV. **G3PJT** & G3PMR. **G4BLX** & G4KZD. **GB5DX**: G3NOH, G3OUF, G3RTE, G3VRY, G4DJX, G4JKS, G4XRV, NZ1W, WG5Z. **GB5WW**: G4MVA, GØLII, GØNUP, GØNXX.

GS4TMS: GM4UYE, GMØKAE, GM4DGT, GMØTTY, GM4XRP, GMØKWL. **GXØFUN**: G4WJS, G4WVX, G4DQW. **HA3KHC**: Lovay, Robert, Tibor, Balazs. **HA3KNA**: HA3OU, HA3OV, HA3NS, HA3NU. **HG6Y**: HA7PO, HA6IOB, HA6DX, HA6NG, HA6OB, HA6OI, HA6OO, HA6OY. **HSØAC**: HSØ/G3NOM, HSØZBI, JA3KWX, K1XM, KQ1F. **HZ1AB**: AB5ML, KM4E, N4KT, SMØCXU, W7SE. **II1D**: I1EAZ, IK1QUK, IK1QAC, IK1AUS, IK1LBO, IK1LZE, IK1VBE, IK1TZO, IK1TXH, I1JZV. **II6I**: IK6GZM, IK6BSN, IK6CLX, IK6FFL, IK6FJV, IK6JBA, IK6MLI, Mauro. **IO2L**: IK2QEI, IK2PFL, IK2JUB, IK2GWH. **IQ4A**: I4VEQ, I4LCK, I4IND, I4EAT, I4IKW, I4TJE, I4PVP, IK2NCJ, IK4DCT, IK4DKO, IK4DWK, IK4DZF, IK4QJH. **IRØA**: IKØQDB, IKØHWI. **IR2W**: I1XPQ, I2EOW, I2VXJ, IK2CFH, IK2EGL, IK2VJF. **IR2X**: LU4AE, IK2YSB, IK2MOV, IK2QMU, IK2GNW, IK2IQV, IK2MRZ, IK2DOT, IK1PMR.

IU2X: IK2GSN, IK2GZU, IK2WAD, IK2FYH, IK2GXK, IK2SAU, IK2JTU, I2QIL. **J6DX**: K9BQL, N9AG, W8OK, W8QID, WB8ENR, WD8IXE. **JA2YKA**: JK1GRI, JJ2CKV, JQ2SUO, JI4RDO. **JA6YCL**: JF4CZL, JE6EKC, JE6UWK, JF6KPD, JI6MYW. **JA8YBY**: JE8TNH, JG8NFE, JG8NID, JI8UCI, JJ8CKS, JO1DFG, JP1OQY, JR8DHA, JR8WJS. **JG2YIV**: JF2WEQ, JE2PCY. **JH5ZCP**: JA5AUC, JH5PHC, JR5JAQ, JR5MYC. **JH5ZJS**: JA5BJC, JA5CJZ, JA5FDJ, JA5JCC, JA5THU. **JJ3YBB**: JA3FHL, JA3LHL, JA3PJL, JE3TXA, JF3EIG, JH3FBS, JH3FQF, JI3ERV. **JM1ZTI**: JA7FYF, JR1SDF, JA6AKL. **K1TR** & K1FWE, K1JKS, K1MNS, NW1U, NX1H. **K2QMF** & AA2FB. **K2WI** & N2NU, W2REH, WO9S, WW2Y. **K3CP** & K3YD, KU3K, KU3X. **K3DI** & WD4IEH. **K4IUV** & AK4Z. **K4LTA** & N1CWR, W4TYU, WA4TKR, KY4L, KC4URW, AD4LG, AC4EM. **K5HKX** & NV5L. **K6HRT**: Club. **K6XT** & N6AYW.

K7YHA/3 & WB3FYU, KA3WTF. **K8LX** & N8EA, WA8ZDT. **K9UWA** & KA9A, KC9LA, KR9U, N9NO, W9FC. **KA9P** & WB9CEJ. **KB2HZ** & KU2C. **KC1XX** & AD1C, KM3T. **KR7G** & KS7O. **KS9K** & KA9FOX, N9AW, NØBSH, NB9C, WE9V. **LA1DXG**: LA2KD, LA4DCA, LA5MT, LA6MP, LA7AFA. **LO3A**: LU6BEG, LU6EF. **LX/DFØBK**: DL8SGG, DL4SDX, DL5SEJ, DL4SDW. **LZ6S**: Club. **LZ9A**: LZ2BE, LZ2CC, LZ2DF, LZ2HE, LZ2II, LZ2JE, LZ2PO, LZ2PS, LZ2UU, LZ2XA, LZ2-E-72, Ilya. **N2MM** & WB2R, WN3K. **N3BNA** & NM2Y, KD3CN, NB3I. **N5OK** & N5CG, WØRRY. **N6CQ/3** & K3SWZ, NY3G, WD3U, WF3T. **N6YKL** & W7CB. **NCØP** & NØJL, NØSM, WAØFLS, WDØGVY, WOØV, WRØG. **NE3F** & NT3V, NN3L. **NM3K** & N3HTZ. **OE1XTU**: 4N4JJ, OE1OPW. **OH1BV** & OH1VL. **OH2AF**: OH2BPB, OH2BPJ, OH2CX. **OH2X**: OH1JT, OH2IW, OH2JA, OH2BAF, OH6CT, OH6DD, OH6OS.

OH3AT: OH3FS, OH3DC, OH3NBJ. **OH3NE**: OH3FM, OH3LQK, OH3MEP, OH3MYD, OH3NLP. **OH6NIO** & OH6MFN, OH6MMC, OH6NEX. **OI5AY**: OH5PZ, OH5LAQ, OH5LLR. **OK1OKE**: OK1DUT, OK1VBA, OK1FUT, OK1HPW. **OK2KDS**: OK2VWB, OK2HIJ, OK2-22266. **OK2KJU**: OK2BXU, OK2BXE, OK2BDX, OK2PTD, OK2PWJ, OK2PRW. **OK2KOD**: OK2BDI, OK2BGR, OK2BNX, OK2PID. **OK5W**: OK1AEZ, OK1CF, OK1JJB, OK1WT, OK1JKT, OK1PN. **OM3KFF**: OM3TPG, OM3TRG, OM3TLU, OM3TCW, OM3TPW, OM3CZQ. **OM3RJB**: OM3CSQ, OM3CQD, OM3CKW, OM3CPG, OM3TCL. **OM3RKA**: OM3TDP, OM3YX, OM3CQR, OM3CPC, OM3THR, OM3TTZ. **OM3RDS**: OM3TUM, OK3-26Ø15. **ON6AH** & ON4GO, ON5OO, ON5PV, ON6QR, ON6VL, ON6DM, ON7PC, ON7ZV, ON9CMB. **PA3FNE** & PA3EYZ. **PI4CC**: PA3BSQ, PA3EPD, PBØAIU. **PI4TUE**: PA3GBU, PA3GIP, PA3DUA, PAØERA, PA3FCD, PA3DQW, PE1NEX. **PI4ZLD**: PA3GCU, PA3EOB, DF6JC.

RB4LWM: Dmitry, Yuri, Maxim. **RS3A**: RA3DUU, UA3-17Ø-79, UA3-17Ø-126, UV3AEV, UZ3AXX. **RW1A**: UA1AQF, UA1-169-2391, UA1-169-13Ø6. **S55AA**: S53BM, S53EO, S53VV, S53WW, S55AA, S58MM, S59KW. **SK3IK**: SM3BDZ, SM3CER, SM3DMP. **SK5AA**: SM5ACQ, SM5FUG, SM5LNE. **SK6AW**: SM6CAS, SM6CDG, SM6CVE, SM6DED, SM6DER, SM6EHY, SM6ERS, SM6GBM, SM6HCX, SM6IQD, SM6LFJ, SM6SHF. **SK6QW**: SM6NJK, SM6SKU, SM6TRZ, SM6VAU. **SK7BQ**: SM7BHM, SM7TV. **SK7JD**: SM7HQD, SM7SRC, SM5OTH, SM2EWG. **SM3OSM** & SM3SGP, SM3RPK. **SP3KPN**: SP3GXU, SP3SFN. **SP9KAO**: SP9LAS, SP9HVV, SP9JZT, SP9LAB. **SP9KRT**: SP9-1753, SP9HMB. **SP9PDF**: SP9CTT, SP9FIH, SP9MQE, SP9TCE, SP9TCV, SP9UOG, SP9-1573-KA. **TM9C**: F5IN, F5QF, F5LGE, F6ARC, F6DZS, F6IWW. **UT7W**: U5-W-7, UB5WCX, UB5WBY.

UW2F: RA2FA, UA2FC, UA2FF, UA2FJ, UA2FM, UA2FX, UA2FZ, UA2-125-767. **UZØQWA**: UAØQDL, UAØQN, UAØQAU. **UZ4AZJ**: RA4AV, UA4AFM, UA4AGO. **UZ4WWA**: UA4WA, RW4WA, UA4WAZ, UA4WAN. **UZ4WWB**: UZ4WHW, UA4WGU, Alex. **UZ9AWN**: Club. **V31KF**: K5GA, K5WA, KI3L, N5DU, W5ASP. **VE6AO**: VE6KZ, VE6AMR, VE6NAO, VE6CIZ, VE6CGY, VE6KCT, VE6IC, VE6DMD, VE6RAJ, VE6RCL. **VP9AD**: KI3V, N3AD, N3RD. **VP9MZ** & WB2YQH/VP9, KB2NMV/VP9, VE3YBH/VP9, WA2AOG/VP9, WB2ABD/VP9. **WØKEA** & KØKR, W1XE, WØUO. **W1BK** & WA1UAR. **W3GG** & WD3I. **W4PRO**: K4IX, WB4DNL, W4DHZ, KI6ZH, W4HIR, W4PRO, WB4GCS, N4JEO, KDØR. **W6BA** & N6AW, N6NU, K7JYE, W6HAL. **W6REC** & WC6H, KN6SO. **W8BI**: NO8C, N8DIX. **W9KDX** & K9BG, K9RN, KS9W. **WA6IET** & W2KVA. **WB6GBR** & KN6JN, WA6OWM. **WD8LLD** & AF8A, KU8E, NZ4K, W8TK, WD8AUB.

WE1B & AA1FN, N1IFN, WF1L. **WS1F** & WA1PMA. **WU3A/2** & NS2K. **WXØB** & NA5Q. **XX9AS** & OH1EB, OH2BH. **YU1HFG**: YU1ML, YU1TS, YZ1ZI. **Z3ØM**: Z31GX, Z31GB, Z31PK, Z32RC, Z32RY, Z32ZM, Z32JA, Z32DR, Z33ILE, Z34TCA, Boby-san. **ZF2WW**: G3SXW, K5VT, K7GE, KC7V.

STATION OPERATORS
Multi-Operator Multi-Transmitter

4N1Z: YU1DX, YU1GU, YU1QL, YU1VO, YU1LX, YU1ZQ, YU4LB, YU4NW, YU4RW. **9A1A**: 9A3GW, 9A3MJ, 9A2AJ, 9A2AW, 9A2SD, 9A2EU, 9A2OG, 9A2MP, 9A2MM, 9A2NJ, 9A2LJ, 9A2HV, 9A2KL, 9A2DQ. **AA4G**: G4BKI, K1KNQ, NY1H, WW1N, AA4XR, KN4RI, WB4FNH, WB4ROY, WK9Z. **AA6TT** & K5RC, N6ND, KA5Q, AH3C, WA6OTU, AI9X, AA7NX, N7KA, AA5B, F5JTL, WF5T, KTØF, AEØQ, NØYEI, N5SDO. **AHØK** & JE1JKL, JP1OGL, JE2JCV, JL2TZC, JJ3OLZ, JR7OMD, JE7BIZ, JA8RWU, JA9VDA. **DA2UK**: DA2OJ, DA2QX, F5PRG. **DLØKF**: DF3HU, DF4PA, DF6LI, DJ2BV, DJ3UL, DJ4FZ, DJ6TN, DJ7SW, DK7LN, DL4FZ, DL2ZT, DL3KUD, DL3LBX, DL5HBS, DL5KWA, DL8HCO, DL8LBM, DL8PY. **EA9EO**: CLUB. **G3YBT/P** & G3XMZ. **GU3HFN**: G3MBS, GU4SXM, GU4WRP.

HG73DX: HA1TJ, HA1TD, HA1DAC, HA1DAE, HA1AH, HA1YA, HA1YU, HA1WD, HA5GF, HA5IW, HA6WX, HA5AWH, HA5ML, HA5CCC, HA5FM, HA7VB, HA7RY, HA5OM, HA5TI, HA5WE, HA6NF, HA6OQ, HA6NY, HA6QN, HA6ND, HA6PX. **JA1YDU**: JHØNZN, JHØLFE, JF7TFK, JP1JFG, JRØUUU, JEØBKI, JFØMQX, JI2UYK, JK3GAD, JEØIUZ. **JA1YXP**: JF1QOW, JJ1OJG, JP1AEQ, JS1INN, JS1XEX, 7K1EWD, 7K1QOE, 7L1CBL, 7L1DGK, 7L1ETO, JL2TSY, JS2XHN, JL7CMG. **JA3YBF**: JL1PEI, JH3NFZ, JL3AKW, JO3LDN, JO3QVG, JF4FUF, JG4CLV, JK4ITY, JA9TOZ. **JA3YKC**: JG3MRT, JG3WDN, JF3VXV, JE9GMX, JM3FVL, JE5DTS, JG4LSR, JL4CVB. **JA3ZOH**: JA3PIA, JH3OPB, JH3PRR, JE3MAS, JF3DRI, JG3JEW, JG3KIV, JI3OPA, JM3XKG, JH4IFF, JH4RHF, JH4NMT, JR4ISF. **JA7YAA**: JE1AMC, JF1CKX, JM1QPR, JJ1CVH, JO3GKN, JF1SXL, JG7PSJ, JL7LYM, JRØSPG.

KØRF & N2IC, WØUA, KCØD, WØUN, KØEU, K9AY, WØCP, N7RT, W6UQF, K6UA, G3SZA, K6XO. **K1AR** & K1EA, K1ST, K1GQ, K1MEM, W1RM. **K3ANS** & W3TB, WF3H, N2BIM, N3JGX. **K3LR** & WR3G, W3YQ, W5ONL, NI8L, NA8V, K8CX. **K8CC** & AA8AV, AA8FE, AA8U, AC8W, K8DD, K8NA, K8MJZ, KF8QE, N8CC, N8CQA, W8UA, WA8RRR, WX3M. **KY1H** & NS1M, KB1W, KB1KE, WZ1R, WM1K, NT2X, AA2OX, KB2R, NB1Y, AA1AS, NJ1F, KS1N, NU1P, WA1ZAM, KJ4KB. **KY3N** & WB3FIZ, WB3HAZ, WB3LFZ, W3BGN, W8FJ, WU3M, NF2L, K3IE, KY3N, NN3C. **LA5M**: LAØGE, LA9VDA, LA9WDA. **LY7A**: LY2NK, LY2BDW, LY2FN, LY2BMX, LY2OA, LY3BBC, LY3BN, LYR346, LYR728, LYR1751. **N3RS** & N3ED. **N6DX** & WA6CDR, AD6C, N6VR, WB6SHD, N8SR, N6RVZ, N6RZ, N6IC, GØCKP, AC6T, AD7G. **NL7G** & KL7Y, KL7PJ, KL7AF, KL7U, NL7VJ, N7DF, KØMVL, NTØJ.

OH1AJ: OH1JM, OH1LD, OH1WR. **OZ5WQ** & OZ1BIZ, OZ3ZW, OZ3PE. **R6L**: UA6LV, UA6LO, UB3IW, UA6LFQ, UV6LPL, UA615Ø1Ø6Ø, UA615Ø1212Ø, UA615Ø1413. **RU1A**: RV1AO, RV1AW, RW1AC, UA1ABR, UA1ALZ, UA1ARL, UA1BX, UT3UA, UT5UGR, UV1AA, UA1-169-946, UA1-1692475. **UR8J**: UB2JO, UB2JZ, UB3JD, UB3JF, UB3JM, UB3JW, UB3JX, UB4JBK, UB4JFJ, UB4JMG, UB5JIM, UB5FDM, UB5JMR, UB5-Ø67-2ØØØ, UB5JW, UB7-Ø67-2. **US7I**: RB4IZ, UB3IO, UB3IM, RB4II, UB5IUA, RB1IA, RB5ID, UB5IFZ, UB3IKY, RB5IN. **VS6WO**: NA9O, 9V1YC, WX9E, K5GO, AA2NS, VS6EY, VR2GO, VS6YHT. **WØAIH/9** & KØFVF, WØUC, NØAXL, AAØOD, AAØOS, WWØJ, KSØT, AIØY. **W3LPL** & WB2EKK, WR3E, W3EKT, N3GB, AI3M, K3NA, KF3P, KE3Q, K3RA, W3ZZ, W4BQF, KO7V, KE9A. **W4MYA** & WA4DAI, K4BAM. **WS4G**: Club.

YE3Z: YB3AS, YB3FFB, YB3HCM, YB3FNL, YB3TAF, YC3SPS, YC3MIG. **ZL2K**: ZL4OY, ZL2AGY, ZL2IR, ZL2AL, ZL2VS, ZL2BSJ, ZL2AMI, ZL4SS, ZL1AIZ.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (All country terminology reflects the DXCC list at the time of the 1993 contest. The 1994 contest results will reflect political changes since that time.)

CW RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

K1KI	**A**	**5,603,364**	**2867**	**153**	**523**
K5ZD/1	**"**	**5,569,200**	**3027**	**146**	**484**
N6BV/1	**"**	**4,941,490**	**3074**	**135**	**430**
W2SC/1	**"**	**3,784,710**	**2438**	**133**	**410**
W1WEF	*	3,042,105	1997	131	406
W1OO	*	1,728,603	1123	139	398
K2TE/1	*	1,529,337	1151	116	355
W1BR	*	1,060,998	830	118	336
KS1L	*	1,000,846	765	119	350
W1ZK	*	989,985	765	123	342
KA1DWX	*	909,051	749	112	317
K3UOC/1	*	781,722	704	103	308
K1WJL	*	643,017	591	101	288
W1KM	*	635,271	800	69	204
K1EFI	*	540,144	525	105	267
NB1B	*	488,832	481	101	283
W1FJ	*	454,595	490	87	248
K5MA/1	*	454,209	539	86	215
WE6G/1	*	211,440	321	63	177
W1FV	*	185,928	356	48	135
K2LE/1	*	128,968	244	54	134
WA1KSY	*	60,187	157	47	92
W1CNU	*	40,068	127	32	76
KD1OG	*	21,804	84	29	63
WV1C	*	10,500	63	24	46
AE1D	*	2,940	36	16	26
K1ZZ	**21**	**574,224**	**1210**	**35**	**133**
K1RU	**"**	**531,139**	**1135**	**33**	**128**
KM1H	**14**	**1,001,035**	**1892**	**39**	**146**
			(Opr. KQ2M)		
K2SS/1	**"**	**801,534**	**1528**	**38**	**140**
W1RR	**7**	**706,660**	**1392**	**36**	**142**
W1CWU	*	62,126	200	29	89
W1MK	**3.5**	**340,431**	**932**	**30**	**99**
K2RR/1	*	98,670	302	25	90
K1WGM	*	93,636	320	24	84
W2AX/1	*	46,000	183	22	70
AA1M	*	4,746	42	12	30
W1BYH	**1.8**	**48,552**	**279**	**15**	**53**
W1CKA	**"**	**36,992**	**66**	**16**	**52**
***KC1SJ**	**A**	**1,326,332**	**1059**	**120**	**349**
***WS1E**	**"**	**1,085,750**	**900**	**109**	**321**
***KM1X**	**"**	**933,282**	**890**	**94**	**284**
*WA1FCN	*	672,695	664	99	266
*K1VUT	*	515,888	605	78	226
*WA1S	*	512,458	702	76	181
*K1EBY	*	503,063	563	84	235
*AA1HJ	*	382,260	501	72	205
*K8JLF/1	*	308,398	411	76	195
*K1TN	*	279,818	390	62	191
*K1VWL	*	224,460	326	78	180
*KB1KM	*	201,984	293	77	179
*K5FUV/1	*	129,870	257	52	133
*N1JAC	*	83,941	219	47	96
*WZ1K	*	66,470	203	59	111
*KA1ZFK	*	35,500	103	44	81
*K1CLN	*	15,920	72	25	55
*K1VSJ	*	4,326	37	13	29
***KQ1V**	**28**	**13,054**	**85**	**19**	**42**
*KA1GTR	21	10,547	69	16	37
*KA1UJ	14	1,120	26	7	13
*WØMHK/1	7	41,511	153	25	76
K1ZM/2	**A**	**5,579,164**	**2920**	**155**	**497**
N2NT	**"**	**5,019,948**	**2758**	**155**	**481**
N2LT	**"**	**4,892,272**	**2727**	**153**	**463**
W2HPF	*	2,211,691	1550	125	378
K2SIG	*	1,650,636	1242	117	351
K2ONP	*	1,476,860	1070	122	368
N1CC/2	*	1,131,321	965	107	310
WA2VYA	*	1,078,922	883	117	325
N2NU	*	1,011,632	963	103	265
KF2ET	*	937,251	657	139	374
K2DM	*	852,624	804	101	271
WA2ASM	*	834,480	800	100	280
N2GC	*	781,056	656	106	326
KA2HMJ	*	775,600	782	88	262
K3JGJ/2	*	762,420	708	107	281
WA2ORX	*	670,071	607	103	298
WA2MBM	*	558,126	630	88	219
WA2C	*	548,293	635	84	227
W2FXA	*	501,790	500	95	266
K2NV	*	486,315	556	81	222
WA2VZQ	*	353,729	461	79	198
KW2J	*	342,240	462	80	196
W2FR	*	282,240	381	78	202
N2MR	*	268,062	375	70	188
KE2WY	*	257,295	330	80	175
NA2Q	*	253,422	367	73	161
WA2UDT	*	175,536	300	67	80
W2NS	*	147,264	292	52	125
AA2GQ	*	83,650	178	52	123
W2GW	*	75,075	156	59	116
W2YY	*	33,360	102	36	84
WF2Y	*	27,485	89	44	71
K2FL	*	17,472	80	24	54
N2MZH	*	7,455	57	32	39
KA2DFO	28	2,343	27	11	22
K2MT	**21**	**302,577**	**667**	**32**	**127**
N2UN	14	153,456	388	32	107
WØVU/2	3.5	21,312	122	13	51
W2FCR	**1.8**	**19,610**	**101**	**15**	**59**
N2WK	*	1,534	25	9	17
***K2ZJ**	**A**	**1,904,654**	**1230**	**135**	**412**
***K2SG**	**"**	**1,845,006**	**1524**	**106**	**320**
***WA2SRQ**	**"**	**975,460**	**890**	**98**	**286**
*KE2ZU	*	576,281	539	107	302
*W2KHQ	*	348,975	448	75	200
*KM2L	*	269,620	376	74	186
*K2SHL	*	241,368	339	78	189
*WA2VEZ	*	133,133	238	65	144
*W2TZ	*	121,450	251	43	132
*K2JF	*	90,300	211	59	116
*W2OMV	*	62,208	149	57	105
*WB2JFP	*	61,335	153	48	97
*K2SWZ	*	47,360	140	50	98
*W2HCA	*	46,569	130	37	92
*WB2WBU	*	38,913	117	38	81
*K2MN	*	38,232	129	29	79
*KD2MI	*	33,930	119	50	80
*N2PEB	*	27,255	97	40	75
*W2EZ	*	22,504	97	34	63
*N2LSK	*	18,705	78	30	57
*KB2SE	*	18,592	85	29	54
*AA2PQ	*	15,272	73	31	52
*W2NNR	*	10,136	65	17	39
*WB2DVU	*	9,577	58	22	39
*WT2Q	*	3,999	36	16	27
*N2LTK	*	2,738	27	15	22
*K2MFY	21	73,575	240	26	83
*N2INN	*	11,532	67	17	45
*K2POF	7	44,064	163	22	74
*WA2ASQ	*	35,424	135	24	72
*N2JOH	*	24,276	129	16	52
***W2VO**	**1.8**	**11,832**	**78**	**14**	**44**
K3ZO	**A**	**4,959,360**	**2722**	**161**	**479**
AA1K/3	**"**	**3,372,720**	**2133**	**137**	**415**
W3UM	**"**	**2,213,810**	**1439**	**133**	**397**
K3MD	*	2,006,000	1506	128	344
K3TEJ	*	1,510,816	1080	115	381
K3ZZ	*	1,418,840	1113	116	333
AK3Z	*	1,324,775	1002	115	360
K3OX	*	1,124,366	885	117	329
N3II	*	1,010,264	840	116	315
K4JLD/3	*	536,805	502	117	278
KL7HIR/3	*	407,364	463	95	237
W3KV	*	372,368	452	76	220
K3SME	*	335,315	371	103	234
W3NX	*	322,322	376	101	221
N3KR	*	265,650	390	64	189
NY3C	*	207,616	306	74	182
W3SOH	*	199,184	306	67	169
WA3NNA	*	179,622	222	90	216
KM3D	*	118,980	229	55	125
W3GU	*	106,896	206	72	132
W3FTG	*	81,993	169	59	122
WA3SCW	*	50,826	150	39	90
NI3I	*	22,400	82	42	58
W3FQE	*	8,100	62	16	29
N3UN	*	6,120	47	17	34
N3MTU	*	588	21	15	13
W3GN	**28**	**31,233**	**169**	**25**	**62**
WZ3Q	**21**	**406,512**	**1003**	**34**	**110**
AK3M	14	50,344	39	14	31
K3WX	**7**	**542,300**	**1123**	**38**	**132**
			(Opr. KH2F)		
K3BSY	*	132,928	992	32	102
W3BGN	*	8,481	86	6	27
K3GYS	*	6,210	49	12	34
WE3C	**3.5**	**218,163**	**661**	**28**	**93**
K3UA	1.8	7,956	60	11	40
***KX3Y**	**A**	**838,000**	**728**	**79**	**230**
*W3UJ	*	436,112	552	73	208
*KB3MM	*	381,480	427	85	245
*W3QIR	*	133,722	242	65	142
*N3QA	*	128,700	243	56	139
*AA3FY	*	110,208	242	40	124
*K3TLX	*	96,307	189	58	135
*N3CZB	28	117	9	4	5
*WW3S	21	41,031	156	25	72
*W3CPB	7	20,569	115	16	51
*N3RW	*	13,481	79	16	45
KT3Y/4	**A**	**3,695,880**	**2256**	**140**	**430**
K4PQL	**"**	**3,629,774**	**2325**	**130**	**412**
W4RX	**"**	**2,802,442**	**1820**	**145**	**393**
N6AR/4	*	2,700,578	1496	153	494
N4AR	*	2,511,028	1566	147	412
AA4S	*	2,241,871	1572	134	369
W4XJ	*	2,184,622	1562	129	370
WZ4F	*	1,522,790	1228	121	324
K4BAI	*	1,466,640	1091	120	365
W3VT/4	*	1,420,440	945	138	396
K7SV/4	*	1,407,348	999	133	365
W1IHN/4	*	1,294,950	1022	115	330
N4TO	*	1,278,680	882	135	385
KG4W	*	977,368	801	122	312
K4AMC	*	976,304	916	107	272
N4XM	*	960,190	858	113	293
N8UM/4	*	861,846	810	107	272
KX4R	*	756,756	619	125	316
N4UA	*	708,344	650	104	288
AD4MQ	*	548,493	545	93	270
W4OUN	*	518,035	523	103	258
K4GKD	*	446,620	490	95	231
N4MM	*	441,039	463	94	245
AD4KE	*	424,560	444	93	255
W4NTI	*	295,800	369	99	201
K4LNA	*	248,724	346	80	202
K4KUZ	*	245,127	296	103	200
W4GTS	*	140,180	245	64	151
WB4OSN	*	126,875	230	65	138
KI4M	*	115,840	229	61	120
WB8BMV/4	*	104,276	200	61	138
NI4Y	*	103,930	204	65	125
KQ4ZX	*	103,544	215	52	120
WB4UBD	*	91,425	200	47	112
K6ETM/4	*	43,542	143	41	77
AD4Y	*	41,654	132	35	83
W4WKQ	*	38,148	117	50	82
KS4S	*	37,506	117	31	83
AC4VV	*	34,146	114	41	78
W4VC	*	29,539	103	32	77
KB4CG	*	27,702	125	24	57
W4OGG	*	24,941	157	35	70
AC4XL	*	17,877	79	45	56
KC4ZV	*	13,795	68	39	50
KØRNZ/4	*	12,096	56	33	51
K4FW	*	4,920	107	40	65
K1FIR/4	*	595	12	6	11
K4XS	**28**	**66,600**	**290**	**23**	**67**
			(Opr. WC4E)		
N4CT	**21**	**382,950**	**886**	**31**	**119**
N4IR	*	258,115	622	33	110
K4PIC	*	64,200	222	25	82
K4RZ	**14**	**134,366**	**368**	**28**	**99**
W4BRE	*	4,510	38	17	24
WA4CTA	**7**	**382,776**	**824**	**37**	**127**
K4JPD	**"**	**380,281**	**728**	**38**	**143**
			(Opr. AE6E)		
AB4RX	**"**	**200,976**	**455**	**35**	**123**
K4PI	**3.5**	**192,384**	**535**	**31**	**97**
WA4PGM	**"**	**105,462**	**307**	**30**	**96**
W4NL	*	50,700	183	24	76
WB4FOT	*	12,255	82	16	41
K4TEA	**1.8**	**27,115**	**122**	**22**	**63**
AA4VV	*	5,445	47	11	34
***K4FPF**	**A**	**438,372**	**483**	**79**	**245**
*KC4TEO	*	292,098	412	77	190
*K4OAQ	*	282,846	370	75	207
*W4YN	*	274,541	110	28	80
*N8LM/4	*	236,808	329	76	188
*W4KY	*	229,376	330	74	182
*AC4ZO	*	172,656	298	62	156
*N6MW/4	*	115,413	200	68	151
*KA4IKH	*	45,628	149	39	83
*W4ZYT	*	35,938	116	42	77
*AA4KD	*	30,590	109	44	71
*AC4ZD	*	23,226	90	34	64
*AC4PQ	*	13,536	70	23	49
***KK4SM**	**28**	**7,446**	**57**	**17**	**34**
*K2YJL/4	*	1,800	24	11	19
***N4MO**	**21**	**217,750**	**580**	**32**	**108**
***WB4TDH**	**"**	**208,925**	**541**	**29**	**108**
*N4UZ	14	6,900	54	16	34
***N4IJ**	**7**	**127,020**	**318**	**31**	**114**
*K4LDR	*	11,041	64	15	46
K5GN	**A**	**3,519,425**	**2178**	**157**	**438**
N5RZ	**"**	**3,069,627**	**1994**	**149**	**408**
K5MR	**"**	**2,550,274**	**1703**	**153**	**388**
KM5G	*	807,452	875	100	237
NJ1V/5	*	330,050	619	79	151
WF5W	*	174,306	320	68	141
N5HB	*	55,948	147	53	89
WF5E	*	50,100	128	60	90
K5HDU	*	49,660	138	44	86
K5LZO	**28**	**34,316**	**152**	**25**	**67**
AH9B/W5	*	11,501	98	16	37
W5VX	**21**	**288,840**	**713**	**32**	**113**
AA5ZO	*	210,042	615	32	94
KN6M/5	**14**	**451,520**	**950**	**40**	**130**
W5XJ	*	89,775	297	28	77
K5NU	**7**	**160,599**	**404**	**34**	**107**
N5UD	*	100,815	252	35	108
***K5KLA**	**A**	**837,936**	**754**	**111**	**285**
***N5AW**	**"**	**725,642**	**605**	**127**	**319**
*WD5K	*	584,775	614	96	249
*K5DX	*	443,156	514	104	219
*K9MK/5	*	362,595	406	114	231
*N8VV/5	*	98,875	219	59	116
*NN5T	*	75,140	156	59	111
*KB5OHT	*	66,120	163	52	100
*N5XUS	*	55,970	157	58	87
*WA5JWU	*	38,252	128	56	75
***KB5JJB**	**28**	**7,803**	**80**	**16**	**35**
***NI5M**	**21**	**124,344**	**337**	**31**	**101**
***WV5S**	**"**	**111,684**	**326**	**30**	**93**
***W5VGX**	**"**	**107,760**	**318**	**30**	**90**
*NN7A/5	*	7,089	51	16	35
***KD5IA**	**14**	**65,988**	**220**	**31**	**77**
*NZ5A	7	15,810	97	17	45
W6EEN	**A**	**2,315,619**	**1848**	**142**	**315**
N6TU	**"**	**865,536**	**793**	**132**	**260**
W6BJH	**"**	**758,725**	**966**	**94**	**181**
N6TW	*	590,538	640	113	226
W6BIP	*	406,585	436	111	238
W6FSJ	*	304,323	396	102	179
N6TV	*	280,779	577	66	107
W6NKR	*	234,000	335	88	162
KD9E/6	*	231,043	335	92	165
K6KM	*	217,581	293	98	175
K6UO	*	143,856	220	90	153
K6DR	*	112,726	257	61	96
W6KNB	*	90,729	223	62	91
W6MFC	*	78,318	170	70	101
WA5VGI/6	*	62,622	162	62	85
N6IP	*	36,704	200	29	33
N6AZE	*	34,542	128	44	57
K6OXU	*	26,883	92	47	56
W6IXP	*	17,073	101	31	32
WA6UFY	*	6,968	54	24	28
W6YA	**21**	**310,453**	**784**	**32**	**111**
W6QHS	**"**	**290,655**	**757**	**33**	**102**
W6BSY	*	113,220	364	31	80
N6JKQ	**14**	**244,464**	**660**	**36**	**96**
K6OY	**"**	**219,329**	**492**	**37**	**120**
NW6S	*	102,778	311	31	87
N6RO	**7**	**505,938**	**1113**	**39**	**120**
NW6N	**"**	**341,348**	**820**	**35**	**111**
K5KT/6	*	141,247	370	36	101
K6PJY	*	103,056	311	31	83
AB6FO	*	25,641	121	26	51
W6MVW	*	8,000	50	22	42
WA6VNR	3.5	1,007	23	10	9
***W6JTI**	**A**	**820,017**	**817**	**121**	**242**
***N6NF**	**"**	**227,040**	**341**	**92**	**166**
*N6IBP	*	127,008	250	73	123
*AA6DX	*	105,436	236	70	102
*W6NNV	*	44,145	122	54	81
*WD6DXH	*	30,747	111	47	64
*WA6URY	*	29,120	110	46	58
*N6GL	*	21,870	102	39	42
*AA6EE	*	17,680	88	37	48
*N6KT	*	1,450	19	13	16
***N6EE**	**28**	**11,041**	**67**	**21**	**40**
*WA6FGV	21	22,836	125	24	42
*KU6T	*	11,169	81	18	33
***NI6G**	**7**	**47,124**	**223**	**25**	**59**
NN7L	**A**	**1,773,550**	**1577**	**126**	**269**
N7TT	**"**	**628,286**	**791**	**99**	**190**
WC7Q	*	567,936	868	90	143
K7NO	*	477,385	582	98	209
N6HR/7	*	341,572	404	103	205
W7QDM	*	229,616	344	95	159
W7IIT	*	196,504	357	77	126
W2VJN/7	*	181,883	300	77	144
AA7FL	*	175,718	355	77	129
NT7E	*	95,680	217	52	108
AA7BG	*	73,981	180	69	98
KX7J	*	32,232	114	35	67
W7ZMD	*	19,866	91	36	50
KI7Y	*	11,880	79	24	30
K7QQ	**28**	**34,675**	**445**	**23**	**50**
W7AYY	14	45,756	175	25	68
W6QJI/7	*	31,752	193	32	52
NX7K	**7**	**187,625**	**533**	**34**	**91**
WA7BPI	**"**	**177,684**	**401**	**37**	**119**
WA7FAB	*	30,800	155	23	47
K7ABV	*	30,411	117	28	65
N5CT/7	*	1,407	25	9	12
W7HR	3.5	12,906	95	20	34
N6SS/7	**1.8**	**19,548**	**140**	**19**	**35**
KG7D	*	8,352	160	11	21
N7AM	*	910	55	7	6
***WAØRJY/7**	**A**	**372,354**	**500**	**100**	**171**
***N7LOX**	**"**	**343,616**	**550**	**85**	**151**
*WW7Q	*	337,221	458	92	175
*WA7VNI	*	127,160	281	69	101
*W7QN	*	106,045	245	66	101
*N7EPD	*	105,099	244	72	87
*K7NPN	*	32,968	135	45	59
*KA7FEF	*	21,584	110	35	41
*W7VIH	*	6,251	52	22	25
*AA7PM	*	1,690	24	13	13
*K7WA	*	1,462	31	8	9
*W3AP/7	*	660	11	11	11
***KA7T**	**14**	**120,640**	**375**	**31**	**85**
*KD7H	*	50,149	188	26	71
*AA7FK	7	16,587	117	20	37
*K7MM	*	16,133	81	25	48
*W7TSQ	*	13,536	108	21	26
K8GL	**A**	**2,869,867**	**1653**	**148**	**463**
W8JGU	**"**	**1,541,664**	**1142**	**137**	**340**
K8MR	**"**	**1,407,555**	**1057**	**123**	**342**
K3JT/8	*	914,914	758	125	332
WA8SAE	*	485,826	480	103	271
N8FU	*	378,840	512	84	196
KU8U	*	276,360	411	64	171
NU8Z	*	224,950	300	80	195
W8GOC	*	191,595	302	78	163
NT8V	*	105,315	216	52	125
W8IDM	*	100,980	194	60	138
N8AA	*	94,600	200	49	123
WB8JBR	*	34,060	149	51	80
WB8BUQ	*	14,720	68	31	49
K8SJ	*	8,772	58	28	40
W8GMH	*	4,272	32	23	25
K8OOL	**21**	**318,525**	**807**	**29**	**108**
K8JM	*	294,831	701	31	110
W8FN	*	184,950	472	30	107
WA8DXB	**14**	**308,256**	**680**	**35**	**121**
N8LXS	*	218,226	671	31	80
W9LT/8	**3.5**	**204,472**	**597**	**29**	**93**
WD8QBP	*	49,622	577	18	68
WB8PHI	*	34,408	146	22	66
WB8K	*	24,804	114	22	56
W8KZM	*	5,733	50	9	30
WB8SFF	*	2,666	32	10	21
***WU8A**	**A**	**452,184**	**507**	**91**	**241**
*W9VNE/8	*	284,954	369	87	202
*W8LRY	*	226,800	363	61	164
*KF8TM	*	139,920	243	68	144
*W8YGR	*	42,612	107	54	98
*WB8ORV	*	6,696	49	19	35
*KF8XZ	*	2,378	36	14	15
***KV8Q**	**28**	**14,941**	**88**	**21**	**46**
***N8II**	**21**	**324,144**	**777**	**30**	**114**
*KW8J	*	94,046	286	28	90
*WT8P	*	62,230	224	24	74
***W8UMR**	**14**	**53,448**	**186**	**27**	**75**
*W8WEJ	3.5	1,326	21	10	16
W9RE	**A**	**2,854,551**	**1842**	**143**	**400**
K4XU/9	**"**	**1,619,622**	**1106**	**136**	**398**
K9MA	**"**	**1,544,358**	**1252**	**124**	**313**
K9ZO	*	969,054	840	122	311
WB9HRO	*	871,850	854	109	262
N9CKC	*	723,003	671	113	288
KA9LTR	*	695,589	625	110	281
WA9TPQ	*	575,942	577	107	255
ND9O	*	349,673	426	87	220
W9OA	*	262,818	350	85	194
K9UQN	*	249,324	386	70	167
W9NA	*	245,784	339	78	186
W9HE	*	165,015	302	62	131
W9MSE	*	113,225	245	55	120
W9KIA	*	71,750	149	59	116
W9CA	*	45,108	131	41	85
NJ9Z	*	37,772	117	54	79
NE8J/9	*	10,184	56	25	42
W9GIL	**28**	**9,331**	**82**	**18**	**43**
K9OM	**21**	**179,732**	**489**	**30**	**101**
WA9BOW	*	78,210	261	28	82
K9BGL	**14**	**407,160**	**907**	**35**	**121**
N9KAU	*	305,320	828	30	106
				(Opr. JF3NRI)	
K9CAN	*	294,350	719	35	110
W9OF	*	209,129	447	37	126
NK9G	**7**	**112,890**	**289**	**33**	**109**
K9CJ	**"**	**86,016**	**241**	**34**	**94**
WB9IIQ	*	81,496	240	30	92
W9YYG	*	69,564	209	32	92
WB9TIY	*	38,570	148	26	69
N4CC/9	**3.5**	**137,372**	**402**	**29**	**93**
WI9C	**"**	**55,100**	**180**	**30**	**86**
W9CH	*	32,844	146	23	61
KE9U	*	23,332	114	21	55
W9RN	*	10,368	79	14	34
WB9Z	**1.8**	**46,314**	**207**	**22**	**71**
***K9QVB**	**A**	**687,420**	**656**	**113**	**267**
*KJ9C	*	293,160	376	80	200
*NA1R/9	*	255,936	376	80	178
*NG9L	*	85,888	185	57	119
*W9REC	*	5,152	33	24	32
***W9HLY**	**21**	**144,493**	**389**	**32**	**99**
***K9KU**	**14**	**231,768**	**560**	**35**	**113**
***KB9S**	**"**	**118,560**	**326**	**31**	**99**
***W9JOO**	**"**	**76,035**	**248**	**27**	**84**
*WA9AUW	*	400	23	8	17
***K9MMS**	**7**	**58,206**	**195**	**26**	**83**
*K9UIY	*	55,045	192	29	80
*KO9Y	*	48,124	162	27	79
K4VX/Ø	**A**	**3,832,281**	**2065**	**167**	**490**
WØWP	**"**	**1,332,800**	**1009**	**130**	**346**
KDØZR	*	759,428	750	115	258
KMØL	*	740,440	787	104	242
NXØI	*	606,400	566	120	280
KCØEI	*	462,384	503	102	236
KØRWL	*	393,040	434	95	245
WCØY	*	364,364	394	97	241
K9WIE/Ø	*	347,964	405	88	233
KEØUI	*	346,884	462	86	188
NSØB	*	300,348	367	102	207
WØML	*	263,349	366	86	175
KØVXU	*	228,570	295	92	193
KEØY	*	225,504	353	72	160
KIØW	*	222,498	305	78	185
WØRSR	*	190,960	314	71	149
KØGSV	*	173,055	260	69	180
KØBJ	*	139,950	234	88	137
WAØOZP	*	55,727	163	48	85
KØJE	*	29,561	109	36	67
KØINR	*	25,520	103	41	69
KØJA	*	23,400	98	30	60
NQØI	**14**	**321,328**	**765**	**37**	**115**
KØOD	**7**	**197,658**	**443**	**35**	**123**
WBØO	**3.5**	**39,552**	**152**	**27**	**69**
KØTT	*	29,602	134	21	61
KVØQ	**1.8**	**28,161**	**186**	**20**	**43**
WØRXL	*	1,113	26	9	12
***KZ6E/Ø**	**A**	**564,465**	**573**	**104**	**259**

AVERAGE UNIQUE PERCENTAGES BY CATEGORY

Here is the CW unique percentage for various categories. Each number in the table is the average of the top ten entrants of that category for which we have disks. The first # = U%. Second # = U + 1%.

	160	80	40	20	15	10
WORLD-AB	1.9/1.6	2.2/2.0	2.4/1.9	2.8/2.2	2.3/1.9	2.5/1.8
USA-AB	2.0/1.8	2.0/1.7	2.8/2.3	2.0/1.6	1.9/1.6	2.0/1.6
EUROPE-AB	1.6/1.4	2.2/1.5	2.3/1.9	3.0/2.6	2.6/2.1	1.2/1.2
WORLD-LAB	4.5/3.6	3.4/3.0	3.5/2.8	3.1/2.6	3.1/2.4	3.2/2.7
WORLD-QRP	0.0/0.0	2.3/2.3	1.2/1.2	0.4/0.4	0.5/0.5	3.5/3.5
WORLD-ASS.	3.2/2.6	2.8/2.1	3.1/2.6	2.3/1.9	2.9/2.4	2.2/2.2
WORLD-MS	4.0/3.1	3.2/2.6	5.1/4.1	5.1/3.9	4.3/3.4	4.0/3.6
USA-MS	3.1/2.4	4.2/3.1	5.5/4.0	4.9/3.9	3.4/2.7	3.0/3.0
EUROPE-MS	3.8/3.2	5.2/4.5	7.1/5.6	8.7/6.4	6.5/4.8	3.6/2.5
WORLD-MM	5.4/3.8	6.8/5.1	5.3/4.2	5.5/4.2	3.8/2.8	4.0/2.9
USA-MM	4.8/3.6	5.6/4.2	5.1/4.0	5.5/4.4	3.9/3.1	4.0/3.0
EUROPE-MM	8.2/6.3	8.4/6.6	7.7/6.0	10.6/7.8	6.7/4.8	4.9/2.9

*NSØW	*	345,514	465	88	186
*KRØI	*	173,978	284	76	162
*NWØF	*	110,088	229	68	130
*NØFFZ	*	86,944	179	58	118
*KBØIHM	*	41,422	121	52	87
*NØFMR	*	37,375	145	48	77
*NØUEI	*	16,786	88	31	46
*WWØQ	*	4,590	42	24	30
*WØYRN	*	2,556	27	16	20
***WDØAVV**	**28**	**9,900**	**71**	**15**	**40**
***WIØR**	**14**	**60,770**	**205**	**28**	**75**
***KJØB**	**7**	**55,836**	**190**	**30**	**78**

ALASKA

AL7CQ	**14**	**409,812**	**1519**	**30**	**61**
KL7RA	**7**	**383,328**	**1224**	**31**	**90**
AL7MX	**1.8**	**8,322**	**182**	**10**	**19**
***NL7DU**	**A**	**171,229**	**873**	**36**	**47**
*KL7FAP	21	14,094	218	13	14

ANTIGUA

***V2/G6QQ**	**A**	**304,623**	**734**	**57**	**130**

BAHAMAS

***C6A/N4RP**	**A**	**646,722**	**1060**	**88**	**181**

BELIZE

***V31YZ**	**A**	**386,155**	**975**	**68**	**119**
		(Opr. W5YZ)			

BERMUDA

K8PYD/VP9	7	20,160	106	19	51
***VP9 /WB8YJF**	**A**	**713,310**	**1051**	**80**	**215**

CANADA

VE1XDX	**28**	**27,571**	**145**	**21**	**58**
VE1ST	**14**	**790,444**	**2044**	**33**	**113**
VE1MQ	3.5	12,054	98	12	37
VO1NA	**1.8**	**148,050**	**661**	**20**	**70**
***VE1AZN**	**A**	**1,043,616**	**1252**	**82**	**254**
***VE1HA**	**"**	**856,716**	**934**	**91**	**281**
*VF1L	*	691,470	1048	72	198
			(Opr. VE1AL)		
***VE1FQ**	**14**	**113,238**	**595**	**22**	**59**
CH2ZP	**A**	**2,651,971**	**2317**	**122**	**335**
VE2AYU	*	894,138	988	96	270
CH2AWR	*	129,870	296	61	124
VE2GHI	*	67,512	247	39	77
***VE2CUA**	**A**	**863,604**	**1216**	**85**	**213**
			(Opr. VK3DXI)		
*VE2WAT	*	98,000	225	57	118
*VE2FFE	*	41,234	165	38	68
***VO2AC**	**14**	**97,510**	**660**	**17**	**53**
***VE2DSX**	**7**	**61,336**	**342**	**21**	**61**
VE3KP	**A**	**664,608**	**955**	**92**	**209**
VE3OTL	*	352,518	595	77	169
VE3CWE	*	146,265	276	54	145
VE3TEE	*	51,590	207	37	73
VE3MM	*	26,068	113	35	63
VE3BR	*	3,364	60	10	19
VE3HX	**28**	**26,180**	**169**	**21**	**49**
***VE3ST**	**A**	**387,450**	**509**	**77**	**210**
*VE3TDG	*	158,235	742	41	64
*VE3ZTH	*	92,826	198	61	130
*VE3IAY	*	39,875	106	51	94
***VE3MVV**	**21**	**57,750**	**214**	**25**	**80**
***VE3DSN**	**14**	**68,130**	**300**	**23**	**67**
*VE3KUK	*	24,050	131	23	51
***XM4VV**	**A**	**1,203,840**	**2044**	**93**	**195**
*VE4CE	*	128,318	328	58	108
VE5SF	**A**	**128,184**	**336**	**64**	**104**
***VO5SF**	**14**	**273,060**	**1020**	**24**	**87**
*VE5GC	*	1,551	71	6	5
VE6JY	**7**	**256,032**	**888**	**34**	**92**
			(Opr. VE6WQ)		
***VE6BF**	**A**	**426,398**	**836**	**85**	**144**
*VE6BMX	*	314,959	741	72	119
*VE6HPT	*	140,459	593	48	65
VE7VR	**A**	**577,626**	**1055**	**84**	**154**
VE7IN	*	357,408	689	82	122
VE7UF	*	81,554	344	47	46
VE7RBL	**21**	**116,672**	**835**	**23**	**41**
CH7SZ	**14**	**814,506**	**2189**	**36**	**118**
			(Opr. VE7NTT)		
VE7MR	*	405,504	1228	36	96
VE7AV	*	279,377	1058	31	76
CH7SV	**7**	**693,792**	**1877**	**34**	**110**
CH7CC	**3.5**	**213,853**	**1204**	**27**	**52**
VE7BS	1.8	3,318	32	7	6
***CH7AHA**	**7**	**384,300**	**1237**	**33**	**93**
*VE7CFA	*	297	17	5	4

COSTA RICA

TI1C	**A**	**9,123,817**	**6335**	**159**	**448**
			(Opr. N6TR)		
***TI4 /AA7JM**	**A**	**74,360**	**248**	**49**	**81**

CUBA

***CO2MA**	**7**	**78,984**	**521**	**21**	**51**

DOMINICA

HI8LC	1.8	1,634	40	6	13

EL SALVADOR

YS1X	**A**	**3,512,151**	**3313**	**137**	**340**
			(Opr. NL7GP)		

GREENLAND

OX3RA	A	30,030	155	19	59

GUADELOUPE

FG5BG	**7**	**992,654**	**2725**	**33**	**113**
			(Opr. KD6WW)		

GUATEMALA

TG/EA4KT	**A**	**723,726**	**1758**	**64**	**122**

HAITI

HH2PK	**A**	**1,380,248**	**2099**	**89**	**207**

JAMAICA

***DL6KVA /6Y5**	**A**	**1,341,714**	**1994**	**93**	**226**

MARTINIQUE

***FM5CW**	**A**	**445,816**	**1056**	**66**	**200**

MEXICO

XE1/AA6RX	**A**	**3,758,225**	**3952**	**133**	**292**
XE1VV	*	1,050,247	1506	103	204
XE2MX	*	206,238	369	78	144

PANAMA

***HP1AC**	**A**	**238,700**	**690**	**56**	**99**

PUERTO RICO

WP4IIW	**A**	**1,039,635**	**1811**	**73**	**182**
***NP4Z**	**A**	**3,948,966**	**3926**	**108**	**326**
*KP4TQ	*	520,920	1388	58	122

SINT MAARTEN

***PJ5JP**	**A**	**177,660**	**612**	**47**	**88**
*PJ8NA	*	64,750	457	32	38
			(Opr. K1NA)		

ST. CHRISTOPHER

V47KP	**A**	**1,207,569**	**2222**	**77**	**176**
			(Opr. K2DOX)		

TURKS & CAICOS ISLANDS

VP5RX	**A**	**5,205,519**	**4781**	**120**	**339**
			(Opr. AA2Z)		

U.S. VIRGIN ISLANDS

KP2A	**21**	**964,960**	**2619**	**32**	**116**
			(Opr. KW8N)		
***NP2I**	**A**	**2,202,228**	**3055**	**94**	**230**

AFRICA

ASCENSION ISLAND

ZD8Z	**A**	**9,086,940**	**5369**	**151**	**419**
			(Opr. N6TJ)		
ZD8VJ	**21**	**1,650,663**	**3235**	**36**	**135**
			(Opr. G4ZVJ)		

BURKINA FASO

***XT2BW**	**A**	**181,178**	**400**	**59**	**98**

BOTSWANA

A22MN	**7**	**544,688**	**1555**	**33**	**85**
			(Opr. OH7XM)		

CANARY ISLANDS

EA8EA	**A**	**12,703,752**	**6483**	**158**	**499**
			(Opr. OH2MM)		
*EA8BGX	A	41,080	115	41	89
*EA8ABF	*	16,587	101	21	36
***EC8AXM**	**21**	**224,640**	**941**	**19**	**61**
*EC8AZM	*	58,218	315	17	45
***EA8NQ**	**7**	**205,485**	**724**	**18**	**77**

IVORY COAST

TU2MA	**A**	**2,176,488**	**2155**	**96**	**246**

KENYA

5Z4JD	**A**	**1,516,403**	**1501**	**103**	**240**

LIBERIA

***EL2PP**	**A**	**2,594,032**	**2353**	**109**	**262**
			(Opr. I8NHJ)		

MALAWI

7Q7OO	**A**	**7,173,846**	**4630**	**134**	**388**
			(Opr. N6AA)		

MOZAMBIQUE

C91J	**A**	**2,394,963**	**2871**	**80**	**201**
			(Opr. WA4WKY)		

NIGERIA

5NØMVE	1.8	270	10	3	6
			(Opr. ON4AVO)		

REP. OF SOUTH AFRICA

ZS6EZ	**A**	**6,924,175**	**4542**	**137**	**378**
ZS6MG	*	289,172	594	56	110
***ZS6AJS**	**A**	**247,230**	**417**	**76**	**129**

SENEGAL

6V6U	**A**	**8,949,808**	**5242**	**138**	**436**
			(Opr. K3IPK)		

ZONE 33

***AA5DX /MM**	**A**	**255,156**	**652**	**50**	**82**

ZONE 35

***EA1FBJ /MM**	**A**	**135,026**	**266**	**60**	**121**

ASIA

ASIATIC RUSSIA

UZ9AXX	**A**	**1,148,935**	**1328**	**85**	**225**
UA9XF	*	216,840	404	47	148
RW9SW	**14**	**266,760**	**745**	**36**	**94**
UA9XW	*	27,625	166	19	46
UW9CK	**3.5**	**221,208**	**787**	**21**	**83**
UA9OA	*	196,524	735	22	81
UZ9CWW	*	184,688	677	20	77
UA9OC	*	133,453	483	28	85
UV9YI	*	87,824	459	20	68
UA9MA	*	80,000	385	21	59
RA9UK	**1.8**	**15,529**	**143**	**13**	**40**
*RA9XN	A	4,972	40	11	33
***UW9TM**	**21**	**90,804**	**388**	**21**	**71**
***RA9FF**	**14**	**59,808**	**278**	**22**	**62**
*UA9AR	*	38,610	208	17	49
***UA9XC**	**7**	**63,204**	**291**	**19**	**63**
***UA9AT**	**1.8**	**47,334**	**246**	**13**	**56**
RWØAB	**A**	**1,005,975**	**1530**	**73**	**190**
UAØZDA	*	355,040	1256	61	99
UAØKCL	14	20,945	151	18	41
UAØSR	**3.5**	**60,117**	**345**	**23**	**64**
RAØFU	1.8	3,192	130	11	10
***RAØSS**	**A**	**25,440**	**115**	**38**	**68**
*RAØJX	"	12,958	132	27	35
***UAØZAJ**	**21**	**30,528**	**277**	**26**	**38**
*UAØCKA	*	22,632	195	25	44
*UAØSBQ	14	5,478	81	10	23
***UAØJQ**	**7**	**354,311**	**1225**	**38**	**101**
***RAØFA**	**"**	**273,921**	**956**	**32**	**91**
***UAØSMM**	**3.5**	**82,368**	**351**	**28**	**71**

AZERBAIJAN

***UD6DKW**	**A**	**216,240**	**385**	**56**	**156**

CYPRUS

C41A	**7**	**1,307,944**	**2972**	**34**	**133**
			(Opr. T93A)		

INDIA

***VU3VOA**	**A**	**83,122**	**576**	**46**	**93**
*VU2FWW	21	6,020	56	13	30
***VU2HJA**	**14**	**30,580**	**183**	**22**	**43**

ISRAEL

4X6FR	**14**	**617,872**	**1505**	**36**	**110**
4X4WN	**7**	**318,500**	**1995**	**26**	**74**
4X6ZK	*	113,420	373	26	61
4X4NJ	**1.8**	**157,896**	**646**	**17**	**69**

JAPAN

JA1NUT	**A**	**2,115,936**	**1601**	**145**	**329**
JH1AEP	**"**	**1,957,364**	**1781**	**129**	**269**
JA1JKG	"	908,905	1102	102	187
JF1KFV	"	470,110	641	98	167
JR1GRF	"	334,010	367	89	165
JA1QOW	*	124,350	299	53	97
JG1BPS	*	117,760	278	68	92
JA1BNW	*	87,808	164	77	119
JL1MWI	*	57,230	222	36	61
JO1QZI	*	28,797	121	35	51
JA1JNR	*	10,512	58	33	39
7L1ILE	*	5,989	44	22	31
JH1AOU	*	4,366	43	16	21
JA1AAT	*	3,699	51	19	22
JA1ECO	*	1,040	28	7	6
JA1NLX	28	2,247	42	13	21
JR1XFS	**14**	**205,668**	**621**	**33**	**83**
JR4PMX/1	"	132,720	344	37	103
JA1VBW	"	50,274	188	32	66
JA1BDI	*	108	6	2	4
JJ1NNJ	**7**	**278,180**	**716**	**35**	**105**
JK1OPL	*	213,785	538	36	107
JA1SJV	*	7,700	56	22	28
JH1OGC	**3.5**	**154,656**	**576**	**29**	**67**
JF1NZW	1.8	1,890	32	11	10
JL1EUP	*	855	21	8	7
JA1XEM	*	540	13	7	8
***JA1IDY**	**A**	**655,980**	**670**	**131**	**246**
***JJ3SRU/1**	**"**	**259,434**	**375**	**95**	**166**
*JK1AJX	*	237,354	402	89	132
*JK1JHB	*	164,800	325	78	122
*JA1BUI	*	113,448	266	64	99
*JA1TRP	*	105,462	216	67	95
*JAØXQO/1	*	81,950	214	59	90
*JH8KYU/1	*	77,472	195	65	79
*JF1SQC	*	70,800	170	61	89
*7N2TCF	*	64,774	175	54	85
*JA1AB	*	63,414	202	53	64
*JA1QN	*	54,480	180	51	69
*JS1KQQ	*	54,120	169	48	72
*JA6EET/1	*	49,140	164	55	71
*JH1HGF	*	42,592	142	52	69
*JA1BCP	*	23,100	112	34	41
*JN1NOP	*	21,414	90	38	45
*JL7PVR/1	*	14,168	99	24	32
*JI1RCB	*	7,626	71	19	22
*JE1KUP	*	7,035	52	31	36
*JG1RDV	*	6,943	51	25	28
*JF1LKM	*	6,466	43	28	33
*7L1RLL	*	4,400	46	16	24
*JH1NXU	*	3,990	39	19	19
*JE1KDM	*	2,850	42	13	12
*JH1JGZ	*	1,974	36	11	10
*JO1FYC	*	315	10	8	7
*JA1KFX	28	9,555	80	17	32
*7M2MEF	*	8,183	66	18	31
*JA1XPU	*	117	5	4	5
***JE1BDC**	**21**	**119,756**	**443**	**29**	**69**
*JQ1NGT	*	97,470	396	29	61
*JJ1VRO	*	76,590	249	34	77
*JAØBMS/1	*	70,700	260	32	68
*JF2NXS/1	*	54,954	245	30	56
*JH1BDS	*	39,375	191	28	47
*JH1ECF	*	38,947	179	29	50
*JA1KI	*	17,688	109	23	44
*JR1VNX	*	1,518	23	10	12
*JH1BUB	*	646	14	9	10
***JR2BNF/114**		**167,356**	**431**	**38**	**101**
*JE7MAY/1	*	28,542	155	22	49
*JE1REU	*	25,104	181	20	28
*JR1LQK	*	1,656	30	12	11
*JA1POS	*	42	3	3	3
***JM1NKT**	**7**	**54,327**	**224**	**29**	**62**
*JK1OXU	"	17,136	109	26	30
*JK1AFI	"	9,690	68	21	30
*JA1NYV	"	5,895	47	17	28
*7K2GMF	*	1,280	24	9	11
*JA1BFN	*	165	11	6	9
*JE1SPY	1.8	918	20	10	8
JR2AGL	**A**	**1,225,985**	**1253**	**119**	**240**
JH2UVL	**"**	**1,207,545**	**1206**	**116**	**245**
JE2WEN	*	563,970	644	113	217
JA2SWF	*	71,918	180	63	91
JG2LGM	**7**	**70,600**	**258**	**31**	**69**
JH2BCN	*	25,276	136	25	46
JA2KPV	*	3,604	40	14	20
JE2LPC	**1.8**	**987**	**20**	**12**	**9**
***JA9DDF/2**	**A**	**120,903**	**241**	**83**	**108**
*JN2AMD	*	67,179	20	59	88
*JE2NWN	*	54,875	164	49	76
*JH2AMH	"	52,725	186	46	65
*JM2RUV	"	22,704	126	30	36
*JE2DGJ	*	9,855	57	34	39
*JQ2GQG	*	7,396	64	20	22
*JA2MZ	*	4,896	40	24	27
*JE2IFM	28	2	1	1	1
***JI2UNR**	**21**	**102,918**	**363**	**32**	**70**
*JH2ECB	*	102,424	321	34	84
***JA2DN**	**14**	**55,284**	**198**	**32**	**70**
*JA2ANA	*	55,100	195	27	73
*JQ2LGS	*	24,336	128	24	48
***JS3VEX/2**	**7**	**32,175**	**171**	**27**	**48**
*JA2GTW	*	25,086	125	26	48
*JF2LTH	*	496	13	8	8
*JK2PNY	1.8	132	6	6	6
JA3ARM	**A**	**265,593**	**454**	**80**	**143**
JL3SBE	*	9,240	55	27	33
JA3XOG	**28**	**39,336**	**213**	**26**	**40**
JR3NZC	**21**	**270,125**	**764**	**34**	**91**
JN3SAC	**14**	**115,549**	**344**	**36**	**83**
JA3VAP	*	26,100	129	24	51
JN3TMW	**7**	**66,156**	**228**	**33**	**78**
JI3AUD	*	33,440	165	25	51
JA3SSW	*	14,036	93	21	36
JF3LOP	**3.5**	**17,160**	**129**	**22**	**38**
JA3XOG	*	6,864	72	17	27
JA3BCT	*	5,559	47	14	37
***JA3JM**	**A**	**253,725**	**375**	**85**	**170**
***JA1DZC/3**	**"**	**225,456**	**360**	**90**	**154**
*JF3IUC	*	219,420	389	73	139
*JH3CUL	*	207,974	343	88	159
*JG3CQJ	*	193,256	358	79	124
*JA3JOT	*	82,875	255	45	80
*JR3XEX	*	22,148	100	40	58
*JG3EHD	*	4,180	40	18	20
*JA3TBT	*	1,864	41	21	37
***JI3KDH/321**		**48,600**	**200**	**28**	**72**
*JE3UHV	*	10,971	83	20	33
*JA3AVO	*	2,432	30	15	23
***JI3BFC**	**14**	**93,795**	**318**	**31**	**80**
*JE3KGT	*	3,003	31	13	26
***JF3GPS**	**7**	**65,611**	**232**	**31**	**72**
*JA3GN	*	41,200	156	33	67
*JF3XDS	*	33,947	157	27	56

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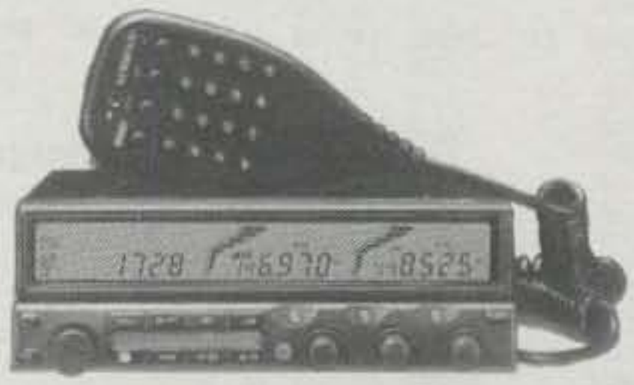

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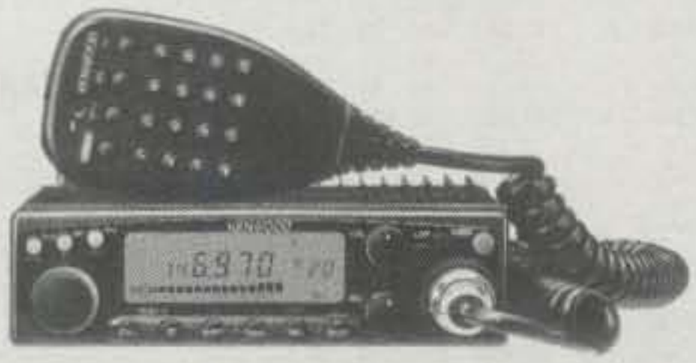

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TM-255A

*JK3GWT	*	21,440	123	25	42
*JA3FZI	*	676	18	6	7
JA4CSH	**A**	**245,993**	**550**	**78**	**131**
JH4OYA	*	180,690	375	75	115
JA4XRN	*	161,541	306	71	122
JA4RTX	*	20,604	76	42	59
JA4CES	*	10,212	64	30	39
JH4UYB	**21**	**157,320**	**516**	**33**	**81**
JA4DXT	7	2,451	43	9	10
JA4LKB	**1.8**	**3,720**	**47**	**14**	**17**
***JK4KBG**	**A**	**402,480**	**507**	**99**	**213**
***JR4GPA**	**"**	**294,624**	**515**	**77**	**139**
*JL4CMT	*	184,672	351	74	125
*JK4KSD	*	177,576	329	70	126
*JA4BAA	*	40,280	140	41	65
*JA4AQR	*	34,701	107	56	73
*JA4HIX	*	14,194	140	47	63
*JA4ETH	28	1,914	27	13	20
***JH4JNG**	**14**	**164,929**	**455**	**36**	**95**
*JA1XCZ/4	*	16,653	116	21	40
*JA5MOO/4	*	2,520	30	15	20
JH5FXP	**A**	**2,655,594**	**2156**	**134**	**304**
JA5CKD	**21**	**87,945**	**262**	**35**	**88**
JA5APU	14	60,320	270	27	53
JA5AF	*	7,650	66	18	27
JA5IP	**7**	**37,683**	**173**	**24**	**55**
JA5JGV	3.5	6,650	66	18	32
***JD1WXJ/5**	**A**	**254,826**	**426**	**91**	**143**
*JG5OYU	*	47,754	137	51	75
***JR5HXU**	**14**	**20,880**	**91**	**30**	**57**
***JR5MTS**	**7**	**21,150**	**103**	**27**	**48**
*JA5PDS	*	16,298	106	20	38
*JA5EZI	*	3,848	38	16	21
JA6WIF	**28**	**33,920**	**159**	**25**	**55**
JH6WHN	*	26,110	144	23	47
JH6NBW	**21**	**128,800**	**473**	**31**	**69**
JF6DSZ	3.5	20,150	128	21	44
JR6EZE	**1.8**	**1,625**	**28**	**13**	**12**
***JH6TYD**	**A**	**242,816**	**406**	**78**	**146**
*JO6GIV	*	24,500	98	41	57
***JK6ISK**	**21**	**24,895**	**142**	**24**	**41**
*JA6QDU	*	5,280	46	14	26
*JA6EML	7	15,989	101	21	38
*JA6HJP	*	5,513	53	14	23
*JA6BIF	3.5	4,560	51	14	26
JH7AUL	**A**	**671,832**	**992**	**94**	**164**
JA7UES	*	226,688	459	76	108
JA7JI	28	3,255	36	14	21
JH7DNO	**21**	**319,858**	**844**	**34**	**100**
JA7FTR	*	272,371	803	33	88
JH7XGN	*	180,032	548	34	82
JA7AXP	14	4,560	42	15	25
JA7MAD	**7**	**42,942**	**149**	**34**	**68**
JR7UOL	*	3,472	47	14	14
JH7PKU	**3.5**	**80,480**	**401**	**25**	**55**
***JH7AUL**	**A**	**671,316**	**992**	**94**	**164**
***JH7XQV**	**"**	**431,181**	**746**	**78**	**129**
*JA7SUR	*	237,440	409	87	137
*JH7BMZ	*	172,557	286	94	137
*JA7BVA	*	92,990	205	68	102
*JH7CJM	*	10,428	92	34	45
*JH7FUJ	*	4,160	40	26	26
*JA7JW	*	424	32	10	10
***JF7QUE**	**28**	**12,485**	**76**	**21**	**34**
***JA7MSQ**	**21**	**118,476**	**395**	**35**	**73**
*JM1VKW/7	*	43,699	198	28	61
*JA7BIJ	*	14,826	124	21	21
***JH7JVJ**	**14**	**223,250**	**619**	**36**	**89**
*JA7JND	*	40,606	195	26	53
*JA7DOT	*	36,192	169	26	52
***JE7RJS**	**7**	**81,988**	**206**	**33**	**70**
*JA7FFN	*	8,190	74	17	22
*JE7JRD	*	5,565	60	17	18
JA8SW	A	35,086	132	43	63
JA8KSD	3.5	10,285	83	21	34
***JA8AJE**	**A**	**113,652**	**267**	**70**	**94**
*JA8HBO	*	57,584	182	54	64
*JE8KGH	7	4,107	41	17	20
JA9CWJ	**A**	**647,088**	**790**	**107**	**205**
JA9CCG	*	9,120	58	28	32
JA9KKD	7	12,144	77	25	41
JA9HU	*	660	22	5	5
***JA9XBW**	**A**	**405,335**	**501**	**115**	**198**
*JR9FJY	*	4,070	42	19	18
*JA9XAT	28	300	9	7	8
***JH9KVF**	**21**	**122,879**	**437**	**31**	**72**
***JA9TSI**	**14**	**60,400**	**219**	**33**	**67**
JAØAXA	A	28,952	94	43	51
JAØONJ	21	24,656	187	21	25
JAØUMV	**14**	**197,792**	**619**	**33**	**79**
JHØFUW	**7**	**206,778**	**526**	**35**	**108**
***JHØKHR**	**A**	**907,920**	**894**	**131**	**259**
*JHØDNX	*	240,464	406	88	138
*JAØQWO	*	170,520	317	86	124
*JAØGCI	*	165,788	290	88	129
*JAØBJY	*	55,000	180	43	67
*JAØNFP	*	12,533	63	36	47
*JAØGZ	*	969	19	8	9
***JEØUXR**	**21**	**109,386**	**401**	**32**	**71**
*JHØEPI	*	21,033	137	22	35
***JFØSGW**	**14**	**53,103**	**214**	**29**	**64**
*JHØAUY	*	19,551	132	20	37
*JHØESK	*	18,023	104	25	42
*JJ1XDL/Ø	7	50,072	215	27	61
*JH3LCU/Ø	3.5	12,700	106	18	32
*JRØXOJ	1.8	198	8	5	4

JORDAN

JY8VJ	**A**	**7,164,512**	**4262**	**139**	**445**
			(Opr. DL1VJ)		

KAMPUCHEA

XU7VK	**A**	**501,650**	**1067**	**81**	**173**

KAZAKHISTAN

UN7LZ	**A**	**1,382,256**	**1517**	**87**	**261**
UN8PT	*	244,530	463	58	151
UN2L	**3.5**	**366,938**	**1053**	**35**	**108**
			(Opr. UW9AR)		
UN5G	*	132,252	562	25	78
UN7BY	*	61,698	272	16	62
UN4B	*	36,783	221	15	52
***UN7FW**	**A**	**527,429**	**683**	**88**	**215**
*UN8IM	*	228,620	318	67	217
*UN7FAZ	*	225,792	581	48	120
***UN9PY**	**21**	**99,180**	**450**	**21**	**66**
***UN7R**	**14**	**36,360**	**190**	**19**	**53**

KOREA

*HL93AP	A	19,872	113	45	47
*HL9UH	*	30,100	165	44	56

KUWAIT

9K2ZZ	**A**	**5,014,159**	**3734**	**137**	**372**

LEBANON

***SM1TDE /4U**	**A**	**232,132**	**627**	**8**	**29**

MONGOLIA

***JT1BH**	**A**	**302,771**	**1010**	**55**	**112**
*JT1CO	*	138,908	652	59	95
***JT1BV**	**14**	**14,553**	**214**	**18**	**31**

OGASAWARA

***JD1BIC**	**A**	**30,095**	**323**	**35**	**30**
*JA9BFA /JD1	*	5,800	64	21	29

PAKISTAN

AP2SP	A	14,500	100	14	36
AP5N	**21**	**393,875**	**1283**	**30**	**95**
			(Opr. SP5DIR)		

QATAR

***A71CW**	**A**	**2,484,460**	**1930**	**126**	**365**

SAUDI ARABIA

HZ1HZ	**A**	**1,012,095**	**879**	**105**	**300**

SRI LANKA

4S7/N6ZZ	**A**	**4,575,420**	**3313**	**144**	**411**
4S7/F6AOI	3.5	1,026	19	13	14
***4S7 /OH2VZ**	**A**	**77,805**	**203**	**60**	**111**
*4S7 /F5LGQ	28	9,798	74	14	32
***4S7 /F6BFH**	**7**	**40,761**	**244**	**19**	**44**
***4S7RPG**	**1.8**	**408**	**14**	**7**	**10**
			(Opr. G3REP)		

TAIWAN

BV2A	**A**	**101,640**	**260**	**57**	**108**
BV/KK6BB	*	84,357	564	40	63
BV/KC6CNV	*	82,680	525	41	65

TURKEY

***TA3D**	**A**	**801,746**	**1371**	**59**	**183**
***TA2BD**	**7**	**297,528**	**1352**	**17**	**60**

UZBEKISTAN

UI8BAA	**3.5**	**67,032**	**497**	**23**	**61**
***UI9ACP**	**7**	**148,590**	**499**	**27**	**90**

ZONE 21

KM6LP/MM	**A**	**100,620**	**215**	**53**	**119**

EUROPE

ALAND ISLANDS

OHØAM	**21**	**427,284**	**1345**	**36**	**130**
			(Opr. OH1EH)		
OHØDX	**14**	**834,912**	**2551**	**37**	**119**
			(Opr. OH2MAM)		

ALBANIA

ZA/OK2PSZ	**A**	**1,348,438**	**2120**	**102**	**332**
ZA1AB	**14**	**225,630**	**1453**	**28**	**81**

AUSTRIA

OE5SPW	**A**	**88,476**	**300**	**54**	**148**
OE3RE	*	73,500	263	40	107
OE3EMN/1	**7**	**106,340**	**425**	**31**	**99**
OE3GSA	**3.5**	**213,344**	**1149**	**27**	**91**
*OE8SKQ	28	2,856	46	11	17

BALEARIC ISLANDS

EA6ZS	A	24,300	157	19	56
EA6ACC	**21**	**190,890**	**965**	**31**	**95**
EA6BD	*	60,987	305	26	61
ED6XXX	**7**	**929,660**	**2740**	**39**	**133**
			(Opr. N6RA)		
EA6AA	*	14,893	177	12	41
***EA6GP**	**A**	**94,188**	**343**	**47**	**120**
*EA6EJ	*	59,192	344	23	75

BELARUS

UC2AW	A	57,288	156	58	96
UC2LR	**14**	**138,504**	**518**	**29**	**87**
UC2IO	*	71,316	385	24	74
UC2SD	**3.5**	**40,117**	**390**	**15**	**62**
RC2CO	*	6,120	148	5	25
UC2WAF	**1.8**	**39,600**	**459**	**15**	**51**
***UC2SN**	**3.5**	**52,890**	**429**	**16**	**70**

BELGIUM

ON4UN	**3.5**	**630,568**	**2119**	**35**	**114**
***ON4APA**	**A**	**157,680**	**422**	**60**	**156**
*ON6LO	*	17,556	104	30	47
*ON6EU	*	2,310	46	11	10
***ON6CW**	**21**	**121,900**	**475**	**27**	**79**
*ON4KFM	*	33,583	173	22	49
***ON4ZD**	**14**	**123,384**	**500**	**26**	**80**
*ON4XG	*	60,016	343	21	67
*ON4ALW	*	40,661	281	18	55
*ON4PX	*	23,166	224	13	41

BOSNIA

T94ON	**3.5**	**222,000**	**1526**	**22**	**78**
***T97T**	**A**	**162,447**	**549**	**48**	**125**
***T93M**	**28**	**37,694**	**182**	**27**	**67**

BULGARIA

LZ1ZF	**A**	**222,420**	**630**	**50**	**170**
LZ1BJ	*	68,670	390	37	89
LZ3HI	*	66,400	223	50	110
LZ1EV	*	13,732	146	43	64
LZ3SM	*	5,002	50	18	43
LZ5W	**14**	**576,034**	**1918**	**38**	**111**
			(Opr. LZ1MC)		
LZ1KBB	**7**	**371,583**	**1261**	**37**	**122**
			(Opr. LZ3FN)		
LZ6G	*	178,215	985	26	83
LZ1KOZ	**3.5**	**237,413**	**1187**	**25**	**88**
			(Opr. LZ1OP)		
*LZ1FJ	A	13,248	153	14	58
*LZ2FM	*	11,275	132	19	36
*LZ1YE	14	30	4	2	3

CORSICA

TK5NN	**3.5**	**321,904**	**1611**	**29**	**95**

CROATIA

9A3ZO	A	2,580	46	23	37
9A5Y	**21**	**480,655**	**1300**	**35**	**120**
			(Opr. 9A3LG)		
9A7A	**14**	**462,308**	**1325**	**35**	**123**
			(Opr. 9A3RB)		
9A3IQ	**7**	**599,589**	**1596**	**36**	**123**
9A2TW	**1.8**	**67,456**	**664**	**8**	**60**
***9A3ZG**	**A**	**65,985**	**199**	**51**	**108**
*9A3LN	*	14,000	93	23	33
***9A2LH**	**28**	**19,275**	**100**	**20**	**50**

CZECH REPUBLIC

OK2BJT	**A**	**80,496**	**307**	**38**	**79**
OK2DB	*	18,190	91	35	72
OK1ALW	**21**	**432,798**	**1123**	**36**	**123**
OK1VD	*	53,240	211	31	79
OK5A	**14**	**735,301**	**1909**	**39**	**128**
			(Opr. OK2PZW)		
OK1AYP	**7**	**662,375**	**1826**	**38**	**137**
OL1CW	**3.5**	**98,420**	**937**	**16**	**58**
			(Opr. OK1DFF)		
OK2FD	*	72,446	475	19	70
OK1DQT	*	9,512	108	10	31
OK1DRU	**1.8**	**37,485**	**518**	**9**	**54**
***OK1FPS**	**A**	**560,280**	**1124**	**80**	**210**
***OK1EP**	**"**	**556,325**	**619**	**110**	**275**
*OK2TBC	*	501,942	837	71	195
*OK2EC	*	481,140	937	61	209
*OK2PO	*	328,335	576	77	218
*OK1FKV	*	295,612	695	63	200
*OK2PCF	*	293,376	768	62	194
*OK2ON	*	272,935	600	62	185
*OK1DKR	*	207,872	421	64	168
*OK1MKI	*	179,586	556	58	140
*OK2BND	*	92,225	400	38	117
*OK2BEV	*	82,500	260	48	62
*OK1AOU	*	75,308	323	28	106
*OK2SWD	*	30,825	215	24	51
*OK2AJ	*	27,722	200	21	62
*OK1BLC	*	23,718	140	20	39
*OK2VVN	*	17,272	189	12	56
*OK1DXW	*	11,067	91	27	66
*OK2FEI	*	5,390	34	24	31
***OK1XW**	**28**	**6,572**	**58**	**18**	**35**
*OK1BMW	*	5,661	44	21	30
***OK1ABP**	**21**	**127,300**	**355**	**34**	**100**
*OK1DJO	*	100,300	361	30	88
*OK2BHE	*	5,658	44	20	26
***OK2HI**	**3.5**	**44,590**	**471**	**12**	**58**
*OK2BWJ	*	26,160	364	10	50
*OK2BJL	*	1,700	63	5	20
*OK2PHC	*	480	30	3	13
*OK1DXU	1.8	700	19	6	14

DENMARK

OZ1LO	**A**	**2,819,322**	**2607**	**133**	**389**
OZ7YL	*	33,022	222	24	55
OZ2RH	*	22,477	83	39	52
OZ7ADP	21	946	15	11	11
OZ1FTE	**7**	**194,994**	**636**	**37**	**120**
OZ8RO	*	190,498	653	34	120
***OZ8AE**	**A**	**774,237**	**1048**	**100**	**309**
*OZ5MJ	*	677,040	877	95	295
*OZ5ABD	*	29,211	150	31	76
*OZ6EI	*	27,432	152	39	69
*OZ7AX	*	27,144	195	22	95
*OZ1BMA	21	18,590	131	20	35
***OZ1FFG**	**14**	**47,816**	**288**	**19**	**67**

ENGLAND

G4BUO	**A**	**3,651,156**	**2731**	**144**	**429**
G3TMA	*	775,202	1022	91	240
G6IRA	*	386,553	744	68	201
G3KKQ	*	125,316	48	128	
G4PTE	*	43,788	300	34	89
G3KDB	**21**	**481,712**	**1232**	**35**	**119**
G3UFY	*	181,930	618	29	86
G4CNY	**14**	**505,180**	**1490**	**36**	**109**
GØIVZ	**7**	**531,522**	**1787**	**32**	**121**
G3WRR	*	10,070	104	12	41
G3BPM	**3.5**	**27,048**	**316**	**11**	**35**
***G3SWH**	**A**	**916,158**	**1214**	**95**	**307**
*G3SSO	*	676,506	1118	71	203
			(Opr. G3ZRJ)		
*G4ZFE	*	481,572	995	64	188
*G3NKS	*	281,880	551	59	184
*G3RSD	*	108,605	446	42	103
*G4ZME	*	89,628	363	34	98
***G5MY**	**7**	**60,809**	**256**	**23**	**96**

ESTONIA

ES1OX	**14**	**166,950**	**801**	**26**	**79**
ES5RY	**7**	**330,086**	**1304**	**35**	**116**
ES6DO	**3.5**	**180,235**	**1003**	**24**	**89**
*ES1CW	3.5	13,000	237	7	43
***ES1AR**	**1.8**	**23,040**	**360**	**9**	**51**

EUROPEAN RUSSIA

UA3AB	**A**	**1,107,400**	**1315**	**120**	**370**
			(Opr. KF2QX)		
RA3XO	*	146,558	329	77	177
UA4ANZ	*	104,056	307	55	141
UA4QK	*	32,860	151	31	75
UA4LM	**21**	**206,859**	**676**	**35**	**124**
UA1OZ	**14**	**337,850**	**1059**	**35**	**110**
UA6LP	*	248,311	1066	34	99
RA6YA	*	85,239	478	26	73
UA4PQB	*	72,186	681	27	79
RZ6LJ	**7**	**589,472**	**1651**	**33**	**136**
UA6LTI	*	247,173	801	34	107
UA6ED	*	151,605	655	34	101
UV3DRU	*	37,125	221	22	77
RA6XJ	*	33,540	174	23	55
RU3RQ	**3.5**	**106,560**	**622**	**26**	**85**
UA4PPR	*	96,465	623	22	87
UA6BAD	*	84,900	612	22	78
UA3WU	*	54,593	555	15	62
***UA3DPX**	**A**	**502,222**	**773**	**107**	**299**
*UA4AGP	*	294,096	737	55	209
*RA4HW	*	187,166	353	55	148
*RA6YJ	*	91,959	201	56	147
*UV3DRH	*	57,976	609	57	174
*UA4YG	*	34,272	400	32	40
*UA1OMS	*	27,370	150	31	84
***RA3LB**	**28**	**6,875**	**56**	**18**	**37**
***UV3HD**	**14**	**257,040**	**958**	**34**	**106**
*UA6LAK	*	43,431	271	23	70
*RA3VY	*	2,940	74	7	28
***RV6LA**	**7**	**24,820**	**216**	**17**	**56**
***RA1ZA**	**3.5**	**75,636**	**454**	**22**	**77**
***UA3VVH**	**1.8**	**4,982**	**98**	**8**	**39**
*UV6AOB	*	4,066	81	7	31
*UA4WEI	*	2,987	70	7	22

FAROE ISLANDS

OY1CT	**A**	**491,904**	**1312**	**60**	**192**
OY9JD	**1.8**	**128,847**	**1155**	**16**	**71**

FINLAND

OH1AF	**A**	**2,569,424**	**2209**	**139**	**433**
			(Opr. OH1NOA)		
OH6WZ	**"**	**2,264,990**	**1974**	**125**	**369**
OH2BC	*	1,814,000	1902	124	376
			(Opr. OH6EI)		
OH4AB	*	1,711,565	1870	116	369
OH2PM	*	1,543,284	1425	132	394
OH6YF	*	1,137,750	1344	100	310
OH1WZ/3	*	700,205	742	105	334
OH6VR	*	671,200	810	92	308
OH2LU	*	287,459	516	70	193
OH3NM	*	214,704	401	72	212
OH3BI	*	68,020	187	57	122
OH6NEV	*	48,396	147	51	97
OH5PA	28	3,225	30	15	28
OH1AA	**21**	**301,806**	**841**	**36**	**126**
			(Opr. OH1MYA)		
OH6MRA	*	137,692	667	33	83
OH3JR	*	62,752	46	16	37
OH2BCD	*	23,232	155	19	44
OH6RM	**14**	**221,088**	**1008**	**26**	**70**
OH7MA	**7**	**651,672**	**1740**	**38**	**130**
OH1TN	**3.5**	**86,691**	**524**	**23**	**88**
OH1GI	*	46,407	308	19	74
OH2BVF	*	40,426	354	19	63
OH1MA	**1.8**	**65,772**	**578**	**17**	**64**
***OH3LIM**	**A**	**984,948**	**1313**	**101**	**321**
***OH6AAI**	**"**	**443,928**	**751**	**83**	**235**
			(Opr. OH6MQE)		
*OH2VF	*	270,216	498	76	206
*OH2MAS	*	172,425	420	56	153
*OH2UBF	*	172,072	391	65	209
*OH2KWC	*	103,668	374	40	119
*OH1MRR	*	91,000	213	59	116
*OH7NW	*	58,918	267	35	143
*OH6MBQ	*	56,017	273	32	107
*OH2LNH	*	39,260	200	36	94
*OH2MJW	*	37,760	190	31	97
*OH6KUL	*	22,825	207	18	65
*OH2RL	*	16,684	110	28	69
*OH3HZ	*	11,856	87	27	49
*OH8LC	21	16,492	137	18	58
***OH6LBW**	**14**	**160,140**	**815**	**27**	**75**
*OH2MPO	*	118,826	564	28	90
*OH6RC	*	65,500	328	24	76
*OH3MC	*	34,621	170	24	65
*OH2BRH	*	16,218	137	16	37
***OH4ML**	**7**	**93,800**	**445**	**33**	**101**
*OH5LK	*	6	1	1	1
***OH3TY**	**3.5**	**35,490**	**318**	**16**	**62**
*OH1BJJ	*	16,632	267	9	47
*OH1BC	*	884	22	9	17
***OH2BVE**	**1.8**	**7,515**	**154**	**6**	**39**

FRANCE

F6CEL	**A**	**1,201,404**	**1791**	**92**	**226**
F5OIE	*	688,644	1139	79	254
F5TFS	*	574,560	1143	63	225
TM4P	*	562,848	999	71	193
			(Opr. F5IG)		
F5NKX	*	288,745	588	59	166
F6FII	*	197,280	550	46	134
F5RAB	*	179,949	411	62	147
F3VV	*	69,400	347	63	137
F5OIU	*	60,711	200	43	104
F5OAV	*	22,355	140	28	57
F5NBX	**28**	**42,224**	**200**	**27**	**77**
TM2O	**21**	**545,160**	**1468**	**37**	**117**
			(Opr. FB1MUX)		
F6KBF	**14**	**503,426**	**1412**	**35**	**119**
			(Opr. F6HSV)		
F6DKV	*	240,236	1017	27	82
F6CWA	**1.8**	**59,563**	**599**	**10**	**57**
***TM6GG**	**A**	**1,640,712**	**1679**	**106**	**305**
			(Opr. F6FGZ)		
***F5JCB**	**"**	**847,735**	**1330**	**89**	**282**
*F5SLQ	*	334,500	700	65	185
*F6DSV	*	258,366	505	78	211
*F6EQV	*	160,550	400	56	113
*F6FTB	*	146,421	414	42	111
*F6DZD	*	136,648	485	45	114
*F5MOY	*	136,048	425	49	127
*F5LHI	*	104,622	334	43	116
*F5ROX	*	72,565	311	35	80
*F5JLV	*	70,500	304	46	95
*F5JDG	*	50,490	278	76	26
*F2FX	*	16,632	106	22	50
*F8TM	*	9,112	95	11	56
*F5NLX	*	7,825	220	17	75
*F5NSO	*	4,480	56	16	40
***F5LMJ**	**21**	**61,855**	**294**	**27**	**62**
*F5TCN	*	13,280	64	26	54
***F9DK**	**14**	**47,286**	**340**	**19**	**55**
*F5JOU	*	30,668	202	18	50

GERMANY

DL2NBU	**A**	**3,156,673**	**2519**	**140**	**419**
DL6RAI	**"**	**2,152,254**	**1763**	**128**	**405**
DK5PD	**"**	**1,670,306**	**1576**	**131**	**375**
DL7MAE	"	1,598,352	1431	129	407
DJ5JH	"	1,104,935	1174	113	332
DJ8CR	"	1,065,816	1120	105	347
DL6NCY	"	908,820	970	114	345
DL1NCT	"	885,076	1067	109	300
DJ7MG	"	851,400	1084	91	266
DJ5LA	"	585,090	1132	62	208
DF4PD	"	571,024	739	91	265
DF3OL	"	486,652	800	85	271
DL8UCC	"	471,744	517	121	257
DK5AD	"	463,392	808	79	209
DL2DXX	"	458,743	720	90	193
DF1IAZ	"	402,000	881	63	177
DL2NXC	"	354,160	612	75	229
DK4RM	"	281,953	416	91	238
DL1TH	"	158,840	400	51	139
DL4FJ	"	154,054	47	150	
DL7URH	"	139,378	364	58	169
DK7ZT	"	121,574	330	52	126
DL8NBJ	"	111,136	311	53	131
DL8UED	"	103,424	350	59	143
DL8UI	"	77,440	230	52	124
DL8MKW/P	"	74,481	232	50	133
DJ2UU	"	41,195	199	29	78
DL9GUN	"	30,590	194	25	70
DL5LYM	"	12,740	67	31	39
DL2JDS	"	9,660	70	21	39
DL8AK	"	6,800	74	20	48
DLØIU	**21**	**235,616**	**618**	**36**	**112**
			(Opr. DL4AAE)		
DL1GGT	"	210,805	639	35	98
DJ7AA	**14**	**554,274**	**1480**	**36**	**123**
DL2OAP	"	102,078	464	27	79
DF7TU	"	26,426	214	15	57
DL2HBX	**7**	**291,210**	**962**	**38**	**132**
DL8OBD	**"**	**266,463**	**811**	**32**	**107**
DL3KDV	"	108,664	468	32	104
DL9LBI	"	102,024	623	25	79
DF9LJ	"	32,470	164	22	63
DL9LBA	"	30,324	209	22	62
DK2OY	**3.5**	**277,611**	**1220**	**29**	**94**
DL3HAH	"	137,200	868	22	78
DLØRB	"	37,960	524	13	52
			(Opr. DL6SEL)		
DK6WL	**1.8**	**107,464**	**711**	**22**	**79**
DJ6QT	"	10,561	157	8	51
DJ2HH	"	1,462	38	6	28
***DL4YBM**	**A**	**793,230**	**1109**	**94**	**292**
***DL2OBF**	**"**	**689,310**	**1114**	**80**	**253**
***DJ5GG**	**"**	**679,544**	**952**	**88**	**258**
*DF4ZL	"	649,720	888	95	275
*DL7VOG	"	568,516	835	86	252
*DL1QQ	"	497,628	868	68	208
*DL2SCJ	"	428,868	581	94	248
*DL7CF	"	388,056	585	80	216
*DL4JYT	"	382,720	679	73	226
*DL4MFM	"	373,248	709	65	191
*DK7ZH	"	338,496	592	69	189
*DL1ARJ	"	251,680	578	52	190
*DL7QU	"	241,732	517	52	171
*DL6DQB	"	230,724	479	63	158
*DL4BQE	"	228,935	635	53	158
*DL2GBB	"	203,553	1077	55	134
*DL7VBM	"	193,019	406	68	183
*DL4XU	"	166,713	457	55	128
*DL1ZQ	"	157,584	545	46	155
*DL6JRA	"	154,037	412	55	166
*DL7VOX	"	151,641	393	50	153
*DL2HRA	"	112,024	345	43	109
*DL3DBY	"	89,658	350	39	114
*DJ4PT	"	72,473	225	45	92
*DL5SVB	"	69,342	298	35	92
*DL2RON	"	61,020	234	41	94
*DL8WCM	"	49,679	173	46	105
*DL2VLA	"	39,500	247	31	94
*DL7UFR	"	38,570	216	32	101
*DL4NBV	"	22,770	152	27	63
*DL6UKL	"	17,250	176	19	50
*DL5DXF	"	16,644	105	23	91
*DL3YDY	"	10,804	112	20	53
*DL2AMF	"	6,240	70	20	40
*DL3FBB	"	5,589	103	13	27
*DF3QN	"	4,288	60	17	50
*DL3KWR	"	3,053	36	19	24
*DF5WN	28	2,220	37	11	19
***DL1YAW**	**21**	**155,832**	**440**	**36**	**115**
*DL3BRA	"	57,165	230	27	76
*DL5JRA	"	48,216	233	25	59
*DJ9GR	"	39,280	200	23	57
*DL5DWW	"	18,249	88	26	53
***DL8CTG**	**14**	**100,016**	**452**	**28**	**84**
*DL3DTH	"	48,279	306	20	57
*DL2SBY	"	28,006	214	15	52
***DK8FS**	**7**	**67,620**	**389**	**23**	**82**
*DL2DUL	"	45,000	291	18	72
***DL6MTA**	**3.5**	**24,862**	**318**	**10**	**52**
*DL6CMB	"	11,322	206	8	43
*DH8BQA	"	6,800	139	8	32
*DL1DWT	"	3,939	57	9	30
*DHØLQU/P	"	3,200	98	5	27
*DH1OAH	"	2,176	77	7	27
***DL3JSW**	**1.8**	**23,754**	**382**	**9**	**54**
*DK2PH	"	14,490	214	10	53
*DL3ARM/P	"	9,020	230	6	38
*DL1KS	"	7,896	122	7	49
*DL3KDG	"	5,452	107	7	40
*DL3JRA	"	234	18	2	11

GIBRALTAR

ZB2X	**A**	**6,129,904**	**4606**	**147**	**491**
			(Opr. OH2KI)		

GREECE

***SV2BOH**	**3.5**	**70,092**	**742**	**13**	**53**
***SV2BFN**	**1.8**	**34,740**	**531**	**10**	**50**

HUNGARY

HA8FM	**A**	**1,836,336**	**2296**	**116**	**286**
HA7YS	"	323,563	790	63	194
HA3LI	"	178,980	408	57	133
HA6NW	**21**	**117,370**	**414**	**29**	**83**
HA5KEH	**14**	**329,800**	**1143**	**35**	**101**
HA4FF	"	73,954	385	29	74
HA5MY	"	667	13	10	13
HA3UU	**7**	**512,316**	**1530**	**36**	**126**
HA3PT	"	151,933	647	33	104
HG6V	**3.5**	**98,752**	**1033**	**14**	**50**
***HAØHW**	**A**	**551,808**	**979**	**75**	**213**
*HA /DL1MAJ	"	255,150	543	61	182
*HA8XX	"	80,142	447	26	85
*HA4XG	"	79,732	317	47	77
***HA8RH**	**21**	**225,776**	**696**	**34**	**103**
*HA8EN	"	30,975	168	28	47
***HA4FB**	**14**	**56,463**	**404**	**26**	**61**
*HA8AT	"	46,719	316	22	65
*HA7MS	"	37,114	240	20	57
***HA4XN**	**7**	**20,064**	**234**	**14**	**52**
***HA8FW**	**3.5**	**122,580**	**748**	**26**	**82**
***HA8IB**	**"**	**74,918**	**593**	**18**	**76**
*HA8RJ	"	72,300	811	12	63
*HA4FV	"	51,156	664	12	51
*HA8FY	"	23,932	336	13	49
*HA6VA	"	23,517	270	12	55
*HAØDD	"	22,685	272	11	54
*HA3GE	"	7,548	118	10	41
*HA5KQ	"	4,032	115	4	32
***HA8EK**	**1.8**	**67,014**	**673**	**13**	**60**

ICELAND

TF3GB	**A**	**82,200**	**315**	**41**	**109**
*TF3LB	A	171	19	1	8

ITALY

IR7A	**A**	**983,030**	**1367**	**102**	**292**
			(Opr. I7ALE)		
IØZUT	"	542,985	1026	71	194
I3FDZ	"	421,785	659	82	233
I3JRF	"	375,878	529	106	220
IK8CHL	"	255,394	443	73	204
II2I	"	24,753	136	32	79
IK1TAO	"	17,334	122	23	58
I2FUM	"	2,596	26	19	25
I5OQV	21	25,058	161	23	44
I2HVE	**14**	**321,606**	**940**	**37**	**116**
IK8JSV	**7**	**182,800**	**1088**	**23**	**77**
I3JSS	**3.5**	**305,148**	**1326**	**24**	**94**
I3VHO	**1.8**	**63,072**	**628**	**16**	**57**
IV3PRK	"	56,356	526	13	60
I5NSR	"	39,396	528	12	55
***IKØHBN**	**A**	**475,999**	**707**	**94**	**273**
***IK5TSS**	**"**	**414,636**	**592**	**86**	**241**
*IK2AHB	"	401,408	757	67	189
*IK4EWX	"	366,276	705	62	200
*IØSKK	"	276,523	635	60	179
*IUØA	"	216,884	586	59	177
			(Opr. IKØSHF)		
*IKØADY	"	166,752	364	64	152
*IK2AIT	"	123,550	372	44	131
*IØMMI	"	116,250	373	46	104
*IK4SDS	"	101,897	304	44	129
*IK6PTJ	"	100,571	382	42	121
*IKØTUG	"	75,469	240	54	109
*IK4TVQ	"	37,884	165	33	51
*IK5SRM	"	33,408	177	36	80
*IK5TBK	"	25,203	128	38	55
*IK2IAR	"	7,056	66	23	40
*IK2TQG	"	1,359	47	13	31
*IK3NLK	21	8,118	140	25	41
***IR6A**	**14**	**133,875**	**701**	**30**	**75**
			(Opr. IK6QON)		
*I3JTE	"	131,193	587	26	87
***I6MU**	**7**	**79,076**	**451**	**24**	**82**
*I2IFT	"	77,826	428	24	85
*IØKHP	1.8	5,538	71	5	34

JERSEY

***GJ/K2WR**	**A**	**1,097,580**	**1871**	**76**	**254**

KARELIA

***UA1NFA**	**14**	**33,572**	**263**	**18**	**57**

LATVIA

YL2EO	**A**	**102,340**	**394**	**32**	**138**
YL2IP	"	11,397	189	33	81
YL2QD	"	9,246	249	26	62
YL1WW	**3.5**	**304,569**	**1293**	**30**	**99**
			(Opr. YL3CW)		
YL2GD	"	91,260	594	23	85
YL2SM	"	57,120	520	18	66
YL2GVL	"	15,867	341	8	35
YL2GVW	**1.8**	**33,408**	**487**	**8**	**50**
*YL2PP	21	19,270	105	25	57
*YL2EC	"	16,704	108	20	38
***YL2GN**	**14**	**261,702**	**977**	**33**	**101**
***YL2UZ**	**3.5**	**26,532**	**340**	**11**	**56**

LITHUANIA

LY2IJ	**A**	**1,850,004**	**1892**	**124**	**407**
LY3BX	**"**	**1,239,165**	**1515**	**109**	**302**
LY1DR	"	666,464	1267	83	270
LY3BA	"	314,650	595	79	211
LY1CN	"	172,660	614	42	152
LY2KM	"	111,150	398	42	153
LY2BIC	"	65,685	223	42	103
LY2BB	"	4,578	75	16	26
LY1CQ	**21**	**159,201**	**526**	**35**	**112**
LY2OU	**14**	**208,780**	**869**	**35**	**95**
LY2BN	"	120,169	679	31	100
LY4CF	"	8,244	110	10	26
LY3BS	**3.5**	**322,432**	**1385**	**30**	**98**
LY1CX	"	168,405	884	20	83
LY2BLF	"	58,155	548	13	56
LY2PAQ	"	40,401	450	13	54
***LY2TX**	**21**	**35,788**	**168**	**27**	**65**
***LY3BY**	**14**	**31,524**	**444**	**19**	**52**
*LY2CX	7	10,400	130	9	41
***LY2BIP**	**3.5**	**53,910**	**438**	**16**	**74**

LUXEMBOURG

LX4B	**7**	**708,247**	**2256**	**36**	**131**
			(Opr. OH2PQ)		

MACEDONIA

*Z32ZM	1.8	2,160	41	7	33

MARKET REEF

OJØ /OH2BBF	**A**	**264,772**	**935**	**39**	**109**
OJØ /OH1VR	**3.5**	**346,875**	**2181**	**22**	**89**

MOLDOVA

ER1OA	**A**	**201,354**	**566**	**64**	**158**
ER1AA	21	27,150	175	22	53
ER3DX	**3.5**	**40,200**	**561**	**12**	**48**
***UO5OED**	**A**	**342,958**	**1091**	**58**	**180**

NETHERLANDS

PAØLOU	**A**	**608,850**	**832**	**92**	**277**
PAØCLN	"	412,050	630	92	243
PA3GKW	"	266,726	583	59	134
PAØUV	"	44,226	186	37	89
PAØKHS	"	15,147	132	23	58
PA3BTH	"	8,949	88	14	43
PA3BUD	"	4,070	35	22	33
PA6A	**7**	**510,720**	**1648**	**37**	**123**
PA3EBT	**"**	**474,158**	**1330**	**37**	**121**
***PAØABM**	**A**	**348,810**	**1155**	**76**	**226**
*PA2REH	"	121,365	323	49	106
*SM6LOG/PA	"	24,786	130	30	51
*PAØJED	"	23,600	174	26	54
*PA3BEJ	"	6,283	77	11	50
*PA3CNI	"	1,881	21	17	16
***PAØMIR**	**21**	**31,524**	**173**	**24**	**47**
*PAØPLN	"	7,520	110	11	19
*PA2CHM	14	8,560	112	9	31
***PA3AAV**	**7**	**217,605**	**772**	**36**	**127**
***PA3ELD**	**3.5**	**47,669**	**496**	**14**	**58**
***PAØRU**	**1.8**	**6,700**	**73**	**7**	**50**

NORTHERN IRELAND

GIØKOW	**1.8**	**77,142**	**727**	**11**	**58**

NORWAY

LA6PB	**A**	**203,184**	**561**	**46**	**158**
LA9DFA	"	134,067	428	42	159
LA1TV	"	110,772	321	50	131
LA9GY	"	33,540	160	44	86
LA6PHA	"	22,655	94	42	73
LA1PHA	"	9,794	79	20	39
LA4EU	"	8,282	77	23	59
LA5AP	21	8,000	100	6	9
***LA5RBA**	**A**	**213,200**	**740**	**52**	**153**
*LA7DHA	"	155,328	473	42	150
*LA2O	"	150,449	474	39	124
*LA9FFA	"	28,420	128	32	84
*LA4BN	"	8,208	54	24	33
*LA1VL	14	9,954	119	11	31
***LA8WG**	**7**	**28,221**	**266**	**5**	**64**
*LA3WBA	"	2,380	45	11	24
*LA1XDA	3.5	5,358	90	8	39

POLAND

SP8NR	**A**	**1,049,312**	**1095**	**117**	**367**
SP2FWC	"	248,981	87	48	70
SP2IU	"	109,804	231	66	128
SP3HC	"	106,106	380	40	142
SP3EJJ	"	64,428	195	48	108
SP8GEY	"	57,820	240	39	101
SP9AGS	"	50,616	260	36	78
SP4AVG	"	40,560	198	34	86
SP5BYY	"	36,716	103	55	82
SP6AYP	"	7,176	46	34	25
SP5DDJ	**28**	**10,792**	**71**	**23**	**48**
SP7GIQ	**21**	**318,626**	**857**	**37**	**117**
SP6CYX	21	162,261	524	34	87
SP6YAS	"	140,719	507	31	78
SQ6J	"	42,505	200	27	85
			(Opr. SP6EVX)		
SP9LAS	"	504	7	4	6
SP4EAK	**14**	**174,592**	**653**	**34**	**94**
SP2JGK	"	66,360	348	22	83
SP7FUH	"	31,347	165	23	58
SP6YAQ	**7**	**564,469**	**1539**	**37**	**126**
			(Opr. SP3ASN)		
SP7CLB	"	71,980	357	33	85
SP5IYY	"	13,527	94	25	56
SN3A	**3.5**	**471,138**	**1773**	**36**	**113**
			(Opr. SP3HLM)		
SP5ZIM	"	86,510	824	16	66
SP5GH	"	24,534	122	17	77
SP5INQ	**1.8**	**28,700**	**354**	**13**	**57**
***SP6NIC**	**A**	**534,540**	**983**	**71**	**224**
***SP6EIY**	**"**	**515,412**	**844**	**85**	**224**
***SN7L**	**A**	**498,332**	**872**	**86**	**246**
			(Opr. SP7NJX)		
*SP9XCN	"	403,788	933	60	193
*SP9WZJ	"	383,842	625	80	222
*SP5TT	"	311,831	592	76	213
*SP3FLR	"	266,084	667	59	162
*SP6TRO	"	206,336	640	46	162
*SP6NIG	"	157,242	363	67	152
*SP7LIH	"	145,348	418	58	145
*SP6AUI	"	103,104	241	63	129
*SP5JCL	"	90,112	222	60	116
*SP6NIF	"	88,725	208	65	104
*SP6DNZ	"	83,160	314	38	97
*SP9VEG	"	68,242	191	50	99
*SP4GAP	"	41,216	222	36	92
*SP8FHJ	"	39,368	224	38	95
*SP5ASY	"	37,128	175	33	103
*SP8IOD/P	"	18,377	287	33	89
*SP4EEZ	"	16,212	79	30	54
*SP3IOE	"	13,884	66	36	42
*SP3CQP	"	10,246	134	34	65
*SP3AOT	28	684	16	9	10
***SP5JTR**	**21**	**142,155**	**429**	**32**	**103**
*SP3SLA	"	97,236	345	30	81
*SP3KEY	"	94,560	316	31	89
*SP9KAT	"	37,316	191	23	53
*SP3EQE	"	33,360	164	20	60
*SP5UAF	"	26,838	145	22	49
*SP2DVH	"	5,053	117	13	18
***SP9DTH**	**14**	**97,352**	**494**	**24**	**62**
***SP8UFO**	**"**	**85,034**	**300**	**31**	**91**
*SP6DHH	"	57,057	104	13	33
*SP8BAB	"	27,432	154	21	51
*SP3XR	"	8,400	90	13	27
*SP6STS	"	6,270	127	7	26
***SP2FAP**	**7**	**120,612**	**501**	**34**	**104**
***SP9NLK**	**"**	**106,425**	**421**	**30**	**99**
*SP2UKB	"	59,808	309	22	90
*SP2AYC	"	29,744	220	19	69
*SP5BB	"	475	17	6	13
***SP2WDW**	**3.5**	**56,700**	**577**	**15**	**66**
*SP5XMM	"	20,592	62	5	26
*SP4DCR	"	16,422	252	11	40
*SP9MDY	"	1,690	61	5	21
***SP2FOV**	**1.8**	**37,329**	**500**	**11**	**58**
***SP9GDB**	**"**	**25,048**	**311**	**9**	**53**
*SP2BRZ	"	6,424	144	4	40
*SP6CPF	"	2,556	83	3	33

PORTUGAL

***CT1DXT**	**A**	**65,094**	**278**	**39**	**75**
***CT4DX**	**7**	**32,572**	**197**	**16**	**52**

RHODES

***SV5 /SMØCMH**	**A**	**315,612**	**1130**	**45**	**153**

ROMANIA

YO7DO	**A**	**255,972**	**555**	**63**	**194**
YO6KNW	**7**	**88,011**	**666**	**20**	**57**
YO4AAC	"	10,502	133	12	47
YO3APJ	**1.8**	**49,473**	**472**	**13**	**56**
***YO2DFA**	**A**	**474,903**	**1112**	**73**	**224**
*YO5DAS	"	20,737	198	21	68
***YO4DCF**	**14**	**39,456**	**247**	**25**	**73**
*YO8BDQ	"	2,700	44	11	16
***YO6FGN**	**7**	**24,648**	**159**	**17**	**79**
*YO4CBT	"	2,701	39	11	26
*YO2LDE	3.5	785	22	6	19
***YO6OBH**	**1.8**	**7,038**	**139**	**6**	**40**

SARDINIA

ISØGSR	A	50,796	165	46	107
ISØMKU	**14**	**109,984**	**607**	**28**	**84**
ISØUWX	"	13,530	163	17	38
***ISØOMH**	**A**	**310,460**	**972**	**40**	**174**

SCOTLAND

GM3YTS	**A**	**1,003,448**	**1352**	**87**	**257**
GM4SID	"	191,000	459	52	139
GM3WOJ	**14**	**542,336**	**1628**	**38**	**114**
GM3YOR	**1.8**	**49,070**	**469**	**12**	**58**
GMØRHP	"	21,114	339	9	45
***GMØ /NX1T**	**A**	**267,332**	**904**	**48**	**146**
***GM3CFS**	**14**	**77,160**	**430**	**21**	**69**
***GM4FDM**	**7**	**53,908**	**607**	**15**	**59**

SICILY

IB9T	**14**	**747,775**	**2150**	**40**	**135**
			(Opr. IT9TQH)		
IT9A	**14**	**742,417**	**2119**	**40**	**129**
			(Opr. IT9GSF)		
IT9ZGY	**1.8**	**66,992**	**546**	**15**	**64**
***IT9AF**	**21**	**175,161**	**695**	**34**	**99**
*IT9DEC	"	15,322	183	14	33

SLOVAK REPUBLIC

OM3PC	A	72,201	248	38	85
OM3RM	**7**	**736,016**	**2130**	**35**	**122**
OM3NA	**3.5**	**393,231**	**1707**	**29**	**94**
OM3PA	**"**	**336,950**	**1663**	**26**	**89**
OM3TRJ	"	78,300	617	17	70
OM3QW	**1.8**	**10,608**	**195**	**6**	**46**
***OM3PQ**	**A**	**400,134**	**678**	**77**	**217**
*OM3CCC	"	368,964	742	69	208
*OM3WST	"	269,100	746	61	173
*OM3CDZ	"	138,904	524	37	142
*OM3TLI	"	64,107	280	38	115
***OM3CAP**	**21**	**124,714**	**393**	**32**	**95**
*OM3CPY	"	13,293	78	24	39
***OM3CAB**	**14**	**27,086**	**281**	**15**	**43**
*OM3TBB	"	23,986	184	20	47
*OM3CVN	"	8,736	78	19	20
***OM3FON**	**7**	**46,754**	**253**	**22**	**75**
***OM3OM**	**3.5**	**49,896**	**454**	**14**	**70**
*OM3TEG	"	22,260	294	10	50
*OM3CUZ	"	19,388	223	9	28
***OM3TQX**	**1.8**	**17,613**	**250**	**7**	**50**

SLOVENIA

S51BO	**A**	**2,546,440**	**2314**	**117**	**355**
S51MF	"	226,695	474	80	175
S51AY	**28**	**77,405**	**319**	**29**	**84**
S58A	**21**	**500,066**	**1300**	**38**	**123**
			(Opr. S57AM)		
S5ØA	**14**	**779,640**	**1854**	**40**	**138**
			(Opr. S52AA)		
S51AW	**"**	**600,682**	**1661**	**38**	**119**
S57DX	"	487,642	1418	38	119
S5ØS	**7**	**950,400**	**2433**	**38**	**138**
			(Opr. S59UN)		
S59WA	"	592,179	1797	38	125
S54CW	**3.5**	**294,300**	**1628**	**22**	**78**
S51OJ	"	255,162	1045	28	101
			(Opr. S51IX)		
S53DCM	"	251,421	1205	30	99
			(Opr. S57AD)		
S51SA	"	109,130	929	15	55
S57AV	**1.8**	**61,273**	**657**	**13**	**58**
***S5ØL**	**A**	**1,921,198**	**1791**	**136**	**402**
			(Opr. S59AA)		
***S52OP**	**"**	**863,330**	**1161**	**99**	**278**
*S53AA	"	385,392	664	77	219
*S51RU	"	308,880	532	72	198
*S51WA	"	251,446	461	74	173
*S53DX	"	2,508	50	11	33
*S59ZA	28	16,948	101	23	53
***S51QZ**	**21**	**217,722**	**664**	**35**	**96**
***S59CAB**	**3.5**	**147,486**	**1035**	**18**	**76**
			(Opr. S57MMM)		
*S57AL	"	46,720	551	11	53
*S59DRJ	"	31,034	428	10	49
			(Opr. S57NAR)		
*S57BBT	"	10,450	199	7	43
***S58MM**	**1.8**	**6,815**	**145**	**6**	**41**

SPAIN

EA2BNU	**A**	**156,807**	**467**	**52**	**119**
EA7HDO	"	111,081	269	54	129
EA7CA	"	100,214	275	57	121
EA7PN	"	82,840	247	56	134
EA5CKP	"	52,976	226	35	53
EA5LA	"	27,573	144	33	58
EA2CR	"	23,183	149	26	71
EA5AIK	"	18,250	93	32	41
EA7GHB	"	15,049	72	37	64
EA3JC	"	12,540	126	18	77
EA7HAB	"	3,648	50	14	24
EA2IA	**21**	**448,043**	**1289**	**36**	**113**

EA7TH	"	**395,922**	**1279**	**33**	**105**
EA7KW	3.5	**259,407**	**1177**	**24**	**87**
EA7XC	"	62,880	380	21	59
EA7BJ	1.8	**14,912**	**150**	**12**	**52**
***EA2CLU**	A	**642,960**	**1082**	**77**	**208**
***EA3AEQ**	"	**603,896**	**1397**	**72**	**202**
*EA5FV	"	436,835	817	69	176
*EA7TG	"	269,552	511	77	195
*EA3BOW	"	249,849	536	62	151
*EA5ACF	"	247,780	562	61	199
*EA3GHB	"	170,430	495	53	142
*EA1JO	"	140,184	367	45	132
*EA7JA	"	120,392	262	72	130
*EA2CNT	"	89,210	294	36	95
*EA3DBO	"	60,988	158	64	94
*EA4AYX	"	53,457	212	33	70
*EA3GJZ	"	46,760	176	42	98
*EA7CWA	"	37,530	124	49	90
*EA4AV	"	33,565	122	49	88
*EA1DD	"	28,458	157	26	76
*EA4EMC	"	21,480	83	43	77
*EA3AAI	"	20,605	121	27	38
*EA7HCB	"	20,468	160	26	42
*EA4VA	"	16,280	108	24	50
*EA7CP	"	13,140	102	21	52
*EA3GIJ	"	3,994	103	22	56
*EA5WX	28	320	10	7	9
***EA7ADH**	21	**80,432**	**424**	**25**	**63**
*EA1CSB	"	61,155	325	20	61
*EA1CS	"	43,092	237	21	55
*EA4BV	"	7,314	106	8	15
*EC3ACG	"	3,910	31	19	27
*EA1FEQ	14	2,121	55	6	15
*EA4UL	"	455	15	6	7
***EA2ARD**	7	**36,226**	**305**	**13**	**46**
*EA7HAT	"	25,389	207	11	52
*EA1ADG	"	4,740	105	8	22

SVALBARD

JW8XM	7	**384,354**	**1355**	**34**	**97**

SWEDEN

SM7PKK	A	**1,052,768**	**1517**	**100**	**294**
SM5AOE	"	634,144	981	86	212
SM5CLE	"	587,300	860	89	261
SM5BAX	"	129,759	361	44	123
SM7ATL	"	46,545	240	34	73
SMØEQK	"	621	17	10	13
SMØKV	21	**128,158**	**419**	**36**	**103**
SM5INC	"	101,362	412	28	90
SM6BJI	14	**175,260**	**622**	**28**	**87**
SM2JEB	"	107,088	523	26	66
SM6JY	"	16,576	169	15	41
SM6LPF	7	**60,008**	**298**	**23**	**81**
SM2BUW	"	18,954	165	17	64
SM6DOI	1.8	**53,534**	**503**	**14**	**57**
***SMØBDS**	A	**340,992**	**666**	**66**	**190**
*SMØCOP	"	91,808	340	37	115
*SM3CVM	"	81,606	288	41	133
*SM5RE	"	50,022	262	35	91
*SM4SX	"	43,290	150	33	57
*SM4SEF	"	12,834	105	23	39
*SMØCGO	"	4,480	52	15	20
*SM5CUN	"	3,854	44	17	24
*SM3PGN	"	2,964	42	13	26
*SM5BEU	21	1,404	21	11	16
***SM4BW**	14	**123,756**	**178**	**11**	**28**
*SM2CDF	"	38,360	179	11	129
*SM7GCZ	"	36,872	44	22	66
*SM7GCZ	"	36,366	168	22	65
*SM7AHW	"	22,495	176	16	39
*SM5PPS	7	7,897	108	12	40
*SM7CQY	"	6,250	85	9	41
***SM6CMR**	1.8	**6,109**	**141**	**5**	**36**

SWITZERLAND

HB9AGA	A	**829,677**	**1355**	**90**	**257**
HB9DX	21	32,368	105	34	102
***HB9ARF**	A	**338,688**	**678**	**75**	**181**
*HB9IBA	"	253,098	645	49	169
			(Opr. W7LPF)		
*HB9HLE	21	34,986	181	25	77
*HB9APJ	14	62,100	340	23	67

UKRAINE

EO5U	A	**2,098,759**	**2083**	**138**	**413**
			(Opr. UT4UZ)		
UT6Q	"	**1,810,440**	**2190**	**117**	**353**
RB1IZ	"	1,565,840	1541	130	399
RB5LJ	"	780,738	1044	108	298
RB5YZ	"	606,452	1010	99	259
UB4ME	"	439,725	710	81	244
UB5TN	"	258,187	498	75	232
UB5SBN	"	229,578	559	64	185
UB5VK	"	82,533	327	32	91
UB5INT	"	80,199	380	29	104
UT5UIA	"	38,850	208	29	82
UB5EIT	"	20,972	100	15	82
UB4JN	"	13,855	158	20	65
UB5PDM	"	13,207	200	12	41
UB4EYT	"	10,680	91	21	47
			(Opr. UB4-ØGØ-175)		
RB5JS	21	6,201	61	19	34
UB4JL	"	2,538	34	14	13
UB5NQ	14	**243,315**	**964**	**96**	**1865**
UB5NBW	"	75,785	350	20	95
UB4HO	7	**589,844**	**1670**	**39**	**128**
UB5WE	"	365,148	1048	35	126
UB5CDX	"	166,375	632	30	95
UB4IRI	"	58,552	348	26	78
UB5IEM	"	42,951	203	24	79
RB5PG	"	35,123	172	23	80
RB5PD	"	34,780	231	16	58
RB5VT	"	15,470	172	16	54
UB4QY	3.5	**209,367**	**1003**	**32**	**97**
UB5LCV	"	97,740	619	25	83
UB5UT	"	86,860	641	21	65
UB5FAN	"	72,709	608	16	75
UB5WCF	"	45,305	404	17	68
UB4JKO	"	30,024	409	12	60
RB5IY	"	27,058	219	19	64
UB5XBD	"	7,562	183	7	38
RB5BA	1.8	**30,384**	**361**	**12**	**60**
UB5ZKG	"	12,768	195	9	48
***RB5QDP**	A	**2,279,600**	**2694**	**134**	**422**
***UT5UDX**	"	**696,864**	**1037**	**92**	**244**
*UB4LCB	"	528,260	1061	69	236
*UB5EF	"	345,154	743	65	228
*UB3MP	"	228,340	624	53	192
*RB3IZ	"	156,220	486	50	164
*UB5BCJ	"	59,058	213	41	112
*RB5AT	"	55,348	270	31	106
*UB4QJ	"	6,262	78	13	31
*RB5UN	28	2,701	73	15	22
***U5WF**	21	**251,482**	**733**	**34**	**108**
*UB5LBX	"	61,478	285	30	88
*UB4QM	"	42,238	229	27	71
*UB4MPY	"	34,944	194	27	64
*UB5IAN	"	33,540	216	20	58
***UB4IBF**	14	**140,280**	**238**	**10**	**42**
***UB3IQ**	"	**136,680**	**663**	**30**	**90**
*UB5QIG	"	117,078	564	29	85
*UB5RAF	"	88,550	412	26	89
*UB5EUV	"	26,496	216	16	53
*UB5EEP	"	16,520	172	13	46
*RB5ERX	"	2,450	50	9	26
***UB5ZKE**	7	**48,852**	**323**	**20**	**72**
*U5WF	"	30,504	208	17	76
*UY5TE	"	29,394	270	14	55
***RB5PE**	3.5	**58,256**	**533**	**19**	**69**
*RB5IIB	"	38,880	315	18	63
*UT5UJY	"	36,917	471	10	57
*RB4EK	"	24,888	370	11	50
***RB4INR**	1.8	**16,240**	**221**	**9**	**49**
*UB5WBJ	"	6,560	154	6	34

WALES

GW8GT	21	**601,160**	**1613**	**35**	**117**
			(Opr. G4IFB)		
GW3YDX	1.8	**154,376**	**1030**	**19**	**73**
GW3GWX	"	3,440	80	8	32
***GW3JI**	A	**431,760**	**883**	**51**	**200**
*GW3JSV	"	85,738	258	50	113

YUGOSLAVIA

4O7AV	A	**3,784,480**	**3185**	**138**	**407**
YU7SF	"	66,856	289	37	100
YU7BW	21	**406,224**	**1118**	**35**	**121**
YZ7A	"	62,084	308	24	59
			(Opr. YU7CM)		
YT7A	14	**585,904**	**1656**	**40**	**136**
			(Opr. 4N7DW)		
YT1BB	3.5	**90,301**	**824**	**15**	**58**
YZ1MB	"	57,870	496	18	72
***YU7LS**	A	**431,340**	**900**	**85**	**188**
***YU1JU**	"	**378,450**	**750**	**75**	**215**
*YU1RA	"	26,857	107	40	67
***4N7N**	7	**609,738**	**1174**	**33**	**118**
*YU1HA	"	32,000	227	19	61
***YTØT**	3.5	**120,712**	**1043**	**16**	**63**
			(Opr. 4N1DXX)		

OCEANIA

AUSTRALIA

VK2AYD	21	**652,795**	**1826**	**29**	**92**
***VK2BQQ**	A	**450,264**	**613**	**98**	**159**
*VK1FF	"	359,464	660	64	132
*VK6HG	"	282,240	406	85	155
*VK6LW	"	49,920	217	37	43
*VK4XW	"	33,900	134	43	77
*VK2QF	"	30,004	200	23	30
***VK4XA**	28	**125,386**	**624**	**23**	**48**
*VK8BE	"	1,425	25	8	11
***VK4TT**	14	**140,556**	**239**	**29**	**77**
***VK3APN**	7	**140,900**	**480**	**29**	**71**

CHATHAM ISLAND

***ZL7FD**	7	**432,200**	**1456**	**30**	**70**
			(Opr. DK8FD)		

EAST MALAYSIA

9M6HF	A	**1,258,104**	**1872**	**81**	**147**

EASTERN KIRIBATI

T32BE	A	**774,720**	**1375**	**88**	**104**
			(Opr. WC5P)		

FIJI ISLANDS

3D2MQ	A	**216,474**	**674**	**49**	**60**
			(Opr. IV3UHL)		
***3D2HI**	A	**46,906**	**339**	**22**	**25**
			(Opr. JA1KJW)		

HAWAII

N6VI/KH6	A	**2,119,476**	**2069**	**129**	**218**
AH6JF	"	478,850	1327	59	63
KH6AQ	"	11,648	86	29	27
KH6XT	3.5	**117,312**	**820**	**19**	**29**
KH6CC	1.8	**68,250**	**547**	**18**	**24**
***NH6T**	A	**2,461,536**	**2713**	**119**	**189**
			(Opr. NØAX)		
*NH6DV	14	9,021	102	15	16

INDONESIA

YB3AQE	A	**423,936**	**549**	**97**	**179**
YB3OSE	14	36,400	193	24	41
***YB6INU**	A	**162,176**	**309**	**62**	**119**
*YC3UEM	"	29,452	128	28	46
***YB6TI**	21	**193,452**	**774**	**22**	**62**

MARSHALL ISLANDS

V73C	A	**397,605**	**705**	**81**	**114**

MIDWAY ISLAND

KH4 /N7TNL	A	**160,960**	**1636**	**72**	**74**

NEW ZEALAND

ZL3SL	A	18,500	89	28	46

PAPUA-NEW GUINEA

P29DK	A	**507,698**	**902**	**76**	**118**

PHILIPPINES

***DU3HF**	A	**140,742**	**387**	**48**	**78**

SOUTH COOK ISLANDS

***ZK1TB**	A	**312,120**	**434**	**98**	**157**
			(Opr. W7TB)		

SOUTH AMERICA

ARGENTINA

***LW2EUE**	A	**142,450**	**925**	**57**	**97**
*LU1EWL	"	92,906	321	50	53
*LU1BW	"	10,994	123	25	29
***LW4DIR**	28	**61,248**	**330**	**24**	**42**
*LU4FAK	"	6,026	52	20	26
***LU4FD**	21	**294,372**	**910**	**28**	**83**
*LU7EAR	"	108,336	467	27	84
***LU1ICX**	14	**129,600**	**463**	**30**	**66**
*LU2BRG	3.5	8,840	82	18	22
*LU3DSI	"	396	14	5	7

ARUBA

P4ØW	A	**11,139,048**	**5883**	**161**	**478**
			(Opr. W2GD)		
P4ØN	"	**10,640,385**	**6032**	**154**	**441**
			(Opr. K1TO)		
P4ØJ	"	6,989,004	4943	126	351
			(Opr. WX4G)		

BOLIVIA

CP1OZ	A	**184,888**	**528**	**50**	**71**
			(Opr. JE6OXU)		
CP1BA	"	24,921	132	24	47

BRAZIL

PY2XB	A	**720,895**	**836**	**98**	**203**
ZX5CW	21	**1,108,242**	**2316**	**36**	**126**
ZV2BW	"	65,640	380	17	43
PW8EM	"	50,853	272	18	49
PX2A	"	32,509	197	21	38
PY2APQ	14	40,370	255	20	35
PY1BVY	1.8	900	26	7	8
PP5JR	"	306	14	5	4
***PW2N**	A	**683,298**	**1161**	**76**	**127**
			(Opr. PY2NY)		
*PY5BLG	"	326,196	722	61	95
*PY1RSA	"	162,482	412	49	88
*PT7AQ	"	140,666	401	44	78
*PP7CW	"	18,134	199	45	71
*PY4OZ	"	10,980	74	27	33
***PY2NQ**	28	**114,400**	**499**	**24**	**56**
*PY2ZI	"	7,172	112	10	12
*PY2OU	"	2,268	38	10	11
***PY2GH**	21	**135,036**	**510**	**27**	**66**
*PY3CJI	"	27,602	140	22	52
*PY2YN	"	23,186	124	21	47
*PY2HF	14	45,421	297	21	32
*ZZ2JT	"	25,550	181	19	31
			(Opr. PP2JT)		
*PY2TI	7	986	21	8	9

CHILE

***XR1X**	A	**1,302,525**	**2006**	**76**	**149**
			(Opr. CE1UDM)		
*CE2NJ	14	60,520	296	26	42

COLOMBIA

HK3YH	28	37,962	198	24	50
5K1R	7	**572,330**	**1585**	**28**	**93**

ECUADOR

HD9N	A	**7,915,320**	**4749**	**145**	**422**
			(Opr. WN4KKN)		

FERNANDO DE NORONHA

PYØF	A	**10,591,744**	**5936**	**144**	**460**
			(Opr. CT1BOH)		

FRENCH GUIANA

***FY5FP**	A	**934,340**	**1444**	**58**	**162**

GALAPAGOS ISLANDS

***WD5N /HC8**	A	**1,185,340**	**1722**	**73**	**162**

NETHERLANDS ANTILLES

PJ2/WJ2O	A	**4,176,428**	**3950**	**106**	**252**
PJ9Y	7	**1,050,966**	**2791**	**28**	**98**
			(Opr. OH6XY)		

PARAGUAY

ZPØY	21	**1,869,978**	**3627**	**35**	**139**
			(Opr. K4UEE)		

PERU

***OA4ZV**	A	**773,610**	**1125**	**83**	**158**

SURINAME

PZ5JR	14	**1,278,083**	**2673**	**36**	**127**
			(Opr. AB6NJ)		

TRINIDAD & TOBAGO

9Y4H	A	**8,262,560**	**4956**	**142**	**423**
			(Opr. K6NA)		
9Y4VU	21	**937,284**	**2148**	**34**	**114**

URUGUAY

CX4SS	A	609	16	10	11
CV5A	28	**940,532**	**2187**	**30**	**116**
			(Opr. CX5AO)		
CX5BW	"	**660,500**	**1785**	**32**	**93**
CX3ABE	21	**652,795**	**1922**	**34**	**101**
CW5W	14	**696,384**	**1638**	**37**	**107**
			(Opr. CX7BY)		
CX9AU	7	**273,505**	**982**	**28**	**67**
***CX6VM**	21	**622,544**	**1434**	**34**	**113**

VENEZUELA

YV3AJ	21	**393,224**	**1580**	**25**	**79**
			(Opr. YV6AZC)		
YV4ABR	14	15,742	157	13	21
*YV7QP	A	24,585	151	25	30

QRP

7Z2AB	A	**2,757,770**	**2335**	**108**	**317**
			(Opr. K2XR)		
AA2U	"	**763,156**	**698**	**107**	**297**
G4BWP	"	**685,500**	**914**	**85**	**279**
K5RX	"	**602,268**	**588**	**113**	**278**
K1CGJ	"	**560,604**	**595**	**89**	**252**
JA6GCE	"	**420,549**	**538**	**107**	**202**
UB4FXX	"	**382,872**	**888**	**91**	**280**
			(Opr. UB5FJA)		
SM3CCT	"	**333,132**	**714**	**65**	**211**
KW2P	"	**318,108**	**392**	**79**	**215**
KA1CZF	"	**314,632**	**436**	**73**	**195**
DL6RDR	"	**312,550**	**503**	**71**	**195**
XE2KB	"	**306,132**	**526**	**73**	**121**
UAØSAU	"	**297,774**	**560**	**63**	**150**
UA9SG	"	**282,172**	**518**	**55**	**157**
KP4DDB	"	**267,344**	**813**	**51**	**103**
UB4IM	"	263,030	569	74	216
N7IR	"	**244,528**	**372**	**86**	**162**
RW3AH	"	**230,580**	**486**	**81**	**189**
IK1GKE	"	**213,661**	**457**	**62**	**171**
EA3FBO	"	**212,798**	**471**	**50**	**156**
DK5WL	"	211,890	574	53	157
N1AFC	"	204,876	378	49	140
WT3W	"	**203,760**	**324**	**71**	**169**
KV8S	"	**197,664**	**318**	**74**	**158**
YU1LM	"	**194,700**	**604**	**58**	**162**
WA1LNP	"	190,722	305	63	176
N4JF	"	**183,436**	**284**	**71**	**171**
YT7TY	"	172,533	479	54	145
S59PA	"	**138,690**	**347**	**34**	**104**
EA7AAW	"	130,790	422	38	107
AA1AK	"	130,339	252	56	129
PAØADT	"	**127,332**	**421**	**37**	**125**
EA1GT	"	122,360	563	33	100
WB2CPU/1	"	110,425	234	50	125
RN1NJ	"	**101,065**	**402**	**43**	**162**
S57XX	"	100,033	346	41	126
9A3GU	"	**96,272**	**364**	**38**	**138**
W4DEC	"	92,781	201	63	120
W6ZH	"	**71,744**	**181**	**63**	**89**
IKØTXF	"	65,730	322	33	72
GM4HQF	"	**59,502**	**319**	**24**	**70**
SM5DQ	"	53,607	228	45	122
ISØLYN	"	**51,972**	**194**	**42**	**141**
NP2Q	"	**48,468**	**274**	**34**	**50**
VE6GK	"	**45,068**	**295**	**36**	**40**
KA4RRU	"	44,086	125	43	91
VE1JMM	"	37,671	199	35	52
OH2YL	"	**34,122**	**168**	**27**	**67**
DL1EFW	"	30,846	212	25	81
JA5CDL	"	**29,640**	**115**	**43**	**61**
HB9XY	"	**29,328**	**197**	**21**	**73**
SP4TBM	"	**26,145**	**186**	**27**	**78**
NØAFW	"	**23,987**	**107**	**24**	**59**
GMØGNT	"	21,165	138	19	66
VE2ABO	"	**17,632**	**232**	**30**	**46**
WB6ITM	"	14,570	80	46	48
DJ5QK	"	13,312	122	23	81
OK2PBG	"	**12,876**	**137**	**12**	**62**
JA4XHF/3	"	11,771	74	34	45
SP5YQ	"	10,488	56	29	47
SM7CZC	"	9,801	75	22	59
DF1QF	"	9,666	105	12	42
PAØTA	"	8,576	92	16	51
N6AZR	"	8,256	92	24	19
WD9IWP	"	6,720	42	23	37
IK3VZO	"	6,384	69	19	38
VE2BLX	"	4,849	94	25	24
DL2BQD	"	4,688	71	15	42
VK2NV	"	4,495	14	17	14
N8AXA	"	3,034	34	12	25
AB5OU	"	2,565	53	22	23
AA1CA	"	2,014	32	16	22
W2JEK	"	1,715	20	15	20
PY4ZO	"	1,260	21	14	14
UA9WSF	28	**5,550**	**57**	**13**	**24**
LU1FNH	"	**3,667**	**66**	**9**	**10**
GØFDX	"	2,844	34	14	22
JT1BY	"	640	33	7	9
RW4NW	"	261	18	7	12
K3TW	21	**82,012**	**246**	**26**	**90**
G3DYY	"	**72,485**	**300**	**26**	**69**
JA1YNE	"	**61,750**	**251**	**30**	**65**
			(Opr. JR1NKN)		
K3FN/1	"	**56,026**	**180**	**25**	**84**
JG2MLI	"	**44,198**	**210**	**28**	**54**
ES1CR	"	**15,996**	**125**	**20**	**42**
UA3ABT	"	**12,720**	**80**	**24**	**56**
UB5PCS	"	4,477	57	14	23
PY2ERA	"	2,926	32	17	21
PAØANK	"	2,540	43	4	5
JA9CZJ	"	1,917	29	13	14
SM3DXC	14	**50,102**	**271**	**22**	**72**
SP4GFG	"	**47,805**	**335**	**19**	**57**
JA1AA	"	**40,236**	**177**	**26**	**58**
JA1GTF	"	**34,574**	**159**	**25**	**53**
G3LHJ	"	**29,460**	**234**	**14**	**46**
RUØUQ	"	**15,651**	**241**	**16**	**31**
W8QZA/6	"	**10,368**	**73**	**22**	**32**
VE5AEO	"	**8,148**	**140**	**13**	**15**
DL4OBJ	"	**7,059**	**99**	**9**	**30**
VE4SF	"	**7,050**	**55**	**15**	**35**
VE6SH	"	5,760	76	14	18
G3DOP	"	5,254	110	7	30
OM3TNA	"	5,166	90	8	33
JH1HRJ	"	4,278	52	15	16
OM3TUM	"	1,992	78	5	19
JG3GMG	"	176	7	5	6
RB5QNV	7	**117,261**	**541**	**28**	**101**
LZ3RR	"	**45,816**	**406**	**19**	**64**
UB5EPU	"	**42,496**	**343**	**16**	**67**
SKØPR	"	**35,955**	**263**	**18**	**67**
			(Opr. SMØDZH)		
I4KRF	"	**24,288**	**216**	**12**	**54**
JH1GNU	"	**17,150**	**126**	**24**	**36**
EA1CMF	"	5,460	80	8	31
PA3FSC	"	12	3	2	2
UT5UQV	3.5	**4,620**	**104**	**7**	**42**
UA9WQK	1.8	**4,646**	**89**	**6**	**17**
OM3TJY	"	**4,251**	**113**	**5**	**34**
SP5NOG	"	**1,196**	**47**	**4**	**22**
KIØG	"	**1,159**	**29**	**10**	**9**
OK1DXE	"	304	21	2	14

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***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!**

You get MFJ's *automatic notch filter* that 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 a local FM repeater.

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

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

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes. It's *milli*-second fast -- interfering CW and RTTY signals are also eliminated.

Voice signals aren't degraded because the notch is *extremely* narrow.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes, miss fewer calls and be less exhausted.

Leave the *automatic* notch filter on during a phone contest and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove tones. Say, you're on CW and a couple of annoying CW stations appear nearby. You can use the *two* manually *tunable* notch filters -- *an MFJ exclusive* -- to completely knock them out.

Adaptive noise reduction

Turning on *noise reduction* silences background noise. Noisy SSB, FM, AM, CW and Data signals become readable.

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

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

Reducing random noise reduces fatigue, especially when the band is noisy.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

You can *tune* the lower cutoff frequency 200 to 2200 HZ and the upper cutoff frequency 1400 to 3400 Hz.

Signals *just 75 Hz* away literally disappear -- they are reduced a *thousand* times, 60 dB!

Unlike other filters, speech clarity is not reduced by envelope distortion caused by unequal time delay.

By adjusting the highpass and lowpass filters you can create *custom* filters for Voice, Data and other modes.

When signals are weak, you can improve copy by removing high and low speech frequencies. They contain little information but are full of noise that reduce readability.

On crowded HF bands, overlapping SSB signals make copying difficult. You can improve copy by slicing off some overlap with razor sharp "brick wall" responses.

You can also highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in an MFJ *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.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 50 dB.

You can use *narrower* bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you *two* tunable filters you can use together on one signal. For example, on RTTY, tune one filter to mark, the other to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 *pre-set* filters -- use factory set or program your own

You can select from *fifteen* convenient *pre-set* filters. Use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode you can think of.

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 and noise reduction --all filter settings-- in 10 *programmable* filters.

Only MFJ gives you the best of both worlds -- *tunable* filters to eliminate nearly any QRM and fast convenient *pre-set* filters customized for any mode.

Plus more . . .

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

Built-in two watt amplifier. Has volume control, input level control, speaker jack, headphone jack, accessory jack, PTT line and PTT sense and line level output. 9x2½x6 in.

It plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315, $14.95.

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You get MFJ's famous one year No Matter What™ *unconditional* guarantee. That means we will repair or replace (at our option) your MFJ-784 *no matter what* for a full year.

Call your dealer for your *best* price

Automatically eliminate heterodynes, reduce noise and QRM on Voice, CW and Data. Call your favorite dealer for your *best* price and order your MFJ *super* DSP filter today!

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NORTH AMERICA

UNITED STATES

K1DG	**A**	**4,560,150**	**2271**	**157**	**551**
AA2DU/1	**"**	**3,510,573**	**1954**	**140**	**487**
W1PH	**"**	**3,528,104**	**1940**	**144**	**484**
KC1F	**"**	**3,147,934**	**1767**	**137**	**480**
K2SX/1	**"**	**2,845,854**	**1693**	**147**	**447**
KZ1M	"	1,581,100	1140	118	367
N4XR/1	"	1,367,598	838	143	436
K1KP	"	1,147,704	988	106	302
WE1F	"	1,104,649	914	111	316
W1BIH	"	1,047,344	708	141	395
K1GW	"	1,039,909	774	124	355
W1NG	"	906,780	649	133	377
AK1N	"	836,140	765	96	292
W1AX	"	470,353	453	93	280
AI1N	"	271,964	320	86	222
WA1IML	"	141,293	225	67	162
AA1DN	"	137,052	220	65	178
WS1A	"	131,502	242	62	140
N6RFM/1	"	106,169	194	67	136
KA1CLV	"	64,558	143	52	117
K1FWF	"	46,800	112	53	97
NG1J	"	45,360	121	44	96
K2AJY/1	"	43,960	104	53	104
KB1H	"	43,099	124	41	90
W1QK	"	36,765	106	47	82
K5NA/2	**A**	**4,490,980**	**2089**	**169**	**582**
K2WK	**"**	**3,135,485**	**1679**	**151**	**504**
K2BU	**"**	**2,060,792**	**1169**	**144**	**482**
K2PS	"	1,965,314	1273	128	410
WAØQOA/2	"	1,499,040	1110	119	361
W9NGA/2	"	1,317,006	890	128	394
NR2H	"	1,144,638	798	123	394
KY2T	"	1,132,032	758	119	417
W1GD/2	"	1,075,284	809	118	358
KF2O	"	812,544	580	136	376
K8FC/2	"	648,627	556	116	345
K2TD	"	595,897	544	101	296
WA2UUK	"	442,035	388	114	309
K2JLA	"	408,421	418	100	253
K2OWE	"	400,438	421	97	250
N2AIF	"	366,376	410	92	236
WA2WYR	"	323,126	355	100	238
WA2MKM	"	297,192	422	64	180
KB2DM	"	286,748	313	95	248
NA2M	"	251,141	322	89	200
KE2OP	"	220,732	294	77	201
WA2ABN	"	87,657	200	62	121
K2SB	"	63,342	150	41	112
KB2NU	"	58,296	126	56	112
N2VW	"	40,896	113	41	101
WJ2W	"	36,195	106	46	81
NA2K	"	16,900	69	40	60
W2XN	"	12,033	67	18	45
WR2G	**14**	**125,190**	**371**	**26**	**91**
W2HG	"	119,930	312	32	102
KE2N	3.5	6,837	60	11	32
K3WW	**A**	**5,056,464**	**2499**	**160**	**547**
W2UP/3	**"**	**4,007,604**	**2071**	**158**	**516**
NN3Q	**"**	**2,430,792**	**1534**	**128**	**418**
AA3B	**"**	**2,399,572**	**1405**	**136**	**466**
W3FV	**"**	**2,224,750**	**1407**	**127**	**423**
K3NZ	"	1,331,889	917	124	383
N3NA	"	1,250,104	865	121	388
K3ND	"	1,223,942	746	149	440
NW3Y	"	1,203,498	928	111	348
W3MM	"	1,104,892	709	141	421
W3OV	"	1,007,720	764	118	354
KZ3H	"	915,444	746	115	316
NX3A	"	908,106	659	117	376
K3II	"	777,304	583	120	364
W3GK	"	776,895	627	121	332
K3ZA	"	774,573	708	100	281
K3SA	"	772,473	722	96	281
N3RR	"	536,900	443	125	330
K3OO	"	507,846	563	89	229
W3MA	"	473,525	518	86	239
K3ATO	"	388,926	391	103	266
N3ARK	"	224,720	303	67	198
K3BHX	"	122,783	233	63	136
NC3C	"	115,304	186	80	152
NK3U	"	67,893	151	61	122
K3NL	"	40,081	102	44	105
N3IMF	"	30,940	100	40	79
WM3L	"	27,100	98	34	66
WR3L	**21**	**67,222**	**193**	**28**	**94**
W3GH	**7**	**447,702**	**883**	**37**	**137**
ND3A/4	**A**	**2,166,395**	**1287**	**143**	**452**
K4CEF	**"**	**1,167,750**	**829**	**132**	**387**
NU4Y	"	851,006	681	128	333
K4PB	"	685,377	540	131	342
AB4ND	"	347,381	349	105	278
WB4VKW	"	338,679	394	92	219
KR4GJ	"	316,953	366	83	190
KJ4VH	"	292,990	317	113	240
W4FDA	"	279,033	363	79	202
KO4PY	"	256,286	376	71	183
KN4UB	"	247,296	318	75	201
K8UNP/4	"	239,645	313	91	196
WR4K	"	232,407	299	78	201
KD4FAZ	"	184,708	292	69	175
AB4H	"	178,560	233	90	189
N4KE	"	175,812	230	88	188
KN4OS	"	124,189	215	72	161
K5OTI/4	"	109,564	198	62	134
KR4DL	"	84,870	160	73	132
AB4RU	"	84,108	188	48	115
W4OVU	"	54,720	137	56	104
AKØM/4	"	54,621	137	52	101
KO4RQ	"	40,131	103	48	99
K4FK	"	32,175	111	42	75
N4SLR	"	3,264	29	24	27
N4KG	**7**	**421,520**	**862**	**37**	**139**
WA4CUG	"	44,732	156	28	78
K5EC	**A**	**275,706**	**389**	**92**	**197**
WB5B	"	161,803	247	78	161
KA5W	**21**	**293,056**	**690**	**33**	**119**
WB5UDX	"	151,174	408	31	100
W9NQ/6	**A**	**677,735**	**580**	**139**	**306**
K6VI	**"**	**640,728**	**597**	**127**	**269**
AB6WM	**"**	**452,610**	**520**	**106**	**215**
KC6X	"	415,053	492	105	216
KT6V	"	407,009	425	125	228
W6OAT	"	376,591	388	115	244
K6SG	"	361,446	405	108	213
WK6V	"	303,094	439	102	151
W6OUL	"	242,760	350	98	157
NI6T	"	241,902	333	97	170
WR6R	"	224,990	274	104	198
KF6HI	"	184,345	299	97	132
W6RCL	"	182,390	300	94	136
AJ6V	"	172,200	305	78	127
AA6MC	"	156,657	255	89	148
K6PU	"	125,664	206	93	138
W6TKF	"	68,510	163	76	94
WA8LLY/6	"	41,040	107	63	81
KJ6HO	"	11,264	57	40	48
KN6EL	**21**	**78,473**	**317**	**30**	**67**
WA6CTA	**14**	**67,522**	**232**	**27**	**79**
WJ7R	**A**	**277,167**	**438**	**88**	**139**
W7KJJ	"	65,631	156	65	102
KS7P	"	16,340	75	29	47
N7IRR	**14**	**98,100**	**327**	**29**	**80**
K7RIE	3.5	13,524	112	18	28
WØCG/8	**A**	**2,369,184**	**1521**	**135**	**417**
K8MFO	**"**	**2,257,200**	**1232**	**164**	**496**
ABØW/8	"	1,048,400	927	114	286
K8JJC	"	933,310	862	100	298
N8BJQ	"	584,766	569	105	273
AG8L	"	289,849	348	94	235
W8IQ	"	285,000	353	85	215
K8CV	"	237,468	331	80	177
W8CAR	"	225,432	336	80	168
KC8EG	"	122,764	234	54	134
WA8OSE	"	82,432	168	64	120
KF8UN	"	80,136	143	71	141
KA8D	"	28,560	100	39	73
KZ8E	"	6,633	39	31	36
WB8VPA	**14**	**79,323**	**208**	**31**	**106**
K9RHY/8	"	41,516	428	28	69
W8UVZ	**3.5**	**177,920**	**470**	**34**	**105**
W8XD	1.8	5,375	51	12	31
K8JP/9	**A**	**1,352,480**	**910**	**138**	**397**
W9XT	**"**	**1,201,692**	**897**	**137**	**341**
W9OP	"	803,700	693	119	304
K9XR	**7**	**79,424**	**220**	**35**	**101**
KFØH	**A**	**1,985,888**	**1314**	**145**	**397**
WYØJ	**"**	**699,600**	**658**	**124**	**276**
KØKX	"	295,785	347	100	213
NØAT	"	136,425	196	88	167
KRØY	"	81,540	169	51	129
K1ER/Ø	"	31,372	90	45	79
AAØCY	"	15,364	73	40	52
WB8ZRL/Ø	**7**	**53,340**	**151**	**34**	**93**
WØSR	"	26,967	96	27	74

CANADA

VE3EJ	**A**	**6,073,614**	**3160**	**173**	**593**
CH9NH	"	737,394	1501	60	121
CH2NAM	"	94,512	337	53	79

ASIA

INDIA

VU2MTT	**A**	**1,576,224**	**1506**	**116**	**305**
		(Opr. VU2PTT)			

ISRAEL

4X/S59PR	**A**	**5,677,000**	**3947**	**127**	**374**

JAPAN

JF1SEK	**A**	**791,954**	**799**	**122**	**237**
JF3LGC	**"**	**371,808**	**489**	**100**	**188**
JK2VQC	"	139,272	415	65	103
JH7QXJ	"	132,172	283	64	109
JA2EJI	"	34,136	95	44	92
JA7MYQ	**14**	**100,092**	**313**	**33**	**81**
JL2LPX	"	46,494	209	27	54
JH6SQI	"	2,412	32	17	19
JH7AJD/1	7	5,850	43	18	32
JK1GKG	**3.5**	**26,520**	**139**	**24**	**54**
JG1EIQ/3	"	9,464	77	18	34
JQ1VNM	"	5,452	45	15	32
JAØVSH/1	1.8	525	13	8	7

EUROPE

4U-GENEVA

4U1ITU	**A**	**4,026,308**	**3411**	**136**	**436**
			(Opr. DL5XX)		

ENGLAND

G3XTT	**A**	**1,502,501**	**1241**	**120**	**433**
G3TXF	**"**	**1,301,300**	**1130**	**129**	**421**
G5LP	"	339,075	657	65	210
G4OBK	"	8,880	54	32	48
G4PDQ	**21**	**81,885**	**332**	**26**	**77**
G3WVG	**3.5**	**126,845**	**667**	**24**	**91**

FINLAND

OH1MDR	**A**	**264,901**	**564**	**76**	**211**
OH2BVM	"	200,692	519	70	192
OH1XT	"	122,537	501	40	141
OH2BO	**1.8**	**14,552**	**165**	**12**	**56**

FRANCE

F5RBG	**A**	**123,015**	**415**	**44**	**95**

GERMANY

DK3GI	**A**	**3,737,205**	**2388**	**171**	**534**
DJ2YA	**"**	**2,356,200**	**1609**	**151**	**479**
DL2MEH	**"**	**2,067,000**	**1621**	**149**	**487**
DJ4AX	"	1,642,576	1168	149	447
DL1HCM	"	1,410,347	1221	130	391
DJ3NY	"	1,329,952	1111	139	417
			(Opr. DL4NAC)		
DL4MCF	"	1,086,255	1098	122	383
DJ9IE	"	1,085,318	1061	128	366
DJ5BV	"	834,426	837	113	340
DJ9MH	"	766,272	919	104	312
DL5MFF	"	518,193	730	96	291
DL8YR	"	514,692	778	87	261
DJ1OJ	"	430,746	668	80	229
DL9NCR	"	281,790	444	82	221
DL8KJ	"	279,680	405	82	222
DK9IP	"	72,436	223	50	149
DL9YAJ	"	51,810	130	60	97
DJ5AV	"	25,826	122	28	46
DF2RG	"	22,644	107	39	63
DJ8FR	**21**	**128,212**	**381**	**34**	**99**
DJ4SO	**14**	**237,109**	**823**	**33**	**94**
DJ6TK	**1.8**	**39,055**	**428**	**13**	**60**

ITALY

IQ2A	**A**	**496,635**	**902**	**87**	**206**
			(Opr. I2UIY)		
IK3SCB	"	43,320	160	43	71
IK5QPS	"	5,830	55	19	36
IN3NJB	**3.5**	**164,600**	**1085**	**21**	**79**

LIECHTENSTEIN

HBØ/DJØIP	**A**	**441,945**	**1065**	**71**	**234**

LITHUANIA

LY1DS	**A**	**209,244**	**331**	**85**	**197**

NORWAY

LA7AFA	A	13,900	118	18	32

SLOVENIA

S56A	**A**	**1,553,664**	**1341**	**133**	**278**
			(Opr. S57MM)		
S51RW	"	140,679	463	58	173

SPAIN

EA3BT	A	49,910	137	56	105

SWEDEN

SM5IMO	**A**	**580,961**	**813**	**91**	**276**
SM6GOR	"	37,944	164	36	100
SMØAJV	7	16,985	131	18	43

SWITZERLAND

HB9AFH	**A**	**34,056**	**111**	**50**	**82**

WALES

GW4BLE	A	42,700	142	45	77

OCEANIA

AUSTRALIA

VK2VM	**A**	**450,448**	**831**	**75**	**113**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

KC1XX	**7,900,138**	**3369**	**175**	**642**
K1TR	**7,311,372**	**3212**	**173**	**613**
WE1B	803,292	673	111	327
WS1F	310,695	418	72	197
W1BK	161,669	222	88	181
K2WI	**6,138,420**	**2726**	**171**	**618**
N2MM	3,247,929	1653	156	553
AB2E	2,566,863	1444	142	497
K2QMF	2,421,600	1416	137	463
WU3A/2	1,691,085	1097	135	420
KB2HZ	1,239,173	922	122	357
W3GG	**2,897,650**	**1708**	**139**	**456**
N6CQ/3	2,827,440	1620	142	474
K3DI	1,809,675	1221	122	403
N3BNA	1,162,035	943	118	323
K3CP	1,090,766	802	113	369
NE3F	511,632	505	104	270
NM3K	492,935	548	86	231
K7YHA/3	151,420	358	71	155
K4LTA	**1,531,796**	**1194**	**127**	**355**
W4PRO	855,712	717	121	321
K4IUV	808,860	763	108	282
N5OK	**1,579,730**	**1491**	**115**	**295**
AD1S/5	1,259,496	1100	124	317
K5HKX	228,346	335	78	176
AG6D	**3,274,992**	**2319**	**157**	**375**
W6BA	**3,066,570**	**1878**	**162**	**423**
K6XT	1,684,590	1353	141	325
W6REC	1,175,265	1154	123	246
WA6IET	1,101,884	1004	134	272
WB6GBR	165,658	272	82	144
N6YKL	134,190	258	73	116
K6HRT	384	9	8	8
KR7G	**1,566,356**	**1532**	**118**	**249**
WD8LLD	**4,334,180**	**2114**	**169**	**571**
K8LX	2,955,708	1650	156	478
W8BI	75,048	167	58	119
KS9K	**4,167,336**	**2141**	**166**	**546**
W9KDX	**3,273,472**	**1753**	**160**	**513**
K9UWA	2,632,342	1371	169	525
KA9P	33,816	106	43	75
NCØP	**2,536,975**	**1723**	**144**	**401**
WXØB	**2,453,842**	**1804**	**152**	**395**
WØKEA	**2,451,554**	**1587**	**159**	**415**
KØVVY	669,696	635	119	265
AAØNC	267,543	527	79	164

BELIZE

V31KF	**8,023,006**	**5600**	**145**	**454**

BERMUDA

VP9AD	**9,323,424**	**5875**	**152**	**502**
VP9MZ	2,259,734	3361	77	221

CANADA

CH9DH	**4,782,008**	**3657**	**127**	**412**
VE6AO	338,100	1118	61	89

CAYMAN ISLANDS

ZF2WW	**8,385,030**	**5697**	**155**	**462**

FRENCH ST. MARTIN

FJ/F8UFT	**538,720**	**2401**	**56**	**129**

ST. LUCIA

J6DX	**11,691,029**	**7180**	**159**	**532**

AFRICA

MADEIRA ISLANDS

CR3W	**6,310,710**	**3996**	**121**	**409**

MAYOTTE

FH/DL5XU	**1,292,522**	**1791**	**64**	**178**

ASIA

ASIATIC RUSSIA

UZ9AWN	**2,281,824**	**1876**	**109**	**347**
UZØCWW	**1,104,805**	**1645**	**101**	**198**
UZØQWA	641,472	1417	71	137

JAPAN

JA1ZLO	**2,472,570**	**1808**	**150**	**348**
JM1ZTI	40,703	154	41	60
JA2YKA	43,992	171	43	61
JG2YIV	72,933	200	66	85
JJ3YBB	**3,450,672**	**2197**	**156**	**402**
JH5ZJS	**4,459,220**	**2639**	**167**	**423**
JH5ZCP	2,584,480	1991	143	321
JA6YCL	**1,471,380**	**1504**	**113**	**245**
JA8YBY	**1,685,264**	**1614**	**123**	**244**

MACAO

XX9AS	**2,375,019**	**3284**	**106**	**255**

SAUDI ARABIA

HZ1AB	**7,107,600**	**4201**	**149**	**451**

THAILAND

HSØAC	**2,379,392**	**2600**	**130**	**334**

EUROPE

AUSTRIA

OE1XTU	**2,311,710**	**2099**	**135**	**367**

BELGIUM

OT3A	**3,324,840**	**2841**	**134**	**404**
ON6AH	1,861,275	2115	106	309

BULGARIA

LZ9A	**5,881,572**	**4037**	**175**	**554**
LZ6S	15,217	273	29	68

CROATIA

9A5D	**1,752,433**	**2844**	**78**	**215**
9A1CED	71,388	444	28	80

CZECH REPUBLIC

OK5W	**4,893,190**	**2943**	**176**	**554**
OL1A	**4,146,048**	**3481**	**133**	**398**
OK2KOD	1,154,979	1356	116	325
OK2KDS	850,135	1156	96	281
OK1OKE	786,380	1025	102	308
OK2KJU	264,600	641	64	181

ENGLAND

GB5DX	**5,497,007**	**3861**	**154**	**489**
G3LNS	**5,308,580**	**3488**	**158**	**511**
G3PJT	1,412,544	1390	107	341
GB5WW	1,266,651	1839	86	301
GXØFUN	1,008,780	1440	95	296
GØFOS	543,840	833	92	238
G4BLX	166,390	1325	20	70

EUROPEAN RUSSIA

RS3A	**3,331,880**	**3298**	**146**	**474**
UZ4WWB	**2,236,455**	**2256**	**139**	**446**
RW1A	1,971,648	2293	109	380
R6Y	1,606,206	1874	134	367
UZ4WWA	1,164,728	1677	110	314
UZ4HXX	1,105,204	1643	99	278
UZ4AYT	559,860	1200	94	216
UZ4AZJ	329,574	732	70	224

FINLAND

OH2X	**5,691,419**	**3642**	**168**	**533**
OH7W	**3,379,584**	**2476**	**151**	**473**
OH6NIO	2,013,420	2119	110	350
OH3NE	1,737,802	2006	109	364
OI5AY	1,601,475	2307	103	290
OH3AT	144,976	453	46	118
OH1BV	121,728	341	55	137
OH2AF	92,463	384	41	106

FRANCE

TM9C	**6,340,554**	**4235**	**162**	**520**
TM6AR	**3,202,035**	**3217**	**127**	**366**
F5KBJ	1,560,924	2147	80	308

GERMANY

DFØHQ	**5,771,870**	**3417**	**176**	**578**
DFØDF	**3,311,437**	**2495**	**154**	**463**
DKØMM	2,843,162	2133	145	477
DFØRU	2,507,100	1904	149	461
DFØRR	2,477,946	2336	128	373
DF3CB	1,916,640	1416	146	459
DF3OG	1,593,786	1392	133	408
DLØSSB	1,350,492	1498	98	331
DKØTZ	597,297	951	82	227
DLØWU	554,513	844	80	231
DLØTUD	484,915	714	89	242
DKØFFO	201,624	555	55	193

HUNGARY

HG6Y	**2,563,580**	**2724**	**116**	**344**
HA3KNA	1,369,666	1813	107	339
HA3KHC	489,230	1032	70	220

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MFJ-208 2 Meter *VHF SWR Analyzer™* finds the SWR of any antenna from 138-156 MHz. Jack for external frequency counter. 7½x2½x2¼ inches.

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IRELAND

EI7M	**3,815,169**	**3395**	**121**	**398**

ITALY

IQ4A	**7,510,110**	**3954**	**185**	**626**
IR2W	**5,734,058**	**3632**	**161**	**538**
IU2X	3,448,224	2726	149	465
IO2L	2,055,840	2118	124	356
IR2X	1,631,593	1570	127	364
II6I	1,363,272	1674	113	403
II1D	583,999	1301	72	197
IRØA	111,650	462	45	130

KALININGRAD

UW2F	**7,192,076**	**4354**	**182**	**606**

LUXEMBOURG

LX/DFØBK	**1,531,896**	**2037**	**111**	**315**

MACEDONIA

Z3ØM	**6,281,040**	**6524**	**141**	**456**

MOLDOVA

ER7Z	**663,645**	**1269**	**77**	**216**

NETHERLANDS

PI4COM	**3,461,022**	**2672**	**150**	**449**
PI4TUE	1,915,825	2396	97	292
PI4CC	1,559,085	2290	95	268
PA3FNE	1,040,580	1506	96	273
PI4ZLD	819,150	1350	95	286

NORWAY

LA1DXG	**1,358,196**	**1575**	**109**	**374**

POLAND

SP9PDF	**847,616**	**965**	**108**	**340**
SP9KRT	280,053	645	80	181
SP9KAO	99,864	320	49	122
SP3KPN	5,562	70	16	38

SCOTLAND

GS4TMS	**461,404**	**1283**	**57**	**187**

SLOVAK REPUBLIC

OM3KFF	**5,576,585**	**3671**	**161**	**524**
OM3KAG	**5,434,509**	**3656**	**158**	**539**
OM3RKA	3,059,085	2535	137	408
OM3RJB	1,319,382	1500	120	357
OM3ROS	840	38	5	16

SLOVENIA

S55AA	**2,300,310**	**2885**	**98**	**268**

SPAIN

ED3KU	**5,417,820**	**3896**	**153**	**482**
EA5WU	**5,102,400**	**4024**	**149**	**451**

SWEDEN

SK3IK	**1,256,625**	**2007**	**83**	**292**
SK6AW	820,600	1148	91	282
SM3OSM	784,256	1303	89	263
SK5AA	764,094	1059	98	249
SK6QW	623,760	1059	75	270
SK7JD	179,400	594	55	145
SK7BQ	101,022	436	36	113

UKRAINE

USØQ	**4,929,172**	**4468**	**160**	**508**
UT7W	1,941,462	1809	144	449
UB4PWC	574,910	1102	92	209
RB4LWM	24,794	150	46	52

YUGOSLAVIA

YU1HFG	**237,495**	**671**	**59**	**222**

OCEANIA

PHILIPPINES

DX1HB	**2,008,354**	**2530**	**91**	**178**
DX3H	686,067	1429	68	95

SOUTH AMERICA

ARGENTINA

L4ØF	**10,236,352**	**5550**	**167**	**459**
LO3A	**2,977,098**	**2991**	**101**	**238**

FRENCH GUIANA

FYØEK	**2,407,812**	**2349**	**90**	**258**

VENEZUELA

4M5I	**11,222,746**	**6051**	**147**	**475**

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

UNITED STATES

W3LPL	**15,338,424**	**6157**	**187**	**701**
K1AR	**15,020,460**	**5623**	**197**	**720**
N2RM	**13,729,504**	**5534**	**186**	**695**
K3LR	**12,919,728**	**5101**	**191**	**701**
KY3N	**9,268,352**	**3959**	**176**	**648**
KY1H	**8,812,000**	**4069**	**174**	**626**
KØRF	**8,368,182**	**4308**	**175**	**563**
AA6TT/Ø	**8,017,310**	**4255**	**179**	**563**
N3RS	7,893,463	3376	172	639
K8CC	**7,188,900**	**3437**	**176**	**597**
N6DX	**6,046,425**	**3369**	**183**	**510**
AA4G	**4,800,449**	**2773**	**154**	**487**
WØAIH/9	**4,683,294**	**2547**	**172**	**521**
K3ANS	2,150,235	1222	147	492
W4MYA	1,191,141	840	137	374
WS4G	309,414	412	85	193

ALASKA

NL7G	**8,072,160**	**6457**	**150**	**352**

AFRICA

CEUTA & MELILLA

EA9EO	**27,553,203**	**11049**	**179**	**658**

ASIA

HONG KONG

VS6WO	**12,631,437**	**8286**	**178**	**511**

JAPAN

JA3ZOH	**6,344,438**	**3610**	**175**	**459**
JA1YDU	**4,994,142**	**3128**	**165**	**417**
JA1YXP	4,282,278	280	162	384
JA3YKC	3,050,811	2174	151	362
JA7YAA	**2,729,178**	**2258**	**138**	**300**
JA3YBF	1,474,720	1306	129	287

EUROPE

CROATIA

9A1A	**14,107,510**	**8297**	**194**	**636**

DENMARK

OZ5WQ	**1,696,986**	**2558**	**91**	**323**

ENGLAND

G3YBT/P	404,505	739	72	231

EUROPEAN RUSSIA

RU1A	**8,113,152**	**5716**	**181**	**587**
R6L	**6,836,960**	**4487**	**176**	**584**

FINLAND

OH1AJ	**1,024,896**	**1090**	**115**	**356**

GERMANY

DLØKF	**3,814,473**	**3349**	**145**	**466**
DA2UK	749,856	1594	75	246

GUERNSEY

GU3HFN	**1,450,872**	**2838**	**75**	**249**

HUNGARY

HG73DX	**15,619,392**	**8780**	**196**	**668**

LITHUANIA

LY7A	**5,659,540**	**4694**	**163**	**534**

NORWAY

LA5M	**562,776**	**1156**	**60**	**202**

UKRAINE

UR8J	**10,622,640**	**7024**	**194**	**646**
US7I	**7,492,578**	**5926**	**160**	**518**

YUGOSLAVIA

4N1Z	**6,227,906**	**5141**	**135**	**428**

OCEANIA

INDONESIA

YE3Z	**1,248,480**	**1280**	**105**	**235**

MARIANA ISLANDS

AHØK	**21,029,060**	**9446**	**198**	**556**

NEW ZEALAND

ZL2K	**9,658,500**	**5965**	**158**	**390**

CHECK LOGS

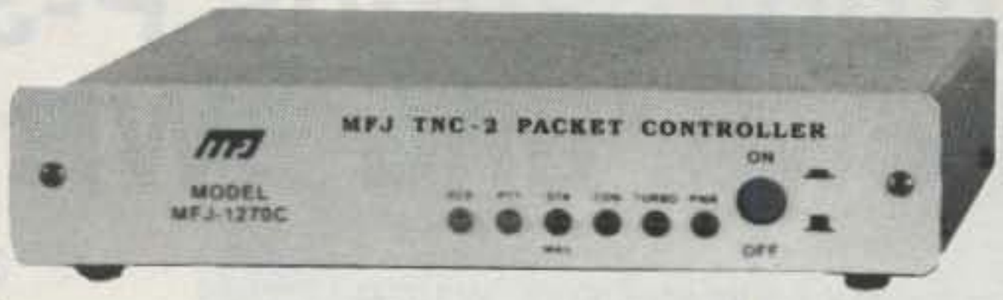
Our thanks to the following stations who sent in check logs: 4O4DCL, 9A1CRJ, AA4WX, AD4FX, CH9RJ, DA1QO, DJØSH, DL1JEI, DL1JF, DL2SZA, DL3HWW, DL3JON, DL3KUR, DL4XM, DL5BWE/CT3, DL5YWM, DL6CHG, DL6CKN, DL6KUA, DL6ZLG, DL7UEO, DL8DZV, EA1EDS, EA1EWG, EA1FAE, EA1KW, EA3AEI, EA3GAS/MM, EA3GCV, EA4MS, EA5EFV, EA5EU, EA5ND, EA5OI, EA5TD, EA6VQ, EA7GZK, EA7HDW, EA7KN, EC7EAU, GD4UOL, JA3XOG, JH3JYS, JL3SBE, JN2AMD, JR1XKU, K6FM, LA1FW, LA1KIA, LA2QM, LA4LN, LA4NE, LA7IJ, LA8CE, LA8HGA, LA8HHA, LA8LA, LA9DAA, LA9HF, LZ1AU, LZ1HX, LZ1YW, LZ2AG, OH2EJ, OH2FQ, OH2OO, OH4LBX, OH5PT, OH6MIL, OH6UC, OH8LAE, OK1AD, OK1FKW, OK1XJ, OM3CWX, OZ1CAR, OZ1EUO, OZ1JLX, OZ5PA, OZ5UR, OZ7JU, OZ7QB, PA3AMA, PA3CLD, PA3DCS, PY2SP, RA6YAD, RK1QXM, SMØNK, SMØBXT, SMØCSX, SM2BQE, SM3CBR, SM4AWC, SM5BFJ, SM5BUH, SM5LI, SM5MLE, SM6BGA, SM6CDN, SM6FPZ, SM6OEF, SM6OLL, SM6PVB, SM7CFR, SM7CKZ, SM7EH, SP2EIW, SP2ERZ, SP2GKQ, SP2GUC, SP2IW, SP2MHD, SP2US, SP2UT, SP2ZT, SP3DIK, SP3FAR, SP4GDC, SP5MBA, SP5MXE, SP5NHM, SP6BEN, SP6CDP, SP6CTC, SP6FER, SP6JZB, SP6SO, SP6SYF, SP7BCA, SP7GAQ, SP7VCA, SP8FHM, SP8JMA, SP8MCP, SP8MJ, SP8NAD, SP9CTT, SP9DAE, SP9QJ, UAØFZ, UA3MIF, UA4HAM, UA9KDZ, UA9XM, UB3IFD, UB5XAN, UB5ZBS, UC2LEO, UC2LER, UJ8SCH, UN6T, UV3AJB, UV4CD, UZ1QWX, UZ3UWA, UZ6HW, VE1ACU, VE3KLM, VK9NJ, VO2JD, W9YCV, WB4RUA, YI9CW, YL2GW, YL2PG, YO2CMI, YO2LIN, YO3ABL, YO6FNA, YO6LV, YO8AII, ZL2JON, ZL2JON, ZP5FGS.

MFJ TNCs for VHF/HF Packet

MFJ-1270C super TAPR TNC clone has a world wide reputation as the most reliable packet TNC in the world! Thousands used as digipeaters, nodes, BBS and in all kinds of commerical applications working 24 hours a day -- many work for years without a single failure . . .

NEW *Super* TNC-2

- *ROM expands to 512K*
- *External accessible reset*
- *Built-in monitor amplifier*
- *Front panel ON/OFF switch*
- *Enhanced DCD circuit for HF*
- *Supports 19,200 baud terminals*
- *Memory Expands to 64K, 128K or 512K*



MFJ-1270C **$119.95**

The MFJ-1270C *super* TAPR TNC clone has a world wide reputation as *the most reliable TNC in the world!*

Thousands are dedicated as digipeaters, nodes, BBS and used in all kinds of commercial applications working 24 hours a day -- many work for years without a single failure.

The Most for Your Money

The most reliable TNC in the world gives you the most for your money. See for yourself . . .

Fully TAPR TNC-2 Compatible

You get full TAPR TNC-2 compatibility -- *all* software and hardware designed for the TAPR TNC-2 standard works without modification. You get NETROM, theNET and Rose Switch compatibility that turns your MFJ-1270C into a Layer Three and Four networking node.

VHF *and* HF operation.

You get high performance VHF *and* HF modems as standard equipment -- for double fun.

You get a true DCD circuit that dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

FREE AC Power Supply

You get a *free* 110 VAC power suppy at no extra cost. With other brands, the AC power supply could cost you an extra $20.95.

New *enhanced* Personal Mailbox

The *enhanced* Easy Mail™ personal mailbox lets you use a dedicated call-sign for your mailbox. Your mailbox can stay on while you operate packet. It will also auto forward or reverse forward mail to and from other BBSs. A *check mail* LED blinks when you have mail. More features: remote sysop access, sysop paging, mailbox C-text, chat mode and many other features not available in other TNCs. The mailbox memory is expandable to 32K, 128K and 512K.

WeFAX gives you Weather Maps

You get a WeFAX mode that lets you print full fledged weather maps from your HF radio to screen or printer or save to disk using an MFJ Starter Pack.

Plug-in Modem - - 2400 or 9600 Baud

You can add MFJ's optional *internal* 2400 baud or 9600 baud modem just by *plugging it in* and making a few simple connections.

KISS interface and MFJ Host Mode

You get a KISS interface that lets you run TCP/IP and MYSYS and MFJ's Host Mode that makes it easy to write efficient application programs.

MFJ *Anti-Collision*™ Technology

You get MFJ's *Anti-Collision*™ technology that prevents packet collisions and improves performance on busy channels.

Plus more . . .

You also get 32K RAM, IC sockets for easy service, 256K ROM, speaker jack, lithium battery backup, RS-232 *and* TTL serial ports, radio cable (you have to add a connector for *your* radio), Fast-Start™ Manual plus much more. Use 12 VDC or 110 VAC. 9½x1½x7½ in.

One Year *Unconditional* Guarantee

You get MFJ's famous *No Matter What*™ one year *unconditional* guarantee.

Enjoy Packet for a long, long time

If you want a TNC that'll work 24 hours a day without failure -- *one that has more features than any other* -- get the ultra reliable MFJ-1270C today and enjoy packet for a long, long time.

2400 Baud *Turbo*™ TNC

MFJ-1270CT, $209.95. Has all the features of the MFJ-1270C plus built-in fast 2400 baud modem. Operate 300, 1200 and 2400 baud packet with the MFJ-1270CT. Radio modification is *not* necessary when operating 2400 baud packet.

MFJ 9600 Baud *TurboPlus*™ TNC

MFJ-1270CQ **$229.95**

Has all the features of the MFJ-1270C, *the most reliable TNC in the world,* plus built-in 9600 baud G3RUH compatible modem. Operate 300, 1200 and 9600 baud.

TNC ACCESSORIES

MFJ Starter Packs

An MFJ Starter Pack, $24.95, gets you on the air instantly. You get interface cable, software on disk and instructions -- just plug it all in and start enjoying packet. Order **MFJ-1284** for IBM or compatibles, **MFJ-1282** for Commodore 64/128, **MFJ-1287** for Macintosh or **MFJ-1290** for Amiga. For VIC-20 or C64/128 with tape drive use **MFJ-1283**, $24.95.

2400 and 9600 Baud Modems

MFJ-2400, $89.95, operates 300, 1200 and 2400 baud packet and works with any radio. **MFJ-9600,** $109.95, G3RUH compatible 9600 baud modem. Not all radios compatible with 9600 baud. Both plug into MFJ TNCs for easy installation.

Mailbox Memory

For MFJ-1270C/1276. Plugs into RAM socket for extra *mailbox* memory. **MFJ-45A** (32K), $14.95, **MFJ-45B**(128K), $34.95, **MFJ-45C** (512K), $219.95.

Real Time Clock

MFJ-43, $29.95, ends re-setting TNC clock everytime you turn it on. Maintains correct time even when TNC is off. Plugs into RAM socket. Works with MFJ TNCs and TAPR TNC clones.

FM Deviation Meter

MFJ-52, $29.95, plug this board into your TNC configured as TheNet X-1J Node and users can check their transceiver packet FM deviation. Requires X-1J or later nodeware. See *CQ Magazine*, Nov. 1993 .

Firmware Upgrade 1.2.9

For older MFJ TNCs. **MFJ-40C**, $19.95, gives you enhanced mailbox and supports mailbox up to 512K.

Mailbox Memory Expansion Board

For older MFJ TNCs. **MFJ-47A**, $49.95, 32K RAM; **MFJ-47B**, $69.95, 128K RAM; **MFJ-47C**, $239.95, 512K RAM. Complete with firmware.

MFJ's new TNC/Mic Switch

Switch between your TNC or Mic by pushing a button!

Switch between your microphone and TNC by pushing a button!

MFJ-1272B/M **$34.95**

You won't have to unplug your microphone and plug in your TNC *everytime* you want to work packet or other digital modes.

Just plug these pre-wired cables into your rig's microphone connector and into your TNC and you're ready to go -- no more hard-to-find connectors and wiring up cables.

Works with HF, VHF and UHF radios with 8 pin mic connectors -- including Kenwood, ICOM, Yaesu, Alinco and others. *For radios with 8-pin RJ-45 modular telephone jack, select the new "M" models.*

Plug-in jumpers let you quickly set-up for virtually any radio. Factory set for Kenwood and Alinco. Includes easy-to-follow instructions. Has audio-in and speaker jacks. 3¼x1¼x4 inches.

MFJ-1272B/1272M, $34.95, for MFJ TNC/multimodes,TAPR TNC-2 clones.
MFJ-1272BX/1272MX, $39.95, for PK-232.
MFJ-1272BYV/1272MYV, $39.95, for KAM VHF/KPC3.
MFJ-1272BYH/1272MYH, $39.95, for KAM HF Port.

Pre-wired Radio-to-TNC cables . . . $14.95

	All MFJ	PK-232™	PK-88™	[4]KAM™/KPC3
[1]Icom/Yaesu HTs	MFJ-5024	MFJ-5024X	MFJ-5024Z	MFJ-5024YV
[2]Kenwood HTs	MFJ-5026	MFJ-5026X	MFJ-5026Z	MFJ-5026YV
Yaesu 8 pin radios	MFJ-5080	MFJ-5080X	MFJ-5080Z	MFJ-5080YV MFJ-5080YH
[3]Icom 8 pin radios	MFJ-5084	MFJ-5084X	MFJ-5084Z	MFJ-5084YV MFJ-5084YH
Kenwood/Alinco 8 pin radios	MFJ-5086	MFJ-5086X	MFJ-5086Z	MFJ-5086YV MFJ-5086YH

1 does not include IC-W2A 2 does not include 2500 3 does not include 25A & 255A
4 YV models connect VHF port KAM KPC3. YH models connect HF port of KAM

Cables with connector *pre-wired* for your radio

MFJ-5082, $9.95, open end cable with 8-pin mic connector
MFJ-5224, $9.95, open end cable for Icom/Yaesu handhelds
MFJ-5226, $9.95, open end cable for Kenwood handhelds
MFJ-5268, $7.95, open end cable with 8-pin modular phone plug for Yaesu FT-2400H, Kenwood TM641A, TM714A, TM732A

FREE MFJ Catalog

Write or call . . . 800-647-1800

PACKET *plus* PACTOR TNC

You get all the features of the MFJ-1270C HF/VHF TNC plus . . . PACTOR . . . precision HF tuning indicator . . . extra 32K mailbox memory . . .

PACTOR combines the best of Packet and AMTOR for HF. You get excellent weak signal operation, error correction, faster baud rate, data compression and full 8-bit word transmissions.

MFJ-1276 **$159.95**

A 20 LED bargraph makes HF tuning easy. Just tune your radio to center a single LED and you're precisely tuned in to within 10 Hz -- and it shows you which way to tune!

You also get an extra 32K of memory for your enhanced *Easy Mail*™ packet mailbox.

MFJ-1276T, $249.95, same as MFJ-1276 but includes fast 2400 baud modem. Lets you operate 300, 1200, and 2400 baud packet.

Nearest Dealer/Orders: 800-647-1800
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• 1 year *unconditional* guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • FREE catalog

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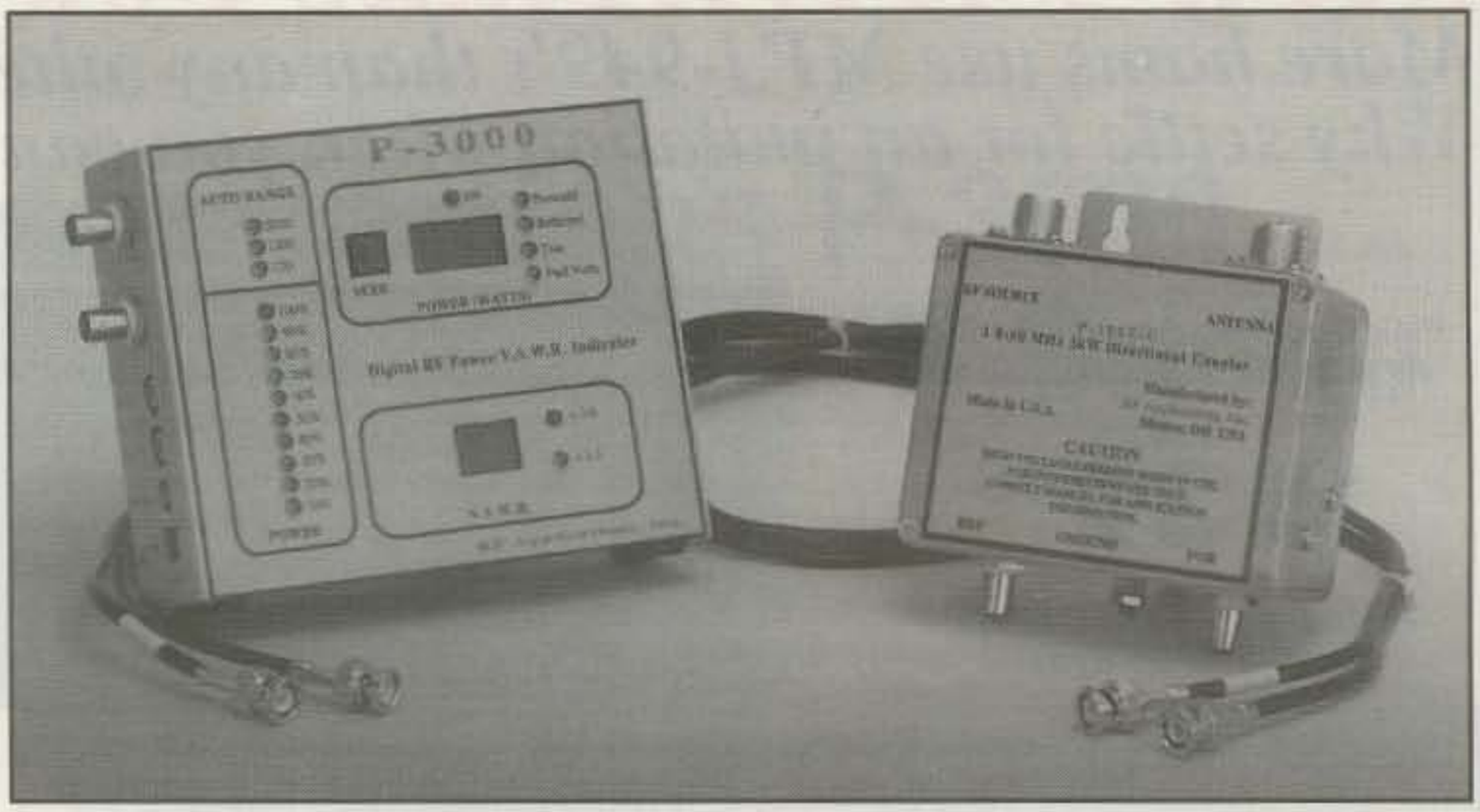
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable

CIRCLE 159 ON READER SERVICE CARD



This is the complete unit as shipped. The pickup box is at the right.

Quite simply, amateurs using SWR indicators that had power scales took the readings to mean there was real power being reflected.

Here is an example. It isn't really easy to follow, so bear with me. Let's assume that we have a rig that is capable of 100 watts output, and no matter what we do, we cannot get more than 100 watts out of the rig. Hah . . . But let's assume we have an antenna that has an impedance of 150 ohms and we feed it with 50 ohm cable. This means an SWR of 3 to 1. Now let's also assume we run 100 watts into this line and load. Our meter could show us 75 watts forward power and 25 watts reflected, or quite likely some other weird combination. And, depending on reactance in the load, our indicators could show us more than 100 watts output with considerable reflected power shown, even though our rig is only capable of 100 watts *total* output.

Here is the clunker that lead many amateurs down the wrong path. The assumption is that the 25 watts shown as reflected is lost power. What we are looking at in actuality is the RF voltage ratio of SWR as translated into meter readings. To really make it simple, and I hope any engineers reading this will forgive me for oversimplifying, at the instant we turn on our rig, the final stage sends an RF pulse up to the antenna and its mismatch. This pulse immediately "looks" at the antenna impedance, shoots back down to the transmitter, and says, "Shut down to 75 watts; that's all we can get into the antenna!" There are always some losses in the line, but they are the inherent ohmic losses, such as resistance and dielectric losses.

What RF Applications does with the P-3000 is electronically take the total measured voltage ratios, forward and reflected voltages, and then present you with the real, or True, power in the line. If you want to argue with what I have just told you, then assume an essentially lossless transmission line. Where is this "reflected power" going to be lost? In the antenna? No way! In the line? No way! (The line is lossless.) Again, quite simply, when measuring the True power, you are measuring the power your rig is actually putting out—no more, no less. Many amateurs will say, "But I am looking at 25 watts being reflected."

As RF Applications points out in their very excellent manual, *exact* power measures will depend on the length of the coaxial lines, the losses, the frequency being used, etc. I just stated that the True power output will be what the transmitter is putting out. However, it is well nigh impossible to put all needed information in a few paragraphs. If the P-3000 is placed in the line directly at the antenna (and this is possible), then the true power reaching the antenna can be measured with extreme accuracy with the unit. However, let's assume that we put the sensing unit at the rig and we have a 100 foot of feed line going to the antenna. Let's further assume this feed line has an inherent 3 dB loss per 100 feet—3 dB means 50 percent, or a 2 to 1 loss. Assuming we had 100 watts coming out of the rig, we would show 100 watts on our P-3000. But if we put the unit up at the antenna, we would only show 50 watts. The 3 dB loss would eat up half our power. As I have stated already, the P-3000 is a simply superb SWR and power measuring device, but the user must have some knowledge of feed-line SWR and power measurements. The accompanying instruction manual provides that knowledge in simple language.

Up to now I have just described power measurements. Below the power indicators is another readout that constantly monitors and displays the standing-wave ratio. If the ratio is less than 1.5 to 1, then a light will light just to the right of the actual SWR measurement display. If the SWR exceeds 3 to 1, then a red light comes on warning the user.

In order to present a pleasing display regardless of CW or SSB operations, RF Applications has carefully selected the update interval for the forward-power display mode. This can be a problem when adjusting a Transmatch or tuner, so the company designed and uses a three times faster update when displaying reflected or True power.

The normal maximum power that can be displayed is 1.5 kW (1500 watts). However, for lab or test work there are jumpers available that will permit a maximum range of 5 kW. There is a special application section in their manual that describes these jumper changes.

The VSWR display provides a continuous readout of your SWR, as mentioned above. The display covers from 1.0 up to 9.9 to 1, and then from 10 to 19 to 1.

At the left of the indicator unit is **Auto-ranging Bargraph**. This is a unique bargraph display. One of the major complaints about digital wattmeters is that the numbers can "jump around" too much. In the P-3000 the bargraph is updated much more quickly than numeric displays. The resulting display is really quite pleasing.

There are three ranges: 120 watts, 1200 watts, and 2000 watts. To display these ranges there are 10 LEDs labeled 10 percent through 100 percent. To read and interpret the display, simply apply the percentage of the highest LED to the range that has been selected. In other words, if the 120 LED is lit and the range light shows 50 percent, it means that you are putting out 60 watts. This system is particularly useful in tuning up amplifiers. This means simply adjusting the amplifier for the greatest percentage. The unit picks the range automatically.

The accuracy of the unit is important. It is rated at ±10 percent. I might add from my knowledge of all SWR measuring devices made, this is the common tolerance rating. (Even the FCC uses instruments rated at ±10 percent for power measurements.) However, if you really need it, the unit can be calibrated to within 5 percent for a given band and frequency, so it could easily be classed as a laboratory instrument. One last point: If you want to mount the pick-up unit remotely, say at an antenna, it is possible to do so up to 500 feet away so that you can monitor an antenna directly at its feed point. But as they say in the manual, they tested the unit at 500 feet; but maybe the user doesn't really want to know what is happening that far out from his station! (I don't!)

As I stated earlier, the manual is very technically sound and very simple to understand and follow. I have not gone into the bridge sensing unit circuit because the details are proprietary. However, it is an offshoot of the Breune circuit.

The P-3000 is priced at $299.00 and is manufactured by RF Applications, Inc., 9310 Little Mountain Road, Kirtland Hills, OH 44060 (216-974-1961). ■

CQ SHOWCASE

Personal Database Applications LOGic™ 4 Windows or DOS

Personal Database Applications has released LOGic 4 Windows or DOS. LOGic 4 features a split-screen CW keyer with printer port interface, SoundBlaster-compatible sound card support, all-new programming code which utilizes the 386 instruction set, and simplified installation and configuration plus logging, online awards tracking, QSL management, contesting, packet spotting, rig and rotor interfacing, and interface to popular callbook databases and the PDA QSL Route List.

LOGic 4 Windows is $99; LOGic 4 DOS is $79; LOGic Jr 4 Windows is $49; and LOGic Jr 4 DOS is $39. (LOGic Jr features complete logging, awards tracking, and QSL managament.) For more information, contact Personal Database Applications, 2616 Meadow Ridge Drive, Duluth, GA 30136-6037 (404-242-0887; FAX 404-449-6687), or circle number 101 on the reader service card.

Slimpak SG-2000SP HF SSB Radio

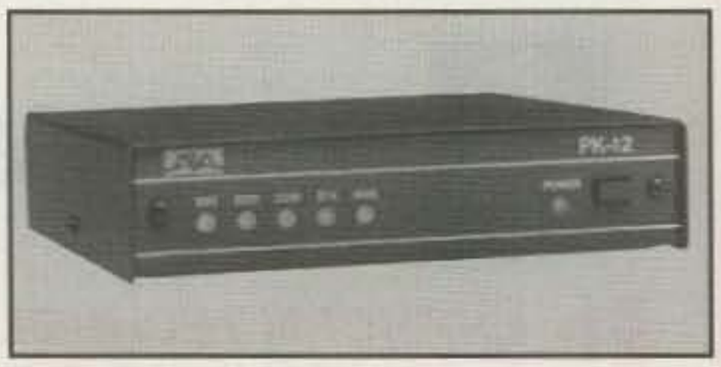
SGC, Inc. has announced their new SG-2000SP Slimpak HF SSB radio. The unit measures 2.6" × 10.1" × 13" and is similar to the SG-

2000. The Slimpak features 644 ITU and amateur frequencies, including SITOR telex channels, permanently etched into memory, and 100 user-programmable frequencies and weatherfax connections. Slimpak produces 150 watts and full frequency range, 1.6 to 30 MHz, for complete and legal marine use as well as covering all the amateur bands. Head options include the mobile head, aviation head, and the standard SG-2000 programming head.

For information, call SGC, Inc. at 1-800-259-7331, or circle number 103 on the reader service card.

AEA's PK-12 Packet Controller

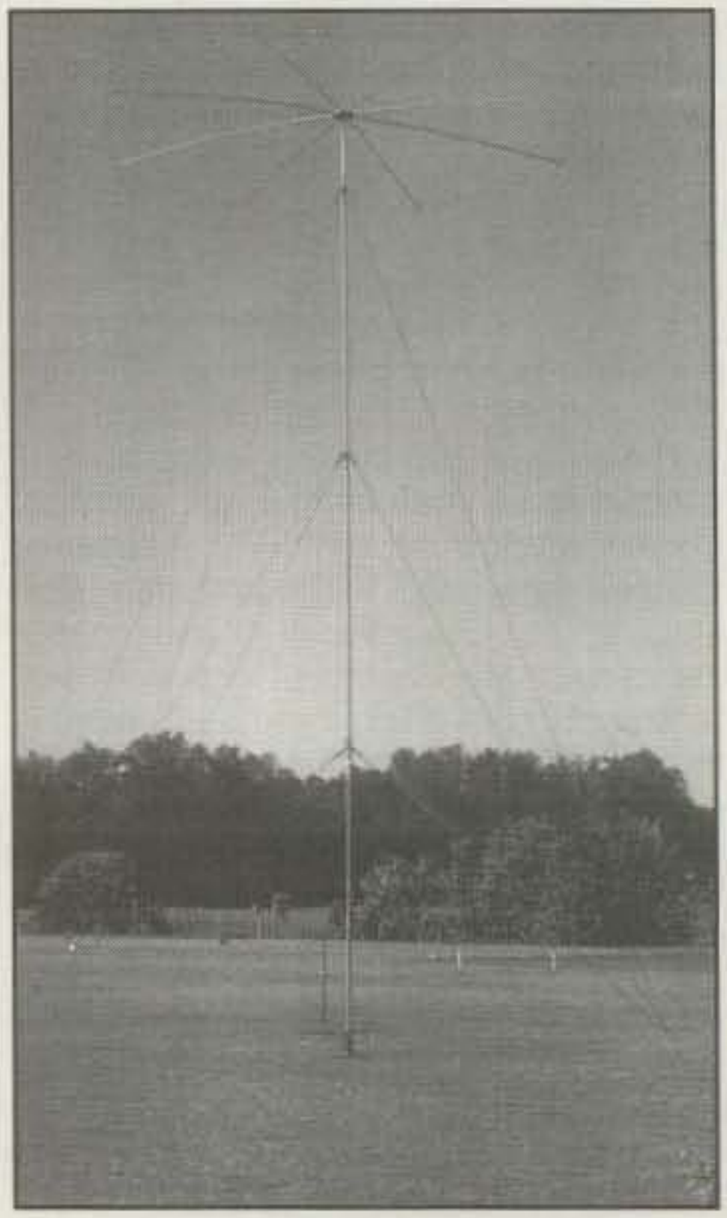
AEA has introduced their PK-12 Packet Controller. The PK-12 is a 1200 bps VHF/UHF packet controller designed for the beginner packet radio operator as well as serious packeteers. The PK-12 comes with AEA's MailDrop feature. MailDrop allows users to automatically receive and reverse-forward messages and control third-party traffic. The 14K bytes of battery-backed Mailbox is expandable to 100K bytes. Other features include HOST mode, KISS, PERSISTENCE, and SLOTTIME, along with Gateway firmware, which will support local acknowledgment of packets. The advanced user can turn EXPERT ON and customize the PK-12 for optimum performance in their applications.



The PK-12 weighs under 12 ounces and measures 5.78"W × 5.28"D × 1.35"H. For more information contact Advanced Electronic Applications, Inc., P.O. Box C2160, Lynnwood, WA 98036 (206-774-5554; FAX 206-775-2340) or circle number 113 on the reader service card.

New Uni-Hat CTSVR

Uni-Hat Corporation has introduced its Capacitance Terminated Short Vertical Radiator (CTSVR). The CTSVR requires an area of 25 × 25 feet to achieve 160-80-17-10 meter operation. The ground system required is one 8 foot ground rod at the base of the antenna with a

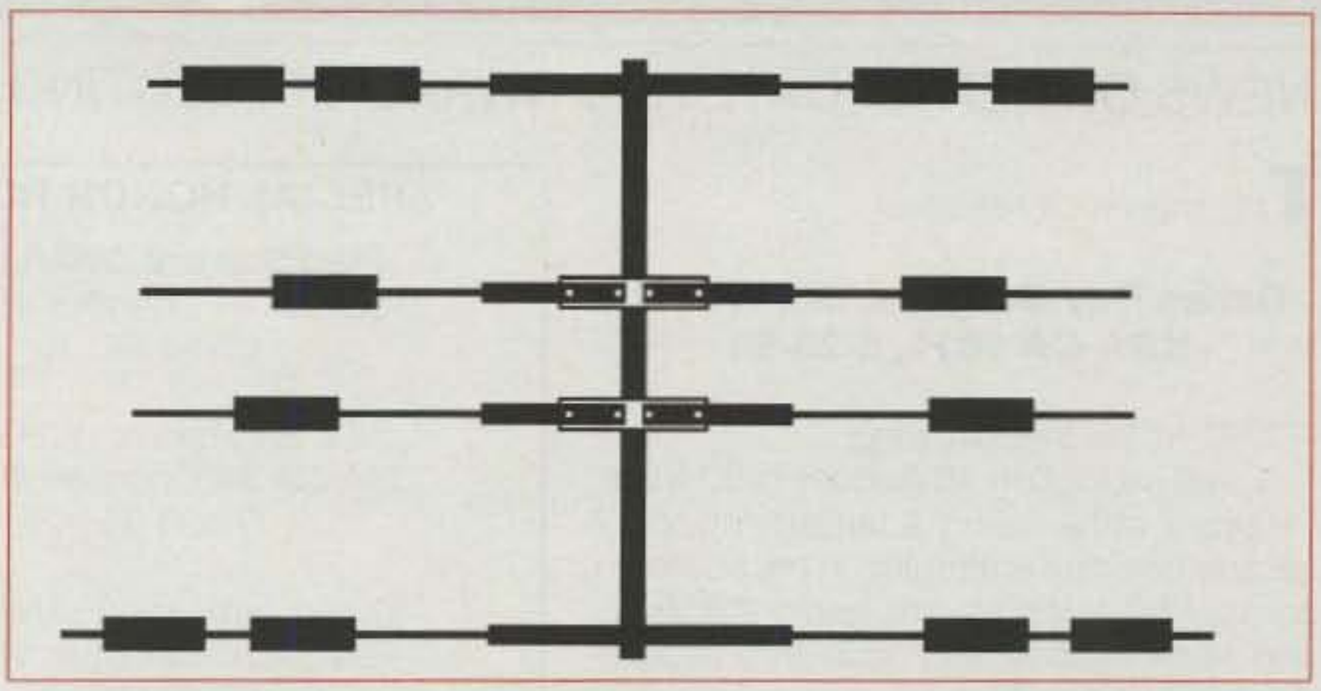


minimum of six radials 34 feet long. The CTSVR is 31 feet tall, top loaded, with no traps, band selection independent, offering multi-band operation, heavy-duty construction, stainless-steel hardware, and a single feed line.

The system is priced at $499 plus shipping. For more information, contact Uni-Hat Corporation Engineering and Marketing Group, 2711 LBJ Freeway, Suite 114, Dallas, TX 75234 (214-241-4793; 1-800-807-5646; FAX 214-241-2632) or circle number 112 on the reader service card.

M.E.I.

Mosley TA-53-M For 10, 12, 15, 17, 20



4 Physical Elements
3 Active Elements on 10, 12, 15, 17 & 20 Meters
Good All-Around Performance
No Measuring - Pre-Drilled - Color Coded
No Tuning - All Stainless Steel Hardware
2 Year Warranty

Specification and Performance Data

Forward Gain:	
10 Meter	7.9 dbd.
12 Meter	7.1 dbd.
15 Meter	6.9 dbd.
17 Meter	6.7 dbd.
20 Meter	6.5 dbd.
Front-to-Back Ratio:	
10 Meter	16 db.
12 Meter	5 db.
15 Meter	13 db.
17 Meter	12 db.
20 Meter	10 db
Power Rating:	
CW	1.5 KW
SSB	2.5 KW
Matching System:	"Q" match
Recommended coax: (RG-8-U/RG-213)	50/52 ohm
SWR at resonant frequency:	1.0/1
Boom Length:	14 ft.
Turning Radius:	14 ft. 11 in.
Recommended Mast Size:	2 in.
Maximum Element Length:	26 ft. 8 in.
Assembled Weight (approx.):	55 lbs.
Wind Surface Area (in sq. ft.):	6.7 ft.^{2}
Wind Load (EIA standard 80 M.P.H.):	160 lbs.
Shipping Weight (approx.):	66 lbs.
Shipping:	UPS
Warranty:	2 Years
Sale Price:	**$526.95**

(Plus shipping, handling and insurance)

The TA-53-M was designed to give the Ham who would like to have a 3 element beam on "5" bands, but keep the size of the antenna to a minimum.

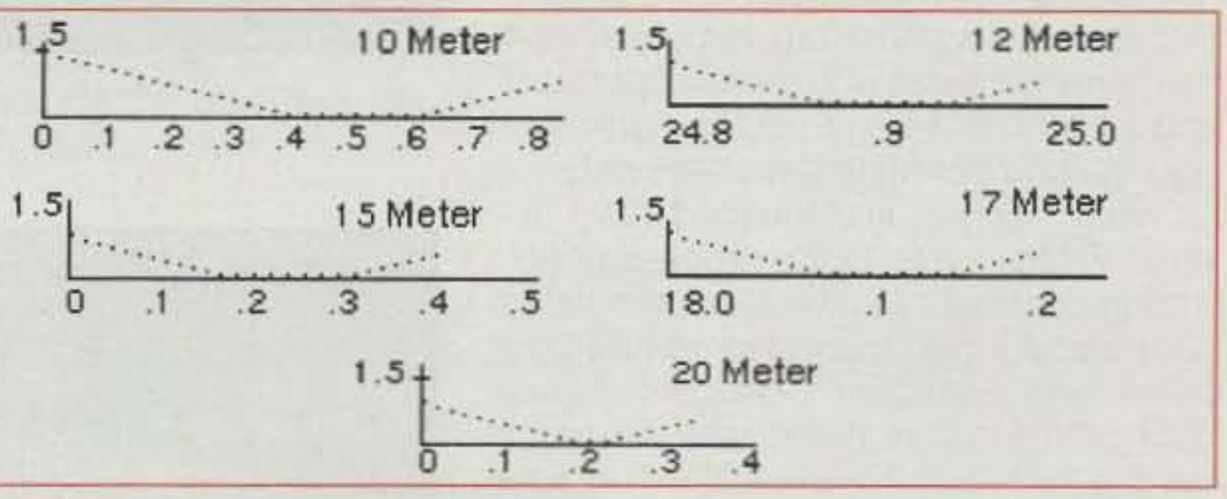
The design criteria was: 1. A single feed line. 2. A very broad band capability, which will work with the new solid state rigs. 3. An antenna that was as compact as possible to justify its use on five bands. 4. To tune it for optimum gain for a "5" band beam on a 14' boom. 5. To minimize the interaction of the close proximity of the various bands. 6. Build it to withstand any above average environments.

We feel this has been accomplished only at the expense of front to back. We considered this to be the least area of importance considering only one director and one reflector spaced over a 14' boom working on five bands.

For the ham that wants a heavy duty all around performer the TA-53-M is for you. It will equal or exceed anyone's 3 element beam on a 14 foot boom in the areas of gain, band width, and construction.

Even though the beam is on a 14' boom and we consider it a small, light weight antenna, it is heavier than our TA-33-M and 2 times heavier than some of our competitors products. This is due to its extra heavy duty construction. This antenna was originally designed to be used as a "light " weight Military and Commercial antenna; and in our Commercial department it is considered light weight.

We feel it gives a Ham the best of all worlds in a small package.



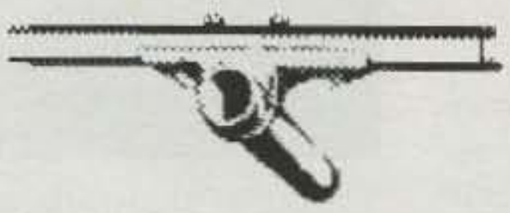
The TA-53-M can also have 30 or 40 meters added to its front Driven element. This 40 meter kit can be added at any time. The kit for 40 is the TA-40-KR. The TA-30-KR adds 30 meters.

Sale Price.....$145.95

(Plus shipping, handling and insurance)

*To **ORDER** or request a free **1994 Catalog** ; Write or Call:*
800-966-7539** or **800-325-4016** or **800-9-MOSLEY

For technical information on the TA-53-M or other Mosley products, Call: 314-994-7872 or Fax: 314-994-7873.



Element to Boom mounting uses our #48 Sand Casted Clamping Block, not a muffler clamp or some other galvanized bracket.

Mosley Electronics, Inc., 10812 Ambassador Blvd., St. Louis, MO 63132

AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month *CQ* salutes:

Dallas Ray Burgess, Jr., WU8Q
USA-CA #811, 8-23-93

"JR" writes the following:

"I was injured on 16 August 1990 when I slipped while rolling a tarpaulin back. I fell and became entangled in the tie-down cords. I received severe back, shoulder, and neck injuries and have been totally disabled since.

"Then at Field Day in 1991 something happened to my vision. I was seeing the world through a sheet of water. Doctors diagnosed a detached retina and I underwent corrective surgery. It was during my recuperation that I really appreciated the County Hunters Net and the many contacts made around the nation.

"I became involved in County Hunting almost by accident. I was listening to the net on 75 meters one night when I heard David, KI6YX, attempting to answer another ham. David asked if anyone could relay the information to him, and I responded. After confirming the contact, David asked about me. Well, I had a lot of questions to ask him, too. He explained about County Hunters and the process of collecting QSL verifications. I was hooked.

"I began participating in the 20 meter net during the day hours and in the 75 meter net at night. I actually had made all the county connections within six months of getting my first one, but the confirmations were a little harder to get. One amateur who had given me about half the counties in West Virginia became a Silent Key, and another had lost his log sheets. Finally, I noticed that I had made way over half of my contacts with mobile operators and all on SSB. I began going back over my logs and contacting mobiles only.

"What I began in January 1991 I finished in May 1993. In the process of collecting counties I also have accumulated 200 plus hours as County Hunter Net Controller and Assistant Controller. I look back on the last year and really appreciate the fact that I finished the first time around when I did. In June my shack took two lightning strikes and my equipment is still being repaired or replaced. I am anxious to be back on the air and begin collecting for my second time.

"Jerry Shean, N8JGT, created a logging and verification program for our computers which makes my record keeping much easier. Because of the doctor's

Box 76, Pleasant Mount, PA 18453-0076

SPECIAL HONOR ROLL

Fred Schmidt, WØULU
USA-CA All Counties #840
07-14-94

Leslie Springmire, W9GPC
USA-CA All Counties #841
07-29-94

David Armstrong, AA6PI
USA-CA All Counties #842
08-04-94

Doyle Payne, N5QOS
USA-CA All Counties #843
08-05-94

Alice Ginsburg, N4MYZ
USA-CA All Counties #844
08-06-94

J.R. Burgess, WU8Q, with his USA-CA #811 award certificate.

PS8YL is shown here receiving USA-CA All Counties #839 at the Mobile Amateur Radio Awards Club Annual Convention in Springfield, Missouri in June 1994.

HONOR ROLL

500

WA3BZT	2776
W9GPC	2777
N7WWQ	2778
4X6DK	2779
9A2WV	2780
AA6PI	2781
N5QOS	2782
N4MYZ	2783
NKØN	2784

1000

W9GPC	1322
WO8L	1323
I3UBL	1324
AA6PI	1325
N5QOS	1326
N4MYZ	1327

1500

W9GPC	1108
WO8L	1109
AA6PI	1110
N5QOS	1111
N4MYZ	1112

2000

W9GPC	1019
AA6PI	1020
N5QOS	1021
N4MYZ	1022

2500

W9GPC	941
AA6PI	942
N5QOS	943
N4MYZ	944
WD3P	945
WY4B	946

3000

W9GPC	863
AA6PI	864
N5QOS	865
N4MYZ	866
WY4B	867

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. 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 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Last month we issued USA-CA 500 to Evognosia D. Tigaraki, SV3AGQ. After the article was submitted, we received this picture of SV3AGQ, who informs us that she has been elected vice-president and awards manager for the Radio Amateur Association of Greece (RAAG).

and my wife's insistence that I avoid eye strain, I asked Barbara Marsh, KB8GGG, if she would enter the 3076 counties and other data into the program. She did. *(The records were impeccable—ed.).*

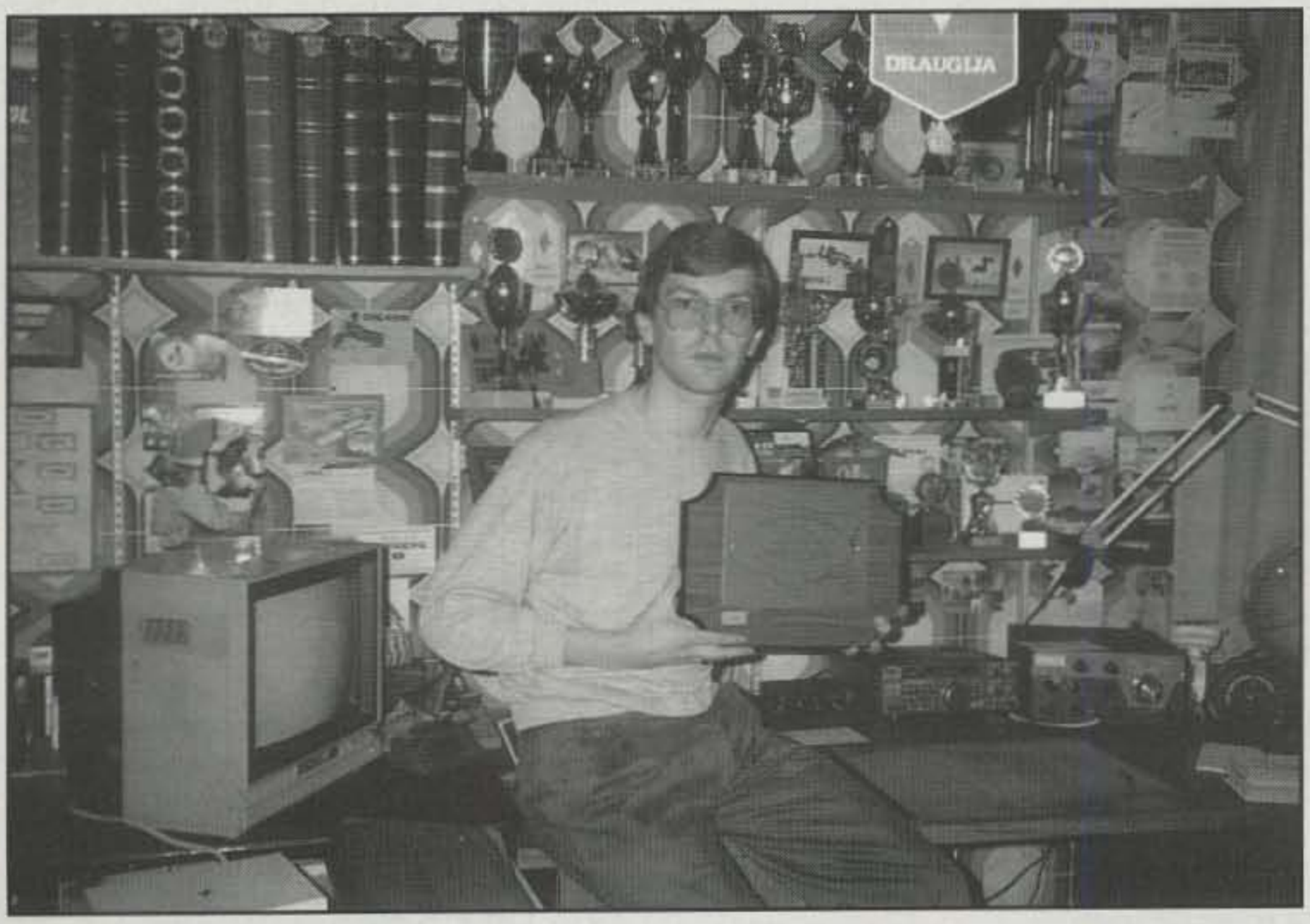
"Gary Holt, WF1G, and Bernie Crump, WW8F, consented to compare the logs with the QSL card verifications. When they returned the materials to me, I was ready to submit the results to *CQ*.

"KB8COG was my Novice call issued 26 May 1987, followed by N8IZQ for my Tech and General, and KE8VH as my Advanced callsign. My Extra call, WU8Q, was issued 1 August 1989. I am a Volunteer Examiner with W5YI teams in Beckley and really enjoy seeing other amateurs upgrade and especially enjoy meeting the new operators.

"'Ham Jones-ing' is my favorite hobby, with fishing and hunting as occasional diversions. I am a member of the Appalachian Repeater Association, Ltd., Berkley, West Virginia, and enjoy being part of the 'Drone Patrol,' which assists in installing and maintaining 19 mountaintop machines. As a group we participate in the annual Field Day and UHF/VHF SO contests and usually score in the top three for West Virginia.

"As an ARA member I can activate a local 2 meter machine, and through a complex system of 220 and 440 MHz links talk as far away as Myrtle Beach, South Carolina. Our system combined with the Piedmont Coastal Repeater Network allows access to four West Virginia repeaters, eight in Virginia, and thirteen in North Carolina. With the addition of the Complex Repeater Group of Pennsylvania we can access thirteen machines in Pennsylvania, two in Northern Virginia,

Amateur radio enthusiast Sheridon "Don" Street, A92BE, is shown here with his wall of trophies, which includes the CQ USA-CA 1000 Award.



Egbert Hertson, SWL ONL 4003, of Belgium, is shown here with a few of his hundreds of awards. Congratulations!

one in Maryland, and one more in West Virginia."

73, J.R., and congratulation on receiving one of amateur radio's most prestigious operating awards.

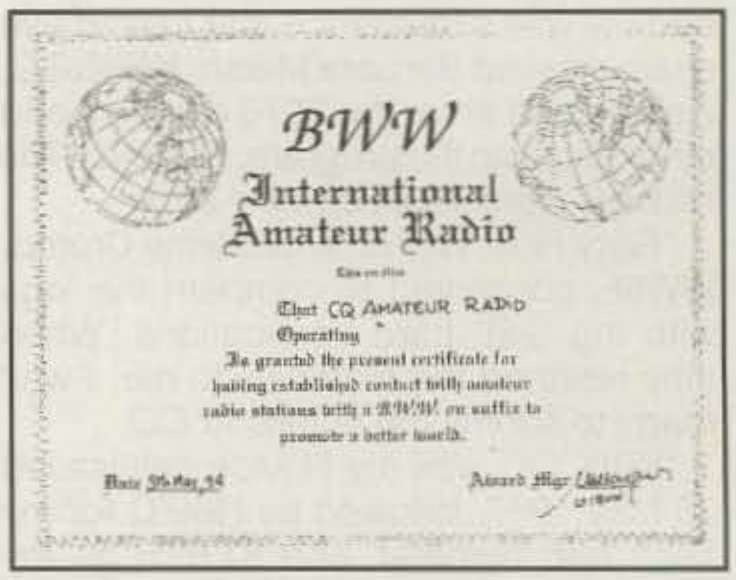
Award News

Thanksgiving Commemoration. The Whitman Amateur Radio Club, Inc. will once again be operating a special events station at the historic Plimoth Plantation, Plymouth, Massachusetts on Saturday, November 26 and Sunday, November 27. The club call, WA1NPO, will be used, and the suggested frequencies are 3.970, 7270, 14.270 18.140 21.370, 24.970, and 28.370 from 1400Z until 2100Z each day. The stations will be set up on the beautiful, historic re-creation of our forefather's first successful settlement in the New World, overlooking Cape Cod Bay. A special QSL card will be sent to those amateurs and SWLs sending an SASE. Also,

The certificate offered for the Thanksgiving special event from Plimoth Plantation, Plymouth, Massachusetts, and sponsored by the Whitman ARC.

an attractive 7.5 × 10 special certificate with the Mayflower II in the background is available for the event. All replies must be sent to Whitman ARC, P.O. Box 48, Whitman, MA 02383.

Better World Award. Manuel Alberto C., CT1BWW, writes that he and friends



The Better World Award from CT1BWW.

(Miguel, EA8BWW; Jurgen, DL3BWW; Oreste, IK2BWW; Jim, UL2BWW; Bill, VK2BWW) have been active in many amateur radio activities—IOTA DXpeditions, hamfests, exhibitions, contests, etc. In recognition of this activity Manuel is sponsoring the Better World Award.

For this award the applicant must submit verified evidence of two-way contact with other amateur stations having BWW as the suffix. European stations must contact three of the above group and three other stations with suffixes of BWW. Non-European stations must contact two of the above stations plus two other stations with BWW as the suffix.

Submit certified log extracts only (no QSL cards are required) to: Manuel Alberto C. Marques, CT1BWW, P.O. Box 41, 2780 Oeiras, Portugal.

Awards Issued

This was a busy month for your USA-CA Award Manager. In addition to the number of applications received and processed, our printer broke down. Due to a series of not so comic errors, it took two months to get it repaired. So for those of you wondering why it took so long to receive your certificate, now you know. Thanks for your patience.

The following received their basic **USA-CA 500** certificate: WA3BZT #2776; W9GPC #2777; N7WWQ #2778; 4X6DK #2779; 9A2WV #2780; AA6PI #2781; N5QOS #2782; N4MYX #2783, NKØN #2784.

USA-CA 1000 recipients were W9GPC #1322; WO8L #1323; I3UBL #1324; AA6PI #1325; N5QOS #1326; N4MYZ #1327.

USA-CA 1500: W9GPC #1108; WO8L #1109; AA6PI #1110; N5QOS #1111; N4MYZ #1112.

USA-CA 2000: W9GPC #1019; AA6PI #1020; N5QOS #1021; N4MYZ #1022.

USA-CA 2500: W9GPC #941; AA6PI #942; N5QOS #943; N4MYZ #944; WD3P #945; WY4B #946.

USA-CA 3000: W9GPC #863; AA6PI #864; N5QOS #865; N4MYZ #866; WY4B #867.

73, Norm, WA3RTY

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MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Measuring Frequency with a DVM

In the July issue of *EDN*, an electronics industry trade magazine, in their "Design Ideas" section, an interesting item was published that should be of interest to experimenters. This short article was written by a Mr. Sjursen of Base Ten Systems Inc., a New Jersey company, and describes an approach for measuring frequency.

The article concerns the use of an SPDT analog switch, reference voltage source, and a capacitor to measure low frequencies. The circuit, shown in fig. 1, is reminiscent of those used to measure RPM in early automotive tachometer applications. As originally described in the *EDN* article, a stable precision voltage source is connected to a capacitor, C1, through a switch that is opened and closed at the same rate as the period of the frequency to be measured. A digital voltmeter, set to measure current, is then connected across the capacitor. In operation, the capacitor sees pulses of charging voltage, at a rate equal to the frequency to be measured, while the DVM sees an output current that is a function of the charge left on the capacitor as it discharges through the DVM's input current shunt. A second capacitor, C2, serves to smooth the current pulses applied to the DVM from the switch. The average value of this current is directly proportional to the frequency applied, provided the input duty cycle is held constant. As a result, the DVM indicates frequency directly on its readout. By the way, analog VOM set to measure current can also be used. A chart of capacitor values for various input ranges is given for convenience.

While not exotic, the above is a very simple way to measure frequency where extreme accuracy is not important. The 10 volt reference source can be a 7810, zener diode, or elaborate voltage regulator. It is only important that it be stable. It is also helpful, for calibration purposes, if it can be varied somewhat. The analog switch can be anything from the Analog Devices part number shown to a reed relay. Capacitor C1 should be a precision unit. However, C2 can be an inexpensive electrolytic. Since the input frequency is driving a digital logic element (or reed relay), a suitable interface stage must also be designed. This can be a logic gate for digital measurements or the output of a comparator for analog measurements. For best results, the input frequency should be converted to a 50% symmetrical duty cycle signal.The overall accuracy of this circuit will be determined by the accuracy of the components.

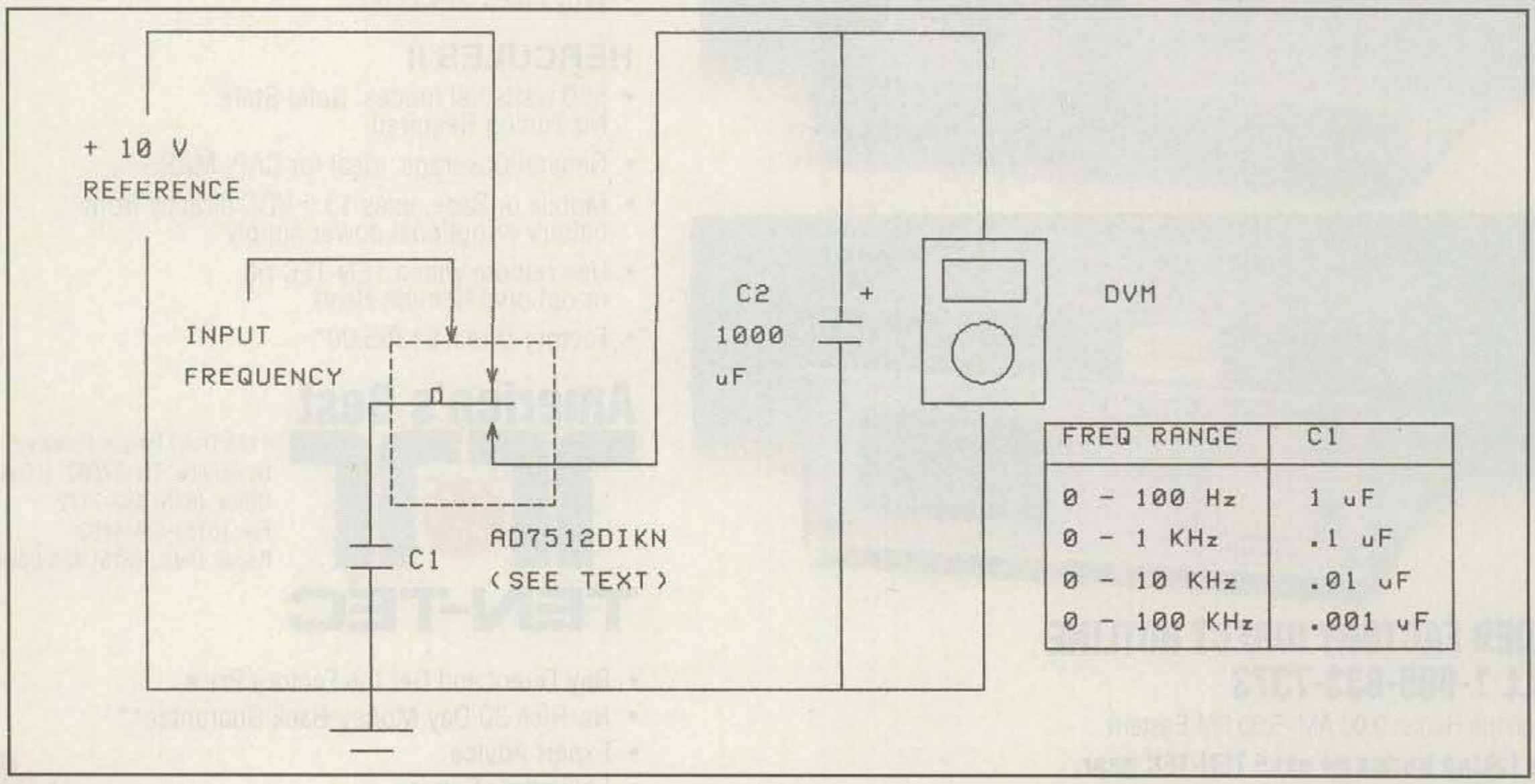
In circuits like this it is also very important to have a few reference frequencies that you can use for initial calibration. Due to the differences in DVM or VOM current shunt values, capacitor tolerances, or switch resistances, you may have to "play around" to get the range you wish, but that is what experimenting is all about!

While circuits such as this will not equal the accuracy or versatility of a full-blown frequency counter, nor will they be of much use into the RF region, they can provide a quick go/no-go indication of the operation of a piece of gear. They are also very useful for other low-frequency measurements such as tachometers (as previously stated), single frequency tone measurements, AC power-line frequency determinations, or even duty-cycle distortion measurements. Best of all, the cost is insignificant.

I would love to hear of your uses for such a circuit and will be glad to publish unique applications.

73, Irwin, WA2NDM

c/o CQ magazine



FREQ RANGE	C1
0 - 100 Hz	1 uF
0 - 1 KHz	.1 uF
0 - 10 KHz	.01 uF
0 - 100 KHz	.001 uF

Fig. 1– Circuit of DVM-type frequency counter.

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- The Omni-VI also has 100 memories and scratch pad, oven-stabilized time base, dual VFOs, +/-10 KHz offset receive and transmit, full or adjustable Semi QSK, iambic keyer and much more.
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Ask anyone who uses a TEN-TEC unit, and you'll begin to understand our customers' nearly fanatical loyalty. There are many reasons for it. And the superior performance of the Omni-VI is just one of them. At $3,000, it would be a bargain. At just $2,385, it's a steal. Order yours today, factory direct with our no-risk 30 day money-back guarantee. And start feeding on the weaklings.

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"America's Best"

1945 CQ 1995

50th Anniversary

CQ turns 50 years old next year, and you're invited to the party! Here's a bit of CQ's history, and what we have in store for the celebration.

Happy 50th, *CQ*!

BY RICHARD S. MOSESON*, NW2L

Golden Memories?

Do you remember *CQ*'s early days? Was there something you read (or even something you wrote) in *CQ* that made a big difference in your hamming? If we've had a real impact on your life or hobby some time in the past 50 years, we'd like to hear from you. Who knows? Your recollections might end up in print!

Try to be brief. Tell us what the article was about, approximately when it appeared ("late '50s" is fine if you can't remember specifics), and why it was significant to you. We'll pick the best of these "golden memories" for publication during our golden anniversary year.

Send your letters to: *CQ Golden Memories*, c/o Rich Moseson, NW2L, CQ 50th Anniversary Coordinator, 19 Linden Ave., Bloomfield, NJ 07003.

(E-mail: 72127.745@compuserve.com—or—NW2L@aol.com)

It was 1945. Amateur radio had been off the air since Pearl Harbor. But now World War II was coming to an end, and it was clear that a new and revitalized amateur radio would emerge from the ashes when the wartime ban on operating was lifted.

A casualty of the war was one of amateur radio's most respected publications, *Radio* magazine, the roots of which stretched back to 1917.[1] In the 1930s it was a thriving publication serving amateurs and other radio enthusiasts. But when amateur radio shut down during World War II, its focus had to change in order to survive.

In 1944 *Radio* was sold and split into three magazines. The new *Radio* focused on the broadcasting industry; *Audio* became (and still is) a magazine for hi-fi enthusiasts; and the old magazine's amateurs were served by a brand new magazine called *CQ*.

Now, as our 50th anniversary approaches, we're planning some great celebrations. And we'd like *you* to "join the party." After all, where would we be without our readers?

The keystone of *CQ's* anniversary celebration will be a very special issue in January 1995. A commemorative insert will chronicle the past half-century in amateur radio, will look at how the world has changed since 1945, and will bring you highlights of *CQ's* own history. (Did you know, for example, that Wayne Green, W2NSD, used to be editor of *CQ*? Or that the concept of amateur satellites was born on these pages in 1959, with a suggestion from then-*CQ* columnist Don Stoner, W6TNS?) Plus, *CQ's* current columnists will be looking back at their own specialty areas and examining the progress of the past 50 years.

We've got something special planned for you on the air, too: A whole series of new operating awards, with something for nearly every active amateur. Anybody with a working radio will be able to earn the basic *CQ/50* Award. Just talk to 50 different amateurs during 1995. That's it. (Well, there is *one* catch: You have to talk to them on the radio. Hamfests and club meetings don't count!) There will be a host of endorsements for the basic award—some easy, some difficult (such as the special endorsement for earning all the other endorsements!). All are aimed at encouraging you to be active, to try new bands or modes, or to challenge your skills by working 50 countries, 50 states, 50 U.S. counties, 50 grid squares, or 50 prefixes during our 50th anniversary year. (Full rules for the *CQ/50* Awards appear elsewhere in this issue.)

As this issue goes to press, several other celebrations, special products, and promotions are still in the planning stage. Watch these pages for more details.

All in all, we've got a big year planned for 1995, and we hope that you'll plan to be part of it. ■

**CQ 50th Anniversary Coordinator*

[1]Historical information courtesy Bill Orr, W6SAI

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REPEATER ANTENNA

COAX CONNECTION
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RADIAL ASSEMBLY

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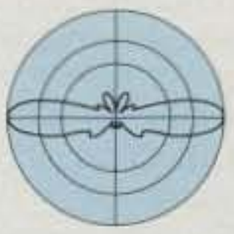
MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CONN.	HT. Ft.	RATED WIND/ MPH
X-50A	144/440	4.5/7.2	200	UHF	5.6	135
X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	144/222	6.0/7.8	150	UHF	11.5	112
X-3200A	144/222/440	6.0/7.8/8:0	100/200	N	10.5	112
X-6000A	144/440/1240	6.5/9.0/10.0	100/100/60	N	10.5	112

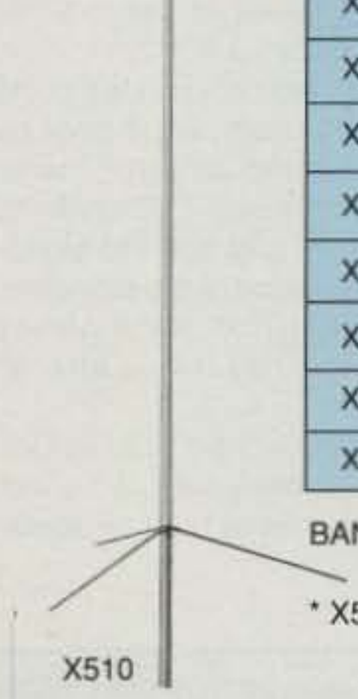
BAND: 144=144 - 148MHz. 222=222 - 225MHz. 420=420 - 430MHz.
430=430 - 440MHz. 440=440 - 450MHz. 1240=1240 - 1300MHz.
* X510NJ :144 - 147 / 430 -440MHz



147MHz

445MHz

RADIATION PATTERNS FOR
X-500HNA/X-500MA/X-510NA

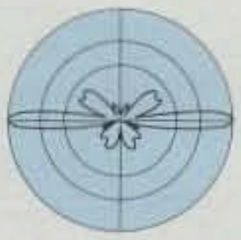


X510

GH/F/U&V series

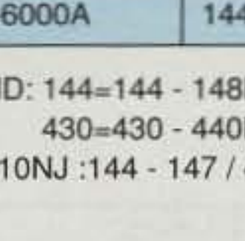
MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CON N.	HT. Ft.	RATED WIND/ MPH
DP-GH62	50	6.0	200	UHF	21.0	78
F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	4.5/8.3/11.7	100	N	5.9	135
V-2000A	50/144/440	2.1/6.2/8.4	150	UHF	8.3	110

*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz



U-300A 440MHz

F-22



U-300A 1200MHz

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

Central States VHF Conference Success Southern Style

For only the second time in the 28 year history of the Central States VHF Society, its annual conference was held east of the Mississippi, although this year just barely. Held in Memphis, Tennessee, the participants and their families were treated to southern-style hospitality by Society President Dave, N4MW, and Cissy, N4ZRW, Meier. (Dave was able avoid a job transfer to Richmond, VA long enough to put on the conference. By now, however, they have relocated, and presumably Dave will be looking for a new location for his family of beacons.)

The Friday session opened with the Antenna Gain Measurements and Contest with Marc Thorson, WBØTEM, conducting the measurements through 432 MHz and Kent Britain, WA5VJB, conducting the microwave band measurements.

Friday afternoon was led off by Jerome, K5IS, and Bobette, N5UDJ, Doerrie, talking about how to really get your antenna in the air. Bobette is a science teacher at the elementary school in Perryton, TX. She and Jerome designed a science program for her classes that centered around balloon launches and amateur radio.

Next Peter Blair, G3LTF, discussed EME operation European style on 1296 and 2304 MHz. He was followed by Michael Owen, W9IP, and Peter Shilton, VE3VD, who showed slides of the Algonquin operation, which could be said is EME the ultimate style.

Bob Carpenter, W3OTC, discussed an automatic logging program he developed that tracks signals of known beacons and gives an idea of existing propagation. He was followed by Bill Tynan, W3XO, who presented a history of VHF.

Next Dave Meier, N4MW, presented some notes on 1296 power amplifier design. He was followed by Tom Whitted, WA8WZG, who presented a paper prepared by Chris Hazlitt, KL7FB, on converting the Motorola Quarter Kilowatt VHF amplifier series to amateur use.

Friday evening was consumed by the flea-market and the noise-figure measurement contest, which was conducted by Al Ward, WB5LUA.

The Saturday morning session was led by Tom Clark, W3IWI, who discussed the use of GPS applications in amateur radio. He was followed by Ray Rector, WA4NJP, who described the construction of his 28 foot EME dish.

Kent Britain, WA5VJB, demonstrated how to build cheap and simple Yagis. He was followed by Tom Clark, W3IWI, who gave an update on AMSAT's Phase 3D project.

The afternoon session was led by Emil Pocock, W3EP, *QST*'s VHF editor, and myself. We conducted a joint forum asking for input from the audience concerning current issues affecting the VHF weak-signal community. We were followed by Joseph Mack, NA3T, who discussed his Azimuthal Equidistant Projection Map software.

Joseph was followed by a tongue-in-cheek presentation of how to win a Nobel prize by Paul Shuch, N6TX. I conducted the last presentation, showing slides of my June trip to Cuba for the VHF QSO Party.

At the banquet the Society's honor awards and the Chambers and Wilson Awards were presented. Winners of the Chambers award were Jim Davey, WA8NLC, and Rick Campbell, KK7B, both for their development of easy-to-build microwave equipment. The Winner of the Wilson award was Gerald Handley, WA5DBY, for his many years of behind-the-scenes work for the Society.

For those participants who could stay in the area, Paul, W4HHZ, and Dorothy (who goes by DB), W4UDQ, Wilson, issued an open invitation to visit their QTH in nearby Collierville to enjoy a catered barbecue and see the world-famous 28 foot dish. Paul is one of the pioneers, and in this writer's opinion, one of the heroes of the weak-signal community. He is also an absolute gentleman.

Next year's conference will be held in Colorado Springs. The new president is Lauren Libby, KXØO, and he promises cool tempera-

P.O. Box 73, Oklahoma City, OK 73010

VHF PLUS CALENDAR

October 1	Canada 50 MHz Sprint, 1000–1400 UTC. (See last month's column for details.)
October 2	Very good EME conditions.
October 5	New moon.
October 6	Perigee.
October 9	Poor EME conditions.
October 16	Moderate EME conditions.
October 19	Full moon.
October 21	Apogee.
October 22	*Orionids* meteor shower predicted peak.
October 23	Poor EME conditions.
October 26	Last quarter moon.
October 29–30	First weekend of ARRL EME contest, 0000 UTC 29 October to 2400 UTC 30 October. (See text for details.)
October 30	Very good EME conditions.

Following the contact with Astronaut Linda Godwin, N5RAX, aboard the Space Shuttle Endeavor in April, lunch was arranged for the students at the Green Country Hamfest in Tulsa, Oklahoma in May. Here Linda poses with the 16 students who talked with her during the space flight .

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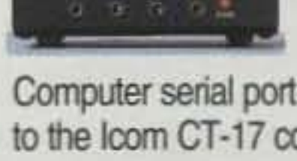

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tures and warm hospitality. Watch this column for more information as it becomes available.

More California-Hawaii Opening Coverage

Paul Lieb, KH6HME, described the massive opening in early July as the best ever. As reported last month, the opening produced to new DX records. Paul sent me an updated distance measurement showing that the distance for the KH6HME-N6CA 2304.1 MHz contact was 2473.009 miles and for the KH6HME-N6XQ 902.100 MHz contact the distance was 2523.369 miles.

Another first was also accomplished during that opening. Gordon West, WB6NOA, was the first to receive an ATV signal from Hawaii. Transmitted by Paul, a test pattern was received by Gordon at a "P4" level, which is quite good for an ATV signal. Shortly after his reception, Gordon notified Tom O'Hara, W6ORG, who in turn notified Mike Henkoski, KC6CCC. Mike, who is located in San Clemente a bit farther away, also received the test pattern, although at a "P3" level.

Unfortunately, no two-way QSO was made because Paul did not have a receiver. However, perhaps next summer the first-ever two-way ATV QSO will be conducted.

One of the Hawaiian participants in the opening was Russ Sakai, KH6FOO. He sent the following report: "FM broadcast stations were being received here on July 5 before the beacons were heard. Shel Remington, NI6E, was receiving some FM broadcast stations at the site of KWHR (a shortwave broadcast station) down at South Point, Hawaii with a Sony portable receiver with the built-in whip antenna during this *great* opening.

"I was first notified that the beacons (144 and 1296 MHz only, as the 432 MHz beacon was off the air) were being heard on July 10th at around 2030 UTC. My first contact of the year was made on 2 meters with Jack Henry, N6XQ, at 2055 UTC (just moments before the end of the CQ WW VHF WPX Contest, a point noted in N6XQ's contest log entry). Conditions started to deteriorate on July 15 at around 1000 UTC. By 1800 UTC on July 15 there were no signals to be heard here or atop Mauna Loa at the beacon site."

Russ reported that he made over 100 QSOs in California, Mexico, and Oregon, all on 2 meters. Among the lucky ones in Oregon were W7TZO and KG7TF. Russ also reported that Paul made nearly 190 contacts in the same areas on bands up to 2304 MHz, although Paul also worked NC7K in Nevada and W6SQN in Oregon. Additionally, Paul worked KG7GF on 432 MHz. A breakout of the bands for Paul are as follows: 144 MHz, 148 stations; 222 MHz, six stations; 432 MHz, 29 stations; 902 MHz, one station; 1296 MHz, three stations, and 2304 MHz, one station.

Russ sent me copies of the weather maps outlining the high-pressure area responsible for the opening. He also sent me a disk with a file listing the calls of all the stations he and Paul worked. Thanks, Russ.

Pat Coker, N6RMJ, who is 80 miles inland, worked Paul on both 144 and 432 MHz, the latter with +20 dB signals. Additional Hawaii stations who participated were Collins Tomei, WH6BR, Alistoir Bostrom, WH6BY, and Sam Kumukahi, KH6AFS.

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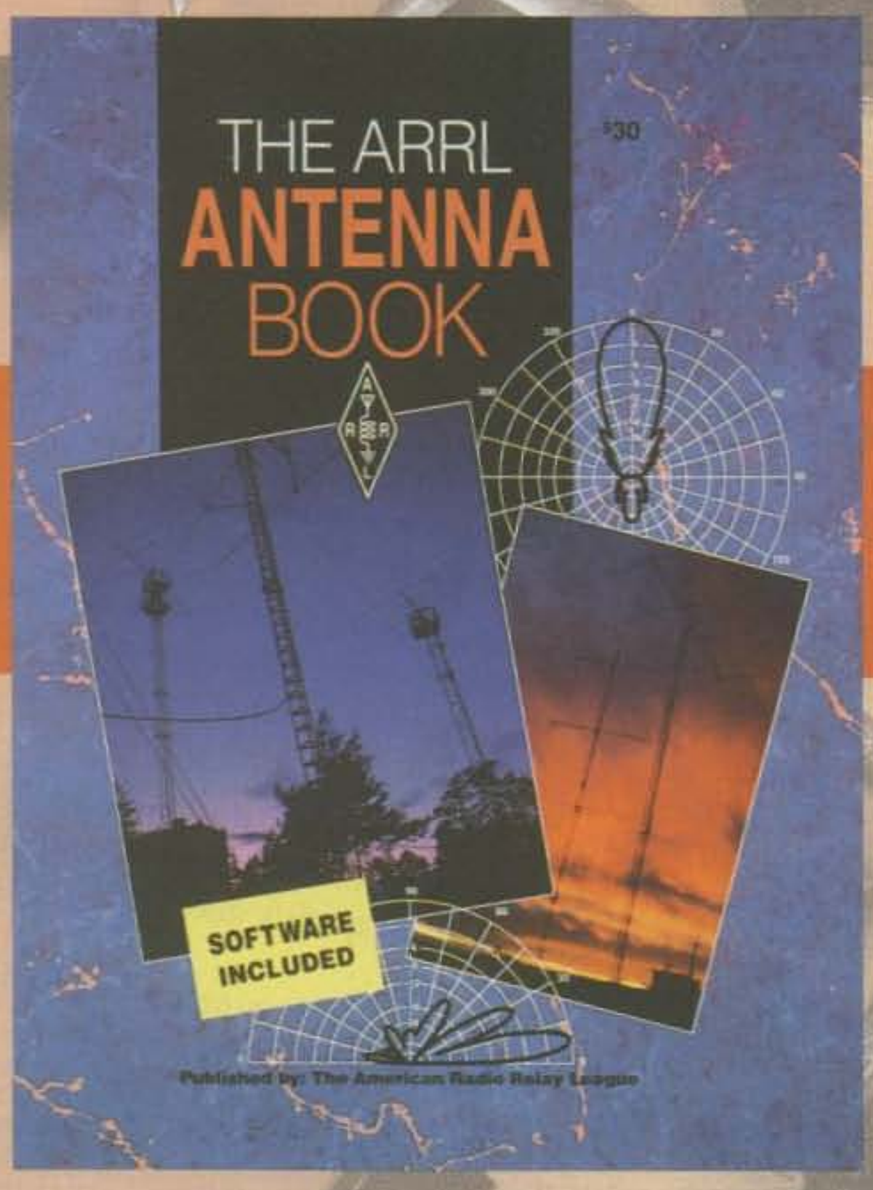

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CIRCLE 170 ON READER SERVICE CARD

Jack Henry, N6XQ, sent along this report: "I would like to give you a little perspective on what the latest Hawaiian opening was like out here in San Diego. The 2 meter KH6HME beacon was in here weakly on the 3rd and 5th of July, and on the 9th was strong enough to prompt a phone call to Russ, KH6FOO. I finally had a QSO with Russ 2 minutes prior to the end of the CQ VHF contest.

"By the 11th the beacon was S9+20 and Paul, KH6HME, arrived on the volcano in the afternoon and was immediately swamped with calls. You would have thought that Peter I was on from the pile-up. The opening was incredible. Paul was working Tijuana, Mexico to Coos Bay, Oregon at the same time with 59 signals. Ed, K6ODV, in Riverside, which is considerably inland and over some mountains, reported Paul at 59+40. The ducting layer appeared to be at a higher altitude than normal. I understand Paul even worked Tim, NC7K, near Reno and was heard in Portland. Paul climbed the tower and rotated the 2 meter array toward Seattle and listened for several big guns up there without success.

"I understand Chip, N6CA, has already informed you of his record-breaking contact on 2304. Wayne Overbeck, N6NB, and I ran with Paul on 902, but Paul was experiencing some equipment difficulty. On the following day Paul and I completed on 902 for a new record of 2523 miles. The contact was on the 13th of July at 2240Z and I sent a 519 to Paul and received a 529. Paul was using the equipment built by N6CA which ran about 12 watts into a short loop Yagi. I was running 15 wWatts into an F9FT 23-element Yagi. The old record was set last year by Chip and Paul.

"The intensity of the opening brought many X-band operators out of the woodwork for the attempt on the first Hawaii to California contact. Those who participated were N6CA, WA6OWD, WA6CGR, WA6CDR, WB6CWN, KK6TG, and myself. All stations were at different hilltops, with KK6TG being the only one in northern California. A few of the stations reported hearing a couple of short bursts, but nothing identifiable. I guess we will have to wait for the next opening. This will certainly be the most difficult band attempted so far to work the Hawaiian path, and it may take some time. Paul is leaving the equipment running in the beacon mode during the season. The frequency is 10,386.100 MHz with 3 watts into a 4 foot dish pointed 60 degrees.

"A pleasant surprise for me was working Kimo, KH6IFN, on Oahu for a new island and grid square. Kimo and Ken, KH6HH, had heard about the opening and set up on the northernmost point of Oahu, Kahuku. They were running 150 watts into a 13-element Yagi. Rick, KH6JJX, and Steve, NH6LO, had similar ideas and set up on Kokohead with 20 watts and 20 elements. Unfortunately, the Oahu stations got in on the opening a little late and were not able to work nearly as many stations as Paul. I heard KH6HH calling WH6IA, who was on the island of Kaui, but Ken was not able to raise him. There is a rumor that Kaui may have been worked by the mainland on FM, but it may have been through a remote.

"Another opening occurred the 17th through the 21st of July, but was not nearly as strong as that of the previous opening. Paul did venture to the hill again to allow the X-banders another opportunity, but again no cigar.

"Keep the antennas pointed *west*."

At the luncheon in her honor at the Green Country Hamfest in Tulsa, Astronaut Linda Godwin, N5RAX, autographed everything, including T-shirts worn by the students who were able to talk with her during the STS-59 Endeavor Space Shuttle mission in April.

On The Air

During an excellent tropo opening from 28–29 June Bill Tynan, W3XO, worked the following. On 2 meters he worked N4DXC (EM70), KB5WMY (EM32), WD5BDI (EM22), AB4CQ (EL98), KC4UKQ (EM70), W5FYZ (EM32), KO4AB (EL88), WD5EWD (EM22), W5VEO (EM40), WD4FAB (EL98), KJ4V (EM60), KE4FSC (EM60), WA4CHA (EL88), WB5KYK (EM51), KE4FMZ (EM60), XE3EB (EL51), N5XES (EM40), NØEOQ, NØSIN (EM29), K5YY (EM27), KCØEH (EM27), AB5JS (EM26), and AB5UH (EM14).

On 222 MHz he worked K5UR (state number 2, Arkansas), WA4CHA (number 3, Florida), AB5UH (number 4, Oklahoma), WØPW (number 5, Missouri), and N5HJV (number 6, Louisana). Pretty impressive totals for just a short opening on 222 MHz.

Bill went on to report on a couple of sporadic-E openings on 2 meters, one of which he startled KC8ZC/M who answered his CQ on 146.52, simplex.

Jack Dobbs, WB6AXW, reports that one of his greatest days as a ham occurred on 28 June. It started when he got in on a double-hop opening on 6 meters. On that day he thought he was on 20 meters. He heard signals from all over, including Leo, CM3ZD.

The best news for Jack, however, was to come when he tuned to 2 meters. There he worked N7DB and W7INX, both in CN85. Later

Gordon West, WB6NOA, received this test pattern via ATV from Paul Lieb, KH6HME, during the Granddaddy of all openings between Hawaii and California. (Photo via WB6NOA)

At the 1994 Central States VHF Society Conference Michael Owen, W9IP, and Pete Shilton, VE3VD, answer questions about the VE3ONT Algonquin operation during last year's ARRL EME Contest.

he worked NØXX in CN84. These were his first taste of DX on this band—truly an exciting time for Jack.

After about ten tries, I received a FAX from Pat Coker, N6RMJ, outlining a sporadic-E opening on 2 meters on 11 July. On that date he worked W7YOZ (CN87), N7MWV (CN87), K7CAI (CN87), VE7XF (CN89) WB7PEK (CN86), KG7FV (CN85), WA7HAH (DN26), N7DB (CN85), and KE7CX (CN85).

Does Lightning Cause Sporadic-E?

Perhaps the most controversial question asked in this column was first asked last January. And boy, did it elicit responses. In that column I reported on an article in the October 18, 1993 issue of *Aviation Week and Space Technology*. I discussed the work done by physicists Drs. Davis Sentman (who is a former amateur radio operator) and Eugene Wescott, who studied and photographed high-altitude lightning flashes during the summer of 1993.

Now comes word of their experiments this past July in the August 1 issue of *AW&ST*. The report, written by James R. Asker and William B. Scott, was a lead story in the magazine. In it their lead sentence is: "Spectacular, massive flashes of light high above thunderstorms have been recorded in color video and from two vantage points for the first time."

They go on to report that the video cameras captured two different types of flashes—one called "red sprites" and the other "blue jets." The sprites appeared to travel as high as 60 miles (sporadic-E territory!) and the jets upwards of 20 miles.

While the researchers are at a loss to explain what causes these flashes, they are definitely associated with thunderstorms and are, in the case of the sprites, in the area of the E-layer.

The video shots were taken from cameras onboard a Rockwell Jet Commander and an Israel Aircraft Industries Westwind 2 during a two-week period in late June and early July. Flying at around 41,000–42,000 feet, they flew within 30–50 nautical miles of thunderstorms over Oklahoma, Kansas, and Arkansas. They were kept apprised of thunderstorms in the area via a computer/modem link with the National Lightning Detection System in Norman, Oklahoma.

So again, with this new research the question is asked, "Do thunderstorms cause sporadic-E?" Perhaps some sporadic-E events can now be associated with thunderstorms. Interestingly, there are contemporary data from broadcasters who observe that every time they see a wall of thunderstorms in a certain area they see a distant TV station.

However, to state unequivocally that thunderstorms cause sporadic-E is to take a giant leap of faith. Perhaps there is an association that causes both. Perhaps the ionization in the E-layer is the fuel that helps trigger certain thunderstorms. However, there are plenty of data that show sporadic-E ionization without a corresponding thunderstorm and visa versa.

Certainly this research has opened the Pandora's box a bit further for us so that we can peer in to solve the mystery. Based on this new data, what is your opinion?

Marc Thorson, WBØTEM, checks gain measurements of antennas on the antenna range at the 1994 Central States VHF Conference.

1994 *Perseids*—Disappointment But . . .

The consensus of operators of the 1994 *Perseids* meteor shower is that it was much worse than last year. Reports of non-completion were up and reports of participants were down. Nevertheless, there were positive reports. What follows are initial reports received by your editor via FAX, telephone, and the Internet.

Shelby Ennis, W8WN, shares the following: "Dave Greer, WE4K (5 miles west of me), and I each spent several short periods (less than 1 hour each time) visually observing on the mornings of the 11th and 12th. Each time there were two shower meteors seen. On one occasion a station in southern Ontario (EN72) reported seeing quite a few, as it was picking up, and this was reported just as I came in from seeing my two. Not long before dawn on the 12th the count was zero in about 20 minutes.

"Except for some short naps, we were on the 144 MHz band from about 0000 UTC 11 August through 1900 UTC 13 August. Twenty-two schedules were run with 18 stations, resulting in 13 completed contacts. Random contacts were also made with four stations.

"There was greatly enhanced tropospheric propagation to the NE for about 24 hours on 10–11 August (an autumn-style opening, per WE4K). Believe that there was also some tropo in the west. Sporadic-E was up to 75 MHz much of the day on the 10th here, with W2CRS (CO) reporting it above 116 MHz at one time.

Europe reportedly had an aurora on the 11th; some buzz was noted on a couple of stations here, but very little. And we have apparently taken a hit from a major solar flare about

1735 UTC 14 August as I'm typing this.

"Radio meteors: Picked up several schedules morning hours of 11 August. Early on the 11th comments were that the shower was very poor. Things picked up after about 0500 UTC. Around 0700 UTC there was a 10-minute flurry, gone by 0715.

"Being before peak time, it became fairly good. Bursts were generally both short and few, but enough and spaced well enough to allow three completions on three schedules. Five skeds were run between 1500 and 1900 UTC, with three completions (believe one station not on). The contact with W5AL (DM95, TX) was interesting, in that he peaked about 25 degrees south of direct; yet he was not using any offset.

"Up to about 0900 UTC on the 12th reports generally indicated poor conditions, with a few indicating it was better for them. For me, 'Just nothing out there!' At about 0950 enough short bursts were coming through to allow random operation on 144.200. In the next hour W1XE (DM79, CO) was worked three times on long bursts, because we each had nobody else right then to contact! Flurries were noted at 0930, 1048, and 1118 UTC 12 August. By 1130, back to the previous rates. This early peak was nothing like the early 'spikes' of the past few years. WØKEA (DM69, CO) reported a peak between 1000–1100 UTC. There were several other small flurries during the rest of the day.

"On the 13th conditions were only fair, about as in past years for this date. A very brief flurry was noted at 1335, and a bigger flurry at 1520–1526 UTC. There was another 10-minute flurry sometime between 1700 and 1900 UTC, but was I too woozy to remember to log it. No doubt there were other brief flurries that were missed during brief naps, while on the 20 meter net, etc. However, around 1700 UTC, a California station was overheard (on 14 MHz) saying that this was the best shower in years.

"It is unknown who he was or what his reasons were, but other comments make me believe conditions *may* have been better to the west and also to the north. Not sure.

"Summary: Visually, nothing (early peak took place after sky too light). Early peak brief, interesting, and good, but no comparison to before. Best day overall, 11th, probably slightly above average for that date."

From **Ron Klimas, WZ1V,** Grid FN31 Connecticut: "I ran 20 schedules on 2 meters August 12 and 13. Completed with 9. My best DX was WØPHD EN18, WA2VOI EN15, NØJPE EN13, all over 1200 miles. Attempts with W5AL DM95 at 1571 miles and WD5DOA EL39 at 1402 miles failed to produce even a single ping (as did all three of my wee hour skeds the 11th).

"Long-haul work seemed to favor the northwest heading this year for me. WA2VOI was S9+ for at least a dozen *entire* 15 second odd sequences on 144.200 while calling random CQ's from 1000–1300 UTC on the 12th. No other stations at a similar distance from the southwest did the same.

"I operated practically non-stop for 30 hours here starting 0330Z on the 12th and observed 0430–1800 most productive on the 12th, also 0600–0800 and 1100–1500 UTC on the 13th. My opinion: An average to mediocre shower."

From **Carl Huether, KM1H**, FN42: "I have to rate this shower as meteor drizzle. I had the distinct impression that for a good part of the time the meteors were over my western hori-

zon. Stations worked included WA2VOI (EN15), AD4FF (EM76), NØJPE (EN13), WB5KYK (EM51), K9VGE (EN59 and EN69), KC8P/VE3 (EN77), all for new grids and one new state, South Dakota. I think that Kansas and Nebraska fell off the end of the earth as everyone I called had station problems."

From **Pat Coker, N6RMJ**: "I completed 12 of 26 skeds, working 5 new grids. I also had 6 random QSOs. My longest contact was with Charlie Calhoun, WØRRY. Charlie worked me on the same burn that I completed a contact with his son, Charlie, Jr., KB5ZUD. Charlie says that he had to run from the living room to the den and still was able to make the contact."

From **Todd Evans, KB6IGC**: "On 220 I worked NU7Z (CN87) at 0910 UTC on a sked; NØLRJ (DM98) at 1116 UTC on a sked; and W5AL (DM95) at 1523 UTC on a sked, all contacts on the 12th.

"On 144 MHz I worked N7ANL (DN18) 0840 UTC random; KA7GUX (DN17) at 0909 random; KE7CX (CN85) at 1206 on a sked; N6CL (EM15) at 1544 on a sked (while running only 12 watts because of a overheated power supply!); W5AL (DM95) at 1556 random; N7WS (DM42) 1646 on random; and K7TM (DN13) on a sked (completing in the first 30 seconds!).

"I would rate this shower as very productive on the radio but not very productive visually. From my observations of the meteor productivity of the days before the shower and the day of the shower, I think that if there was as much activity even ten days to two weeks before the shower as there was on the day of the shower, then there would have been as many completions prior to the shower."

From **Remco, PA3FYM**: "Honestly, here in Europe we consider the *Perseids* not that good as they were last year. Yes, there were nice bursts, and yes they were long, and yes I (or 'we') made a lot of contacts, but compared to last year it was a bit disappointing.

"Anyway, after weeks of silence on 50 MHz suddenly on last Saturday we experienced severe sporadic-E just after the peak of the shower. Almost during the whole day 50 was open to eastern Europe. And surprisingly, at approximately 1800 UTC (don't remember the exact time) aurora was reported on 2 meters (!!!); no aurora on 50 MHz, however."

From **Jukka Sirvi, OH6DD**, who made observations at 87 MHz, an observation of the peak: "The first peak occurred on Aug 12 at 1000–1100 UTC (maximum number of bursts at 1000 UTC, maximum total reflection time at 1100 UTC). The first peak was very good for about 4 hours or so (0900–1300 UTC). It was no surprise that the peak was lower than last year.

"The second peak occurred on Aug 13 at 0300 UTC. This peak was somewhat lower than the first one but broader. Good reflections for about 10 hours (0100–1100 UTC)."

Incidentally, your editor noticed a significant *decrease* in activity overnight from the 12th to the 13th. More than one operator was heard remarking that there was plenty of meteor scatter activity if only there were people to work. One wonders if some "gave up" on the shower after a dismal showing on the 11th and reading (or hearing) that the predicted peak would be on the 12th.

From **Larry Jones, WB5KYK**: "On the 12th I completed the following contacts, all on skeds: WB2VOI (EN15), KM1H (FN42),

While on my way to the Central States VHF Society conference (driving with Larry Hazelwood, W5NZS, and his son Steven, N5NDV), I had a 2 meter QSO with Brian Whitcom, WB7Q, whom I previously had worked on meteors during last year's Perseids *meteor shower. It turned out that for this QSO that we were only ten minutes apart on I-40 in Arkansas. So, being the hams that we are, we pulled into the first rest stop, where we had eyeball QSOs with Brian and his family—young Byron, daughter Aylisa, and his wife ,Teresa.*

KA2MCU (FN32), and WB3JYO (FN29). Additionally, I completed eight 6 meter random contacts. After hearing a loud burn from WB2VOI on 432 MHz while they were running with WS4F, I set a sked with them. However, during my sked all I could get was pings. For me the peak was between 1330 and 1415 UTC on the 12th."

From **Wayne Hoffman, WB6WLR**: "Extremely high power line QRN caused me to limit all but our schedule to daylight hours; even then I had to cancel 80% of my skeds due to high noise levels. Considering these limitations, I am pleased with my results: 14 completions and 9 new grids (up to 72 now—VUCC is on the horizon!)."

From **Ralph Bowen, N5RZ**: "This shower was great! I listened until about 0630Z August 12 and didn't hear any bursts. Discouraged, I went to bed, and overslept the alarm set for 1000Z. Getting to the radio at about 1145Z, I was to be pleasantly surprised at what the next four hours would bring. I began hearing some strong bursts from K7CA (DN26) about 1200Z. At 1215 UTC I worked AJ6T (CM87) for the first of 23 random QSOs that morning on 144 MHz. The peak for me was between 1500 and 1600 UTC, where 14 QSOs were made. Two more QSOs were made the 13th at 1508 and 1547 UTC, both also random on 2 meters.

"Between 1215 and 1600 UTC on the 12th I had to keep looking to make sure I wasn't really on 20 meters! It was unbelievable to this VHF newcomer. Most consistent signals were from K7CA (DN26) and AA7A (DM43). In fact, during one point AA7A was in for almost 5 minutes! Most consistent signals from the east were KE8FD (EM89) and K4TO (EM77). K4TO was never very loud, but I heard him a lot. I only had one antenna, so I may have missed a few as the openings were both to the west and northeast.

"Some stations heard but not worked: K7CA (we worked on random scatter during WPX test), W7XU, KØFF, KJ6HI, KJ7F (both mornings), and NW7O (Aug 13). There may have been some others, but in the frenzy I didn't get them written down.

"Also, on August 13 I heard NR6E (DN00)

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Paul Wilson, W4HHK, one of the heroes of the weak-signal VHF community, had over 40 of us over for a barbecue following the 1994 Central States VHF Conference.

at 1027Z for over a minute CQing, and at 1240 UTC heard WA6LHD (CM88) for almost 2 minutes. I had already worked these stations on the 12th, so didn't call again.

"Final tally was 25 stations, 21 grids (20 were new), and 14 states (10 new ones). Grids worked: CM87, DN00, DM69, DM43, DM13, EN41, EM89, EN40, EM77, DN41, CM88, DM37, EM29, EM48, EN80, EM17, EN35, EM36, DM03, EN82, and EN71. States worked: CA, NV, CO, AZ, KY, UT, IL, MO, KS, OH, MN, AR, MI, and IN. (*Ed note: W7XU was portable in Wyoming. I hope you didn't need that state, Ralph!)* See ya next year!"

From **Dave Carlson, AA9D**: "Good rocks last night (Friday AM, UTC)! Worked W7XU (sked), WA2VOI (sked on tropo), KH2F (random), N7EOJ (random), W1XE (random), and NØLRJ (random). All randoms on 144.200. Heard W1XE and NØLRJ solidly at S9+20 for more than a minute."

Joe Morris, N6RPM, reports completing 4 of 12 skeds with the following stations: NØLL (EM09), WDØBQM (EN81), W2CRS (DM78), and NØXX (CN83). He observed that there was no clear peak, only little bursts, or flurries, of activity.

Your editor completed ten QSOs. The longest was with Ed Urbanik, WA6LHD. It appears that this QSO was tropo assisted because Ed's signal was very watery, and at the same time we were completing, Pat, N6RMJ, was completing a contact with Bryan Edwards, W5KFT, in DM93. The most spectacular was with Todd Evans, who lost his brick's power supply at the moment he hit the mic button to give me "S-2s." We completed when I heard his "whisper" of a signal, although for a moment I thought I was imagining hearing him, or more correctly, dreaming. Sleep deprivation does things like that.

Current Contests

The first weekend of the ARRL EME Contest is set for 29–30 October. The contest period is the entire 48 hour period, beginning at 0000 UTC. The object of the contest is to work as many stations as possible "off the moon." Categories include single operator, single band, single operator, multi-band, multi-operator, and commercial equipment. Each contact counts as 100 points. Multipliers include each U.S. and Canadian call district and each DXCC country worked. Conditions for this weekend and the second weekend of the contest, 25–26 November, are expected to be very good. Complete rules are in the September issue of *QST*.

The Canadian 6 Meter Sprint is scheduled for 1 October between 1000 and 1400 UTC. Complete rules were in last month's column.

VE3ONT To Be Reactivated

The 150 foot Algonquin Dish is scheduled to be reactivated for the ARRL EME Contest. They plan to operate the following schedule: On 29 October they will operate on 432.050 MHz and listen between 432.050 and 432.060 MHz. Approximate hours of operation will be between 0645 and 1815 UTC. On 30 October they will operate on 1296.050 MHz and listen between 1296.050 and 1296.060 MHz. Approximate hours of operation are 0754 and 1844 UTC. At the same time they will also try to operate on 6 meters. They will transmit on 50.100 MHz and listen between 50.100 and 50.105 MHz. The operation on 6 meters will be subject to a non-interfering basis with the 1296 MHz operation.

On both days of the second weekend they will operate on 144.100 MHz and listen between 144.100 and 144.110 MHz. For 26 November the approximate hours of operation are between 0538 and 1645 UTC. For 27 November the approximate hours of operation are between 0646 and 1713 UTC.

The following is from their press release: "Because the Algonquin dish has a 9° lower elevation limit, stations with horizon fixed antennas in eastern North America have a limited chance to work VE3ONT. As in 1993, VE3ONT will operate "split." The following operating hints will improve your chances of making a QSO.

"Do not call on VE3ONT's transmit frequency; pick a random frequency in the listening range. Use the full range, as we will be looking for stations in the clear.

"VE3ONT will use circular polarization on all bands. You may use linear or circular polarization to work us. If you are circular, use right-hand circular polarization on transmit and receive for 144 and 432 MHz. On 1296 MHz we will have switchable sense so you can use either the satellite or EME polarization convention.

"Conditions permitting, VE3ONT may start each operating period on SSB to work strong stations as quickly as possible. Please do not call again for a second contact on CW. Conversely, if you work us on CW please do not call again for an SSB QSO.

"All contacts will be 'random' with no schedules or sequencing. Please be patient, as the QRM on our end was intense in 1993.

"Low-power and OSCAR-class stations are encouraged to make an EME contact. One hundred watts delivered to a single long Yagi should be sufficient on 144 and 432 MHz. On 1296 MHz stations were worked with as little as 10 watts and a 2 meter (6 foot) dish in 1993.

"Use of the dish at the Algonquin Space Complex is always subject to last-minute preemption for non-amateur purposes.

"Please send your QSLs with an SAE (and sufficient IRCs for postage) to Dennis Mungham, VA3SO, RR 3, Mountain Ontario, Canada K0E 1S0. Reception reports will also receive a QSL.

"To clarify anything in this press release, contact Peter Shilton, VE3VD, at 905-774-8766 (evenings). Latest developments will be provided on the EME nets, which meet on 14.345 MHz each weekend."

EME Skeds

Marzio Moncini, I5MXX, (grid JN53jv) is looking for 6 meter EME skeds. He would like to work stations in Hawaii, Alaska, or any Pacific area. His frequency of operation is 50.161 MHz. He uses homebrew stacked 4 × 9 element Yagis that are two wavelengths long. His array is elevatable. He states that the station on the other end should have at least a single long Yagi, with a minimum of 12 dBd gain, and run legal limit power. To date Marzio has made fifteen 6 meter EME QSOs.

You can contact Marzio at Via Del Melo 31, I-51018 Pieve A Nievole, Italy. You can also send him a fFAX at 39-572-950092.

Peter, EA6/DF5JJ, is wrapping up his 432 MHz EME operation from on Mallerca. He will be there through 15 November. If you need that country on that band, contact Peter at 34-71-531426.

New ARRL Rover Rules In Effect

Beginning with the January 1995 ARRL VHF Sweepstakes contest, the new Rover rules will go into effect. Known as the W3EP Rules (because they were proposed by Emil), these rules were published as a proposal in the July column. Watch for further clarification in the Sweepstakes contest announcement appearing in the November issue of *QST*.

Insofar as the *CQ* VHF WPX contest is concerned, your editor is going to take a "wait and see" attitude before changing the rules for that contest.

Current Meteor Showers

The *Draconids* meteor shower usually peaks around 9 October. However, because the rocks associated with the Giacobini-Zinner Comet, the originator of the meteor activity, tend to stay close to the comet, showers associated with the *Draconids* tend to occur only around the time of the comet's perihelion, the point when the comet is closest to the sun. The last perihelion was 14 April 1992. At that time the position of the earth's and the comet's orbits were such that not much activity was seen before or after the perihelion date. The next perihelion is 1998, when astronomers have tentatively forecast a possible storm. Nevertheless, it always pays to be listening. You never know when you might run into some independent rocks ready to burn up and produce propagation.

The other shower this month, the *Orionids*, is a far more popular shower because of its higher reliability. It is predicted to peak around 22 October at approximately 0632 UTC. A characteristic of this shower is that it has several smaller peaks both before and after the main spike, beginning around 20 October and ending around 24 October.

Worked All Space Shuttles?

Walt Hilton, KA6VNU, has claimed a unique accomplishment, perhaps even a first. Walt

has worked all Space Shuttles on voice. He started with *Challenger* and completed with *Endeavor* on its most recent mission. He wonders if anyone else has accomplished this goal. If you are one of the fortunate, then contact Walt at 4777 Paso Way, Placerville, CA 95667-8396, or call him at 916-644-5717.

Incidentally, he has also worked the MIR space station several times and Serge, U3MIR, on board both MIR and *Discovery*.

And Finally . . .

Can friends be competitors? Did you happen to turn off your amateur radio set long enough to watch the internationally broadcast "The Three Tenors?" For over three magical hours on the Saturday evening 16 July the world watched as Jose Carreras, Placedo Domingo, and Luciano Pavarotti, the three greatest contemporary tenors, entertained. What was most remarkable about the broadcast was that each of them checked their egos behind the curtain.

A few days before the production, the three tenors were interviewed on one of the network news magazine programs. When Pavarotti was asked if they were more friends than competitors, or visa versa, he replied that they were both friends *and* competitors. He said that they compete among each other to be the best ,but that they were also the deepest of friends. That friendship was also evident in the way Pavarotti responded to another question about Carreras's bout with cancer. He was asked how often he kept in touch with Carreras during his illness, and he responded by saying "all of the time."

Emil Pocock, W3EP, and Kent Britain, WA5VJB, are atop Paul Wilson, W4HHK's platform which supports his 28 foot dish.

I will give you another quick example of people who are friends *and* competitors. On the day of the funeral for a local TV station reporter following her accidental death covering a story, one of the competing television stations sent a team of their personnel over to staff the newsroom so that her friends could attend her funeral.

Perhaps you may notice that similar material often appears in both Emil Pocock, W3EP's and this VHF columns. While both of us have our sources for material for the columns, we constantly exchange material. At least two to three times a month Emil and I reciprocate phone calls or e-mail messages concerning material for our respective columns. It is the primary concern for both of us that the word of the activities of the VHF operator gets published. And, it is because of our friendship, that we are both friends *and* competitors.

While we do share information, we also compete to make our columns the best. It is with that competitive backdrop, I tip my hat to my friend Emil. Some of you who regularly read both columns have remarked to me that Emil did not print anything about my June trip to Cuba in his August column, whereas I devoted a vast majority of this column to it. Emil did so for a kind reason.

Recognizing that my trip was my story, Emil held back on reporting on it until his September column in order for me to have an exclusive outlet for the story. For that kind gesture, Emil, I say a big "thank you" to you, old friend.

There you have it, another column full of your news. Thank you for continuing to make this column a success. To continue making your column successful, please keep sending me your reports. As usual you can send them to the address on the first page of this column. You can call me at 405-528-6625, or FAX me at 405-528-0746. You can send material via the internet to 72124.2734@compuserve.com. However it gets here, I will do my best to include it in a future column. Until next month...

73, Joe, N6CL

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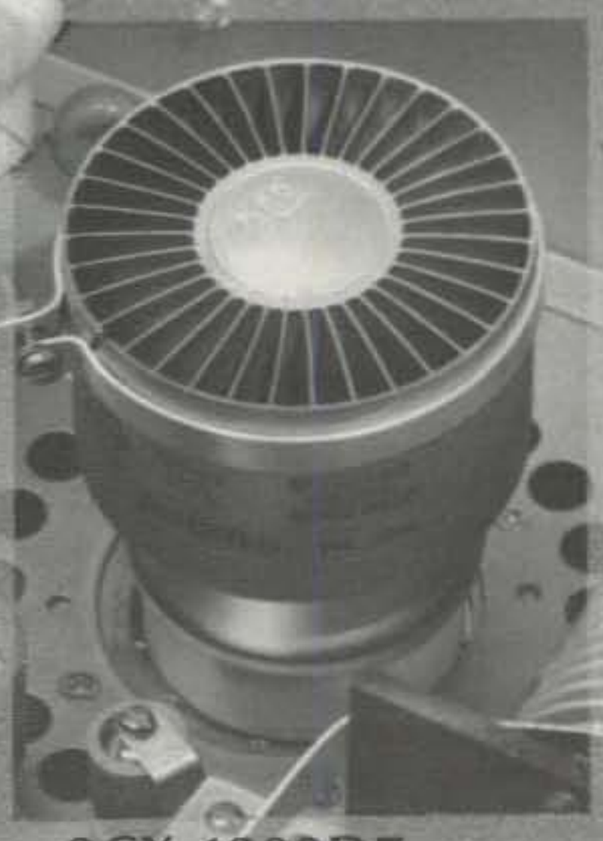

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CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

7040 kHz

You might say this month's title selection is an intriguing choice for a contest column. However, over the past year or two 7040 kHz has created quite a stir in contest circles.

In case you don't know, 7040 is the accepted break point on 40 meters between SSB and CW in the IARU Region 1 (Europe), CW below and SSB above. In recent years activity in the 40 meter SSB band has increased dramatically. I'm not sure if it is the reduction in sunspot activity, better antennas, or other factors, but suffice it to say that the band is booming! As recently as the last decade, only the largest of US stations (usually the multi-multis) would bother to call CQ on 40 in a DX Contest. Contrast that operating strategy to today, where it is not unheard of for a US single operator to start on 40 if 20 is marginal. Another noticeable change is that when you called CQ in the old days, you would only occasionally receive an answer. Usually the stations that called you were the big Europeans simply telling you that you had landed on their listening frequency. Today it is possible for a station with a two-element Yagi at 90 feet to have rates that exceed 70 per hour at peak times from the East Coast. Some of the multi-multis have approached the 100/hour rate!

From a listening perspective, 40 has become a band that is completely filled with signals from 7030–7100 kHz. When the band is wide open, there literally may not be a single place to establish a usable listening frequency when operating split from the US. And to no one's surprise, the increase in digital traffic around 7090–7100 kHz hasn't helped this predicament.

So, you ask, what is the issue? Contest organizers have been receiving increasing numbers of complaints about SSB operation below the 7040 breakpoint. From their perspective, and correctly so in many cases, operating SSB below 7040 is just as illegal as transmitting on 6995 or 13990. To be fair, however, to say that the 40 meter band plan is without ambiguity is like saying New York City's subway system is well understood by visitors from Mongolia. There seems to be wide misinterpretation about the differences between gentleman's agreements and actual regulations for mode usage.

There are two ways to look at this particular problem. From a US viewpoint, calling CQ and listening below 7040 while not illegal is certainly encouraging stations to do so in other continents. More blatant is the Region 1 station setting up shop below 7040 with no regard to band plans (or regulations) at all. Probably the most common request I've seen is to ask contest organizers to disqualify those who operate in this "illegal" mode. Unfortunately, that presents many problems. For starters, it's unclear as to which countries' laws are actually being broken when operating SSB below 7040. Gentleman's agreements are exactly that—an attempt to make the best of a bad situation. To disqualify stations that are technically operating legally, while simultaneously breaking the gentleman's agreement, would set a dangerous precedent in contest administration.

The second concern is that disqualification based on "what is heard" is basing a judgment on a circumstantial situation. How do you know, for example, if the station you're hearing is actually the real station? If a rule existed that disqualified any SSB operation heard below 7040, the possibility would exist to have a close competitor simply use his friend's call for a few minutes. Imagine a large multi-multi making 15,000 QSOs being disqualified because someone thought it would be fun to use their call below 7040 for an hour or two in the contest! For good reason contest administrators have long resisted the temptation to act on logs based on circumstantial evidence. Once you start, it's unclear where you end. Do you disqualify logs for other unsportsmanlike activity because one member of the awards committee has a more conservative view of sportsmanship than another? Should we stop giving stations the benefit of the doubt? Imagine a station with an unusually loud signal on a certain

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Calendar of Events

Sept.	**24-25**	**CQ WW RTTY Contest**
Sept.	24-25	Scandinavian SSB Activity
Sept.	24-25	Washington State Salmon Run
Sept.	25-26	Fall Classic Radio Exchange
Oct.	1-2	California QSO Party
Oct.	1-2	RSGB 21/28 MHz SSB Contest
Oct.	1-2	VK-ZL SSB Contest
Oct.	8-9	VK-ZL CW Contest
Oct.	8-9	Pennsylvania QSO Party
Oct.	8-9	Hambrew Fall Festival
Oct.	8-9	XVII Concurso Iberoamericano
Oct.	9-10	Illinois QSO Party
Oct.	12-14	YLRL CW Anniversary Party
Oct.	15-16	JARTS WW RTTY Contest
Oct.	15-16	QRP ARCI CW QSO Party
Oct.	15-16	Worked All Germany Contest
Oct.	22-23	Texas QSO Party
Oct.	26-28	YLRL SSB Anniversary Party
Oct.	**29-30**	**CQ WW DX SSB Contest**
Nov.	5-7	ARRL CW Sweepstakes
Nov.	12-13	OK/OM DX Contest
Nov.	19-21	ARRL SSB Sweepstakes
Nov.	**26-27**	**CQ WW DX CW Contest**
Dec.	2-4	ARRL 160 Meter Contest
Dec.	10-11	ARRL 10 Meter Contest
Dec.	31	RAC Canada Winter Contest

October's Contest Tip

Have you thought much about your shack's operating chair? I always found it odd that we could invest $10K+ in our equipment, yet use an abandoned $25 operating chair found at a yard sale. When you consider the time invested in contest operating, think about the advantages in score that can come from a comfortable seat. You can't quantify it, but you can be sure your score will go up with comfort!

October's Quote of The Month

"Winning a contest is wonderful. The only thing worse than not winning is not being in it!"—*Gene Walsh, N2AA*

The regulars at the KC1XX multi-single team: (left to right) AD1C, KM3T, and KC1XX.

Ameritron *no tune* Solid State FET Amplifier

No tuning, no fuss, no worries -- just turn on and operate . . . Incredibly low $1299 includes AC power supply, 600 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no warm up, no tubes to baby, fully SWR protected, extremely quiet, very compact

- **Ameritron's** *revolutionary* ALS-600 is amateur radio's *only* linear amplifier that uses four rugged TMOS RF power FETs -- gives unequaled *no tune* solid state performance
- **$1299 includes** Ameritron's *no tune* FET Amplifier *and* a 120/220 VAC, 50/60 Hz AC power supply for home operation

ALS-600
$1299
Suggested Retail
(*Includes* AC Power Supply)

- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate
- **Output Power** -- 600 Watts PEP, 500 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **SWR Protection** -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR
- **Over Power Protection** -- if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter
- **Extremely quiet** -- low speed, low volume fan is so quiet you'll hardly know it's there, unlike noisy blowers used in other amps
- **Very Compact** -- 6 x 9½x12 inch amplifier takes up less desktop space than your transceiver and weighs about the same -- only 12½ pounds
- **Illuminated Cross-Needle SWR/Wattmeter** -- lets you read SWR, forward and reflected *peak* power simultaneously
- **Operate/Standby Switch** -- lets you run "barefoot", but you can instantly switch to full power if you need it
- **Front Panel ALC Control** -- *exclusive* Ameritron feature -- convenient front panel control lets you adjust your output power
- **Transmit, ALC, SWR LED indicators** -- keeps you informed
- **12 VDC output jack** -- lets you power low current accessories
- **Separate** ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 VAC outlet -- no special wiring needed
- **Made in USA**
- **Enjoy** 600 Watts of *no tune* solid state power. Call your favorite dealer for your best price and order your ALS-600 with power supply today

ALS-600PS Heavy Duty Power Supply

ALS-600PS power supply included with ALS-600 amplifier

- **Massive choke input filter** greatly improves voltage regulation and reduces peak AC line current
- **Ameritron's** exclusive *Multi-Voltage Power Transformer* lets you compensate for stressful high line voltage and performance robbing low line voltage
- ***Step-Start Inrush Protection***™ stops damaging inrush currents and extends life of power supply components
- **Illuminated** Cross-Needle Meter monitors voltage and current of 50 VDC line
- **Extremely** quiet fan
- **Very compact** 6 x 9 ½ x12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC,** supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also** use on 100-130 VAC and 220-250 VAC, 50/60 Hz
- **Draws** less than 12 amps at 100 VAC and less than 6 amps at 230 VAC
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

Ameritron Mobile *no tune* Solid State Amplifier

Ideal mobile amplifier -- ***uses 13.8 VDC mobile electrical system, very compact 3½x9x15 inches, extremely quiet, 500 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, SWR protected***

ALS-500M
$799
Suggested Retail

- **Mobile *no tune* Solid State Amplifer** -- uses four rugged 2SC2879 high power linear RF power transistors
- **Instant bandswitching, no tuning, no warm up --** just turn on and operate -- makes mobile QSOs safer
- **Very Compact** -- just 3½x9x15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that's less than some mobile HF transceivers
- **Extremely quiet** --quiet low speed, low volume fan stays off and silent until temperature rises
- **Output Power** -- 500 Watts PEP, 400 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **Load Fault Protection** -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator
- **Thermal Overload Protection** -- disables and bypasses amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator
- **Excellent harmonic suppression** -- multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch**-- bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
- **Remote ON/OFF Control** -- lets you remotely control ON/OFF function for out-of-the-way mounting of amplifier
- **Exciter Drive** -- less than 100 watts input gives full output
- **Power Supply Requirements** -- requires 13.8 VDC at 80 amperes peak current for PA transistors and separate line for 12-15 VDC at 4 amperes for control and bias circuits
- **Made in USA**
- **Call you favorite dealer** for your best price and order your ALS-500M today

Exact power output of amplifiers may vary on each band.

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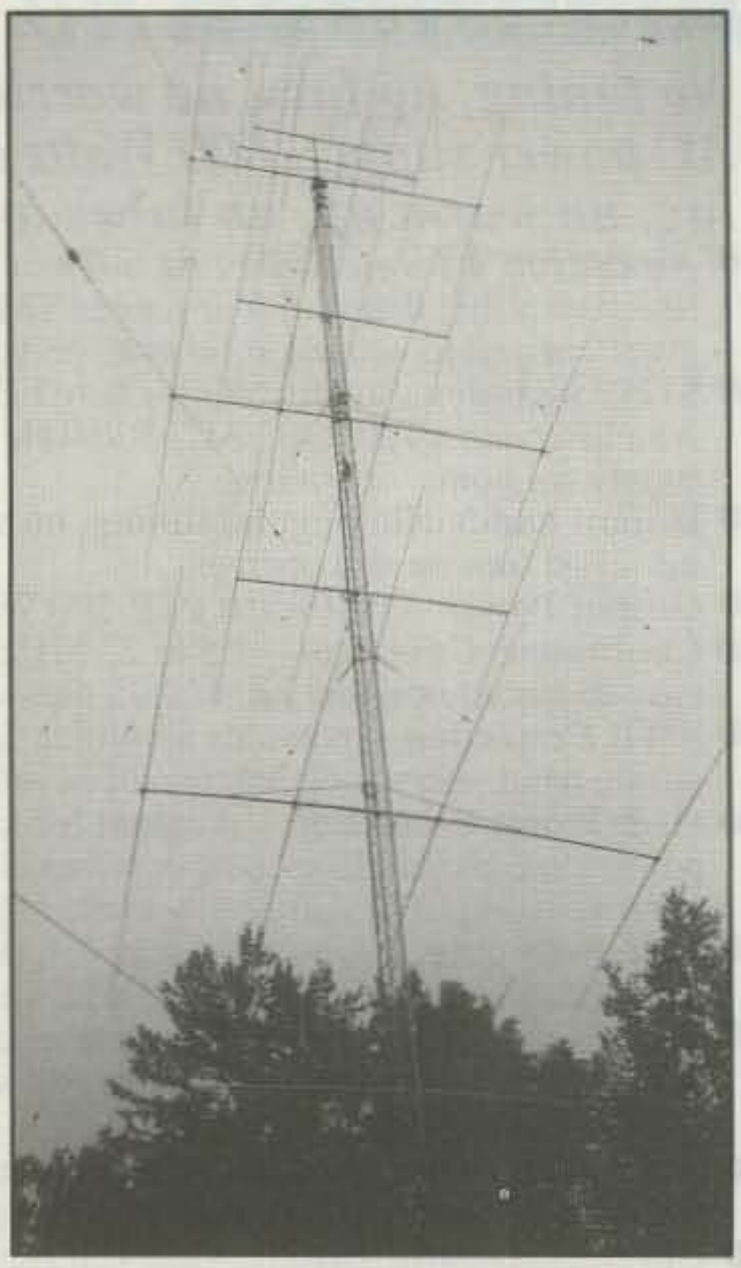
band. Naturally, they must be running excessive power, right? Of course, these examples are not realistic, but they are presented only to stress that is impossible to clearly draw the line regarding circumstantial situations.

I believe that the proper approach here is more benign. It begins by having the contest sponsor emphasize its own policy regarding sportsmanship in general and issues such as 7040 in particular. Many US stations have said that they do not listen below 7040 out of contempt, but rather out of necessity. They most often follow this comment by saying that *they* are operating legally (by US standards) and like any other CQ-ing situation, if no one called them, they simply would operate somewhere else. From a Region 1 stance, more localized peer pressure needs to be brought upon those who are violating the law. When someone is operating illegally (e.g., suspected of high power), the action tends to be swift and decisive in the US from the station's local peers. If you doubt this, ask someone to recall the recent firestorm that took place on the Internet Contest Reflector a few months ago about a station rumored to be running high power.

I realize that many of my European friends will not completely agree with these comments. But take heart in that I am supportive of your concern. I raise the issue this month in an attempt to create awareness of the problem and in the hope that more stations will bring sportsmanship to all aspects of contest operating. This may not be the most explosive issue in the contesting world today, but it is representative of one of our issues. As contesters we must coexist with our fellow amateurs in every respect for our hobby to continue to thrive!



Here is one of the two towers at the QTH of Matt Strelow, KC1XX. This 150 foot beauty has 4/4/4 on 20 meters, 4/4/4/4 on 15 meters, and a single 4-element Yagi on 10 meters at 164 feet.

CQ Profiles
Matt Strelow, KC1XX

One of the most amazing attributes of many contesters is their incredible motivation. I guess when you have a basic competitive nature it appears in all aspects of your life. Matt Strelow, KC1XX, has had competition bottled up inside him for a very long time. And like a fast arriving storm, Matt has hit the contest world running.

Matt first became an amateur in his native homeland of Germany in 1978, being assigned a progressive series of callsigns: DD6FW, DH7AAL, and DL7AEY. Although introduced to the hobby by his father, Rolf, KE1Y, Matt credits his real knowledge of amateur radio to his good friend Ralf, DL7SI, and his elmer, DL7WI. Ralf, in particular, was the motivating factor behind Matt's interest in HF operating and eventually contesting. Even in his early days of operating with limited space for towers and large Yagis, Matt figured out ways to do magic with wire antennas. One of his favorite stories was when he rather casually worked KH6XX on 80 meters—no small feat from Europe. Ralf and others could not believe that this young operator accomplished such an impressive achievement at such an early stage in his amateur radio career. For Matt, however, it was just the beginning of many more impressive things to come.

Matt became interested in contesting during the early 1980s, largely due to the efforts of his friend DL7ON. Becoming even more frustrated by his limited space for antennas (as is the case for most amateurs in Europe and Germany in particular), Matt joined the DFØRR contest group. Even though most individual stations in Germany are small and rather conservative, the larger contest groups build stations that we'd all envy. That association with "big-time" contesting is what drove Matt's interest in contesting after he moved to the States in 1987.

Living with his father in Tewksbury, Massachusetts, Matt quickly realized the operating potential in his new-found home in America. Not surprisingly, Matt quickly joined the New England-based Yankee Clipper Contest Club as DL7AEY/W1. Shortly thereafter (and in one weekend), he studied and passed the US Novice through Extra licensing exams and was well on his way to a new chapter in his radio experience.

A dream that many of us had in our youth was to travel around the United States and "see the world." Matt did exactly that, visiting 47 states and Canada. At the same time, though, he was thinking about his future—both in real life and in amateur radio. It was at this point in his life when the real turning point occurred from a radio perspective. Ironically, that point took place at a local ARRL Field Day, where he met the likes of K1AR and K1DG. At that event Matt saw and related to crazy US contesters outside of the usual club meetings and on-air activities. From that time on there was no turning back—the bug had bitten Matt permanently.

Unfortunately, the bug bit at the same time Matt moved into a rental situation with "contest" antennas being an impossibility. This is where the competitive nature of a contester can show itself in other facets of life. Matt

Just another day at the office for Matt, KC1XX.

agreed to build a large addition to his father's house and share a new "dream" station. If it were you or I, we'd be on the telephone to our local building contractor. In Matt's case, he did everything from pouring the foundation to plumbing, electrical work, sheetrocking, and laying the roof—all in only four months! If that wasn't enough, he then proceeded to pour the foundations of his new towers in April and completely finish a world-class contest station by July. Not a bad nine months' work, I'd say.

The design of Matt's station was mostly in keeping with Ken Wolff, K1EA's setup. So as the pictures show, Matt became very familiar with stacking systems and assembling commercial antennas without the aid of manuals. With the basics in place for the 1992 CQ WW, Matt significantly improved his station during the following year, with the results speaking for themselves—four straight USA Multi-Single wins in the major DX contests.

Matt is one of the most motivated individuals I've ever met. His incredible drive and knack for German precision has helped build an absolutely fantastic amateur radio station. Not surprisingly, Matt decided to use his skills professionally, forming XX Tower Service, where his already busy calendar is full of amateur and professional tower jobs.

Like many of us Matt is concerned about the future of amateur radio, and contesting in particular. In his words, "While there may always be the K1EA's of the world involved with contests, we are losing our ability to attract new blood. Creating new talent should be of paramount concern to all of us!"

On a personal note, Matt and his wife, Christine, are expecting their first child. Looking forward, Matt's dream is to buy his own plot of land and build a world-class Multi-Multi station. Give Matt a couple of dollars and a few months and who knows?

If you ever wonder what makes contesters unique individuals, consider the story of Matt Strelow, KC1XX. Matt's drive, determination, and desire to be a winner make him a very special contributor to our hobby. Keep up the good work, OM!

CQ WW DX SSB Results Additions and Corrections

Following are some corrections and additions to the 1993 WW DX SSB Results published in *CQ* last month.

1. **9A1A** was left out of the Top Scores box. They were number 6 in the World and number 3 in Europe, Multi-Multi. Sorry, fellows.

2. The following line scores were omitted:

UVØEX, on 14 MHz, score 56,784, certificate winner.

S53FO, QRP All Band, high S5, certificate winner.

3. HG73DX was inadvertently added to the operator list of **GØKPW** in the trophy list.

4. **EA6ARM** was incorrectly listed as Single Op. He was Multi-Single, certificate winner.

Final Comments

If you haven't yet taken the time, please spend a few minutes to complete this year's **Contest Survey** found in last month's issue (September). Your input is appreciated and invaluable to us!

The 1994 CQ WW DX Contest is only a few weeks away. Don't miss out on contesting's premier operating event. With the popular Low Power category, there are even more chances to win an operating category and award.

As always, please remember that the deadline for the January issue is November 1st.

73, John, K1AR

California QSO Party

1600Z Sat. to 2200Z Sun. Oct. 1–2

This year's party is again being sponsored by the Northern California Contest Club. Effort is again being made to activate all California counties and make this the most successful of all state parties.

Operating time is limited to 24 out of the 30 hour contest period for single operator stations (multi-ops may use the entire 30 hours). Off times must be at least 15 minutes and clearly indicated in the log.

The same station may be worked on each band and mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

Classes: Single Op, Multi-Single, Multi-Multi, California County Expedition, Mobile, and Novice/Technician.

Exchange: QSO number and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points for CW.

Multiplier: CA stations use states (50) and VE call areas (8). VO/VE1–7 and VY1/VE8. Out-of-state entries use CA counties (maximum of 58).

Final Score: Total QSO points times the sum of the multiplier.

Frequencies: 160 meters through 2 meters, except WARC bands. CW—1805 and 40 kHz up from band edge. Phone—1815, 3850, 7230, 14250, 21300, 28450. Novice—10 kHz up from edge of Novice bands and 28450.

Try CW on the half hours, 147.54 at 2000, 0000, 0400Z, 160 at 0500Z, and 80 at 0300 and 0700Z.

Awards: Certificates to the highest scoring single operator in each state, province, and country; also each CA county and stations scoring 100 or more QSOs. There are also trophies galore, including single operator, top three out-of-state, and CA top three. Also, CA county expedition, and a special award for stations making the most CW QSOs, multi-single and multi-multi winners in CA, and county expedition. The CA mobile team making the most QSOs and the top scorer outside the United States and Canada, high-scoring low-power entry (less than 200 watts) will also receive a winner's trophy. A Special Award of a personalized bottle of California wine goes to the top 20 single operators in CA and out of state and to the top-scoring Novice/Tech entry, both in CA and out of state.

Include a summary sheet showing the scor-

ing, etc., and a dupe sheet if you make more than 200 QSOs, with a large SASE for a copy of the results. Entries may be submitted in CT Ver. 8 format with a signed hardcopy summary sheet.

The mailing deadline is November 15th and entries go to: NCCC c/o Ken Anderson, K6PU, Box 853, Pine Grove, CA 95665.

A contest paperwork packet containing log, summary sheet, contest records, county abbreviations, and Special Awards List is available by sending a large SASE to K6PU.

VK/ZL/Oceania DX Contest

SSB: Oct. 1–2 CW: Oct. 8–9
1000Z Saturday to 1000Z Sunday

This is the 59th year of the VK/ZL contest. Use all bands, 1.8–28 MHz, except WARC bands. Oceania stations may work anyone. The rest of the world may work VK, ZL, and Oceania stations only. The same station may be worked on each band for QSO and multiplier credit.

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Points: For each contact score 20 points on 160, 10 points on 80, 5 points on 40, 1 point on 20, 2 points on 15, and 3 points on 10 meters.

Multiplier: Each VK/ZL/O prefix worked on each band.

Final Score: Total QSO points from all bands times the sum of the prefix multiplier from each band.

Awards: Special large, color certificates to top scorers in each country and each continental winner are available.

There is an SWL section. Only VK/ZL/O stations are logged. Call of station being worked and RS(T) being sent must be reported. Scoring same as above but both SSB and CW scores are combined for final score (maximum total of 24 hours).

Use a separate log sheet for each band and underline each new VK/ZL/O prefix as it is worked on each band. Include a summary sheet showing the scoring and other essential information, and the usual signed declaration indicating that all rules and regulations have been observed.

This year contest logs go to NZART Contest Manager, John Litten, ZL1AAS, 146 Sandspit Road, Howick 1705, New Zealand and must be postmarked by November 15th (SSB) and November 22nd (CW).

Pennsylvania QSO Party

1600–0500Z Sat.–Sun., Oct. 8–9
1300–2200Z Sun., Oct. 9

This one is sponsored again by the Nittany ARC of State College, Pennsylvania. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier credit, and mobiles in each county.

Classes: Single Operator—Low Power, High Power, QRP; Multi-Single, Multi-Multi, portable, Novice/Technician, and Mobile.

Exchange: QSO number and county (PA stations), ARRL section or DXCC country for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points on 80 or 160 meters.

PA stations multiply total by (ARRL sections + PA counties + 1 DX country) a maximum of 150. Others use PA counties for their multiplier (total of 67 possible).

Mobiles making at least 10 QSOs should add 500 bonus points per activated county. Mobiles on a county line give one QSO number but receive credit for 2 multipliers. QRP stations multiply their score by 2, Novice/Tech by 3. Final score is total QSO points times multipliers.

Frequencies: CW—1810 kHz and 40 kHz up from bottom of each band. SSB—1850, 3980, 7280, 14280, 21380, 28310 kHz. Try 160 meters at 0300Z on Sunday.

Awards: Plaques will be awarded to the top entries in all divisions plus single operator USA Time Zones, EPA, WPA, and others as warranted. Certificates will be sent to county and section winners.

Logs need to be postmarked no later than November 13th and should be sent to: Douglas Maddox, W3HDH, Nittany Amateur Radio Club, Box 614, State College, PA 16804-0614. An information package is available for the contest by sending a #10 SASE to the sponsor's address.

XVII Iberoamericano Contest

2000Z Sat. to 2000Z Sun. Oct. 8–9

Organized by "Unio Radioaficionats del Valles Oriental" and by "CQ Radio Amateur de Boixareu Editores," this contest will be sponsored every year the week before October 12th to commemorate the anniversary of the discovery of America. This a phone-only contest with the emphasis on Latin-American areas.

Classes: Single Operator and Multi-Operator, Sngle Transmitter; both Latin-American and non Latin-American. Single Operator EC (EA novice), QRP, less than 5 watts output, and SWL.

Exchange: RS plus a progressive QSO number (001, etc.).

Bands: All six bands, 1.8 through 28 MHz, SSB only.

Points: Latin-American stations score one point per QSO. Non-Latin-Americans 3 points per QSO with Latin-Americans, 1 point with other non-Latin-Americans.

Multiplier: Latin-Americans use the DXCC list. Non-Latin-Americans use the following country list: CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and DXCC dependencies.

Final Score: Total QSO points from all bands times the sum of the multipliers from all bands.

SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. And the same station can only be logged again after 5 other entries.

Penalties: Taking credit for excessive duplicate contacts and violation of rules and amateur radio regulations could result in disqualification.

Awards: Certificates will be issued to the highest scores in each DXCC country. Participating certificates will go to non-Latin-American stations making 50 or more QSOs. There are plaques for overall winning scores showing at least 4 hours of operation and 100 more QSOs.

Mailing deadline for entries is November 30th to: Concurso Iberoamericano, c/ Concepcion Arenal 5, 08027 Barcelona, Spain.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 9–10

This is the 32nd anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long.

Stations may be worked once per band and mode, and IL stations can contact other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for IL stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, 2 points on CW. Illinois stations multiply total QSO points by (state + provinces + IL counties + maximum of 5 countries) worked. Additional DX QSOs count for points but not multiplier. Others use IL counties for their multiplier (maximum of 102). Illinois mobiles add 200 points to final score for each county from

which 10 or more QSOs were made.

Frequencies: CW—3550, 7050, 14050, and 30 kHz above bottom edge of Novice subbands for CW and 28390 for phone. SSB—3890, 7290, 14290. Other bands may also be used.

Awards: Certificates will be sent to the top 10 scoring IL fixed stations, 5 IL mobiles, winners in each state, province, county, and the highest club/team aggregate score. A plaque goes to the top-scoring Illinois station (fixed and mobile).

Logs: Indicate band and mode, circle each new multiplier, and IL mobiles must indicate each county change. Stations with over 100 QSOs must submit a dupe sheet.

A summary sheet showing the scoring and the usual signed declaration is also requested. Mailing deadline for logs is November 7th to: RAMS, 3620 N. Oleander, Chicago, IL 60634. Enclose an SASE for contest results.

JARTS WW RTTY Contest 1994

0000Z Sat., Oct. 15 to 2400Z Sun., Oct. 16

This is the third WW RTTY Contest sponsored by the Japanese Amateur Radio Teleprinter Society, JARTS, and it is open to amateurs worldwide on 80–10 meters.

Classes: Single Operator All Band, Multi-Op Single Transmitter, and SWL.

Exchange: RST and operator age (00 is acceptable for YLs). All multi-operator stations send 99 for their age.

Scoring: Count 2 points for QSOs in your continent and 3 points outside of your continent. Multipliers are each DXCC country worked and JA/VK/W/VE call area. Multipliers count once per band. You can work your own country or call area for a multiplier.

Final Scoring: Final score is total QSO points times multiplier.

Frequencies: 3520–3525, 7025–7040, 14070–14112, 21070–21125, 28070–28150 kHz.

Awards: Plaques will be awarded to the top winner in each operating class. Certificates will be sent to the top five winners in each operating class and continent. Special participation awards will be sent to the remaining top 12 stations in each category.

The mailing deadline for logs is December 31st. Logs can be sent to: JARTS Contest Manager, Hiroshi Aihara, JH1BIH, 1-29 Honcho, 4 Shiki, Saitama, 353 JAPAN.

YLRL Anniversary Party

CW: Oct. 12–14 SSB: Oct. 26–28
1400–1359Z, Wed.–Fri.

This is the 55th annual party run by the YL Radio League. It is open to all YLs around the world. Activity will be found on all bands, 10 through 80 meters, and will be between YLs only. CW and SSB are separate contests and require separate logs. A station may be worked once on each band for contest credit.

Exchange: QSO no., RS(T), and QTH; U.S. state, VE province, or DX country.

Scoring: One point per QSO between stations within the U.S. and Canada (including Alaska and Hawaii). Two points for contacts with stations in other areas. DX YLs score 2 points for QSOs with the U.S. and Canada and with other continents, but 1 point with stations in own continent.

Final Score: Multiply total QSO points from all bands by the sum of states, provinces, and DX countries worked. There is a low-power bonus multiplier of 1.5 for stations using 100 watts or less on CW and 200 watts PEP on SSB. For each duplicate contact removed from your log there is a penalty of three additional and equal contacts removed from your log.

Frequencies: CW—3555, 7055, 14055, 21135, 28195. SSB—3955, 7255, 14265, 21395, 28395 (plus or minus 15 kHz). Look in DX portions of band on 40 and 80 meters.

Awards: Certificates to winning scores in each district, province, and DX country, and first, second, and third place overall winners. There are cups and plaques for YLRL members in North America and DX countries.

Include a summary sheet with your entry showing the scoring and other essential information. Logs must be in their original form, no carbon copies. Your entry must be received by November 30th, and this year logs go to: L. Carla Watson, YLRL Contest Logs, 473 Palo Verde Drive, Sunnyvale, CA 94086.

Texas QSO Party

1400Z Sat. to 2200Z Sun., Oct. 22–23

This is one of the more popular QSO parties and is sponsored by the Texas DX Society. Stations work as many Texas QSOs as possible (Texas works everyone). Operators may work no more than 24 hours and off-times must be at least 30 minutes.

Classes: Single Operator, fixed/mobile; Multi-Single, fixed/mobile.

Exchange: Name and state/province; VE/DX stations send name only. Texas stations send name and county.

Frequencies: CW—50 kHz up from bottom of bands; SSB—3850, 7230, 14250, 21350, 28450; Novice—3710, 7110, 21110, 28110, 28450 kHz.

Scoring: Score one point/QSO on SSB and 2 points/QSO on CW. Non-Texas stations score 5 points for Texas mobiles on SSB and 7 points on CW.

Multipliers: Texas stations use Texas counties, stations, VE call areas, and DXCC countries. All others use Texas counties. Final score is total QSO points times total multiplier.

Awards are available to the winners of each category. Send summary sheet, logs, multiplier and dupe sheets, and signed statement by November 30th to TXDS, Box 540291, Houston, TX 77254-0291.

CQ World-Wide DX Contest

Phone: Oct. 29–30 CW: Nov. 26–27
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue. With the growing number of entry categories, be sure to list your entry category on your summary sheet.

A few trophies have been eliminated, but there are many new additions which fill in quite a few of the category gaps from previous years. The detailed trophy list can be found in the rules announcement.

All entries must be postmarked no later than December 1, 1994 for the Phone section, and January 15, 1995 for CW.

All logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801. **Be sure to indicate Phone or CW on the envelope.**

WHAT TWIN-BAND RADIO'S SPEAKER-MIC DISPLAYS BOTH BANDS WHILE DELIVERING UP TO 50 WATTS?

The Standard C5718DA of course; the smallest, lowest price twin-band mobile radio that delivers all the features. Operate the C5718DA from its optional snap-on front panel with twin frequency display (CRC5700) or mount it under a seat or even in the trunk using the optional extension cable (CAW571 or CAW572).

- Unsurpassed intermod rejection.
- Built in Antenna Duplexer.
- Dual-frequency receive; two VHF, Two UHF, or VHF/UHF.
- Frequency Range: Receives 110-199.995 MHz (including AM aircraft) and 250-499.995 MHz.
- 50 Watts 2M, 40 Watts 70cm (3W Low, 10W Medium selectable)
- Memories: 40 memories (20 per band); stores frequency, offsets and CTCSS tones.
- 200 memory channel option, CMU182.
- CTCSS Encode/Decode standard.
- Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
- Full Duplex cross band operation with CTCSS tones.
- Paging/Coded squelch.
- DTMF autopatch dialing, 10 memories per band, 15 digits.
- Eight kinds of scan, including priority and CTCSS.
- Back-lit Keypad and Display
- Auto mute opposite band, three settings (-6, -12 and -18dB).
- Cooling fan built-in.
- Size: 5.51"W 1.57"H 5.31"D
- Weight 2.2 lbs
- Mobile bracket and power cord (2M) included.
- MARS and CAP modification available (permit required).

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Join The Party!

With CQ's Golden Anniversary Awards

BY RICHARD S. MOSESON*, NW2L, AND BRUCE MARSHALL**, WA1G

We're having a birthday bash all next year, and *you're* invited to join in the fun. In 1995 *CQ* will celebrate its 50th anniversary—a half-century of service to amateur radio. As part of our year-long celebration, we've come up with a whole new series of operating awards available to radio amateurs and shortwave listeners the world over. Some are just plain fun, while others will challenge even the best among us. Here's a preview.

Any active ham or SWL will be able to earn the basic *CQ/50 Gold* Award. Just contact 50 different amateurs sometime during 1995. Make a note of callsigns, dates, times, bands, and modes, and send in your log. That's it. We don't even want QSL cards (although *you* might).

*CQ 50th Anniversary Coordinator
**CQ Golden Anniversary Awards Manager

Too easy, you say? Well, you can add up to 13 endorsements to the basic award by seeking and meeting greater challenges. Our first group of five endorsements are "activity awards," intended mostly to encourage you to try new bands, new modes, new ways of operating. Each one is relatively easy to earn, but each one requires a little something different.

For example, to earn the Repeater Endorsement, you have to contact 50 different amateurs on FM repeaters. Sounds simple, doesn't it? But think about it. Even if you're active on your local machine, there's probably a group of 10 to 15 other amateurs to whom you talk on a fairly regular basis. To find 50 different amateurs, you'll need to put in some extra effort—try out new repeaters, new bands, become a Net Control for your local traffic net or a public service event. Maybe it's not as easy as it sounded at first.

The next four endorsements again encourage you to be active and to try new things: The Multi-Mode Endorsement, for example, requires that you make contacts using at least five different modes. Likewise, to earn the Multi-Band Endorsement you have to make contacts on at least five different amateur bands. There is also an OSCAR endorsement, and another for contacting amateurs with at least 50 different callsign prefixes.

If you knock these off one, two, three, then it's time to move on to the "Challenge Awards." These won't be quite as easy, but if you're reasonably active, they won't be all that difficult either. You can earn endorsements for contacting amateurs in 50 countries, all 50 U.S. states, 50 U.S. counties, and 50 "grid squares." Plus there's the Digital DX/50 endorsement for using packet and other digital modes to exchange messages with at least 50 different amateurs in at least 10 different countries.

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Finally, if you're one of those amateurs who can work DXCC in a single contest weekend, we have the ultimate challenge endorsements: earn them *all*. There's a special endorsement for earning all of the Activity Awards, another for all of the Challenge Awards, and a very special one for doing it all. That means operating at least five different modes on at least five different bands using repeaters, packet, and satellites, and making domestic and DX contacts on HF and VHF—and doing it all in 365 days. Are *you* up to the challenge?

Following are the specific rules for the *CQ* Golden Anniversary Awards.

Basic Award Rules

1. All contacts/receptions must be made between 0000 UTC January 1, 1995 and 2359 UTC December 31, 1995.

2. There is one basic award, with ten endorsements available for specific achievements. In addition, there will be special endorsements for completing all five "activity" categories, all five "challenge" categories, and all ten overall categories (see details below). Awards will **not** be numbered. SWLs may substitute the word "monitoring" for "contacting" in the rules below.

3. Contacts/receptions which qualify for more than one award category may be applied toward all qualifying categories. (For example, a single packet contact on 20 meters with a station in Germany may count toward the basic award, the 50 countries endorsement, band/mode endorsements, and the Packet DX/50 endorsement.) Contest contacts are permitted and encouraged.

4. QSL cards are **not** required. Applications must be accompanied by log forms indicating award category applied for, plus a list of all contacts/receptions claimed.

5. Each log entry must include date, time, band, mode and callsign, plus any other information required for the specific award or endorsement (see specific rules below).

6. Use of official application and log forms is recommended, but is not mandatory. Only paper submissions are acceptable. For official application and log forms send a large SASE to: *CQ* Golden Anniversary Awards, c/o CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801 USA.

7. Completed applications/logs must be mailed to the *CQ* Golden Anniversary Awards Manager by March 31, 1996. A single submission for all qualifying contacts is recommended.

8. There are no fees for these awards.

Award Categories

There are two main categories of awards within the *CQ/50* Award program: *Activity Awards*, which, with effort, should be attainable by any reasonably active amateur or SWL; and *Challenge Awards*, which will test the skills of all but the *most* active operators. The challenge for top operators is to see how many of the ten award categories they can earn during 1995.

BASIC AWARD

The "CQ/50 Gold Award": This is the basic award of the program. It is earned by contacting at least 50 different amateurs on one or more bands/modes (repeaters and digipeaters are okay), exchanging and logging necessary contact information (see Basic rule 5 above).

ACTIVITY AWARDS

(The following are endorsements to the basic award described above.)

1. *Repeater Endorsement*—earned by contacting at least 50 different amateurs via FM repeaters. All bands on which repeater operation is permitted are acceptable. Contact exchange must include callsign and name of each station con-

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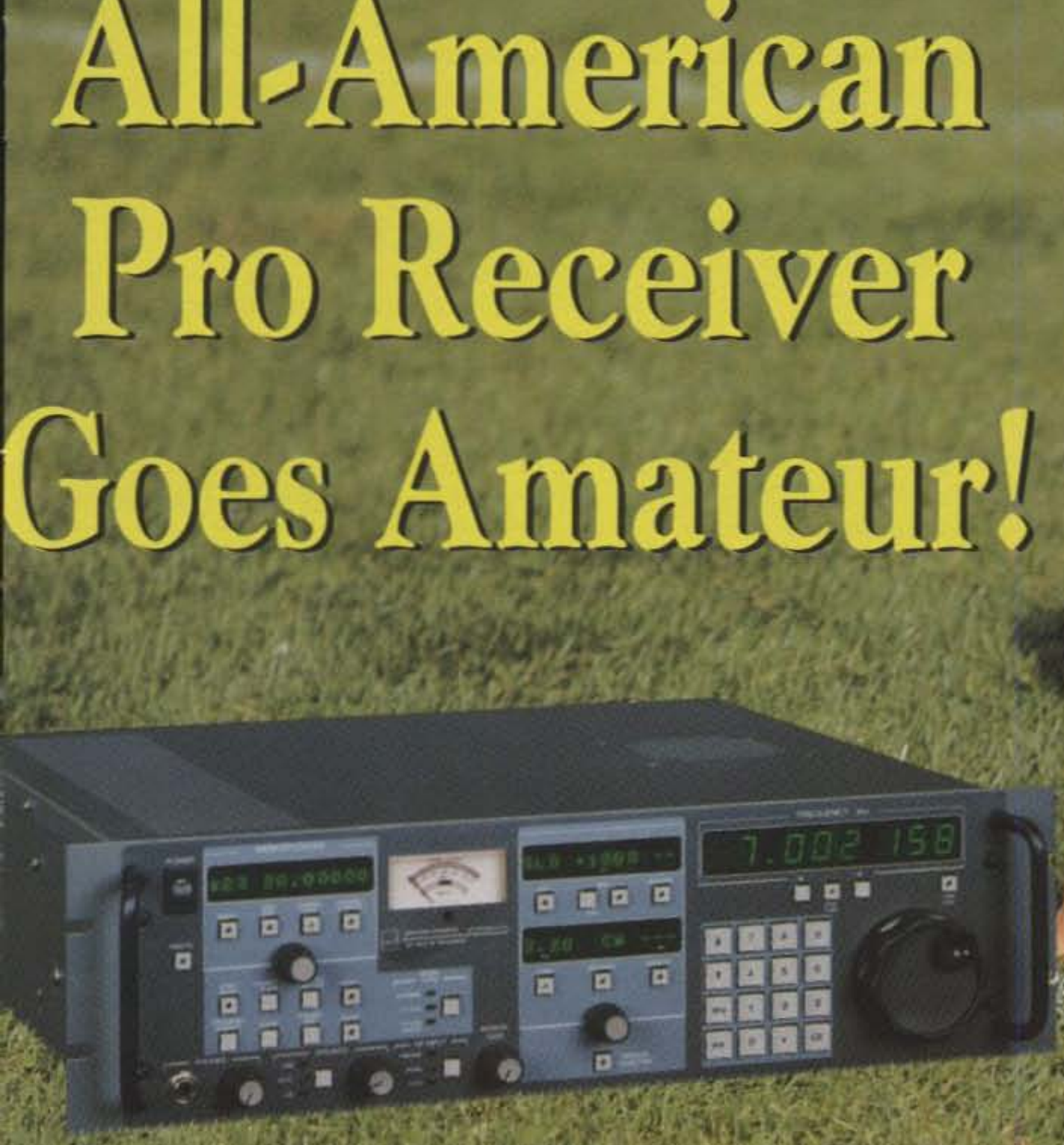

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tacted, plus callsign, output frequency, or location of repeater.

2. *Multi-Mode Endorsement*—earned by contacting at least ten different amateurs on each of at least five different modes (CW, SSB, AM, FM, Packet, Baudot RTTY, AMTOR, Pactor, G-Tor, Clover, ATV, OSCAR [OSCAR contacts count as a separate mode, even though they may be made in other modes, such as SSB, CW, or Packet.], etc. (Logs should be organized by mode.)

3. *Multi-Band Endorsement*—earned by contacting at least 10 different amateurs on each of at least five different bands (all authorized amateur bands count; OSCAR contacts count for the uplink band). (Logs should be organized by band.)

4. *50 Prefixes Endorsement*—earned by making contacts with amateurs whose callsigns are comprised of at least 50 different prefixes, as defined in the rules of the CQ WPX Awards program. (Log should be organized alphabetically by prefix, with each prefix noted separately from callsign.)

5. *OSCAR Endorsement*—earned by contacting at least ten different amateurs in at least five different states and/or countries, using one or more amateur satellites. Packet messages relayed via amateur satellites count toward this endorsement.

CHALLENGE AWARDS

1. *50 Countries Endorsement*—earned by contacting amateurs in at least 50 different DXCC countries. (Log must include name of country and be organized alphabetically by country.)

2. *50 States Endorsement*—earned by contacting at least one amateur in each of the 50 states of the United States (Washington, DC counts as Maryland). (Log must include name of state and be organized alphabetically by state.)

3. *50 U.S. Counties Endorsement*—earned by contacting amateurs in at least 50 U.S. counties. There is no minimum number of states. County determination is based on the rules for *CQ*'s USA-CA Awards. (Log must include name of both county and state contacted, and should be organized alphabetically by state and then by county.)

4. *50 Grid Squares Endorsement*—earned by making contacts on 50 MHz and above with amateurs in at least 50 "grid squares," as defined in the rules for the ARRL VHF/UHF Century Club award program. (Log must include grid square worked and should be organized alphanumerically by grid square (e.g., EM84, FM20, FN19, FN31).

5. *Digital DX/50 Endorsement*—earned by exchanging messages with at least 50 amateurs in at least ten different countries, using one or more digital modes (excluding Morse Code). Use of store-and-forward devices (e.g., networks and PBBSs) is encouraged. Contacts do *not* have to be made in "real time," as long as the necessary contact information is exchanged. Contact exchange for this endorsement must include each station's name and country.

SPECIAL ENDORSEMENTS

Special endorsements will be awarded, upon application, to amateurs/SWLs who have earned the basic *CQ/50 Gold* Award plus:

1. All five *CQ Activity Award* endorsements;

2. All five *CQ Challenge Award* endorsements; or

3. All ten endorsements in both categories.

These special endorsements will be in a form to be determined by *CQ*.

Entry Procedure and Deadline

All applications and logs must be postmarked on or before March 31, 1996 and must be mailed to: Bruce Marshall, WA1G, *CQ Golden Anniversary* Awards Manager, 52 Cornell St., Roslindale, MA 02131-4524.

Applications will be processed in the order received. If you would like confirmation that your application has been received, include a self-addressed, stamped postcard with your submission (US only). ■

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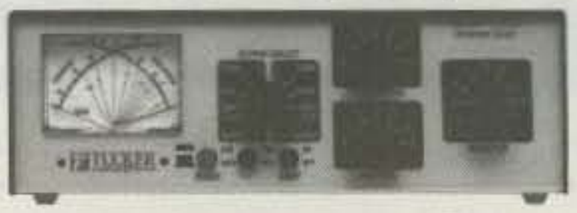

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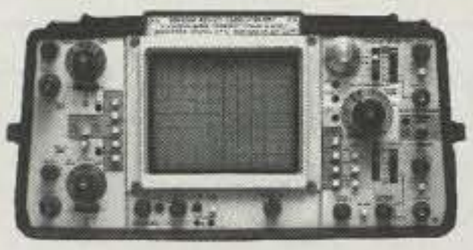

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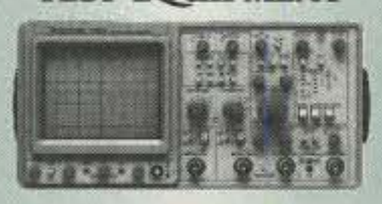

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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Aloha, KH6SB

At the end of May 1994 NOAA closed down the Maui (Hawaii) Ionospheric Research Station. After running for years, all was finished. I pulled into the parking lot in early June to visit my friend Steve Barnes, KH6SB, who had supervised the station for decades.

At first glance all looked normal. The wideband antenna for the ionospheric sounder was in place. Steve's big tower was there, with the big Yagi antennas atop it. Inside the laboratory, however, things were different. The sounder, which had run continuously for many years, was silent. The rack of receivers and recorders was gone, as was a lot of the auxiliary support gear.

In Steve's home most of the furniture was missing. Some half-filled shipping cartons were awaiting final shipment. Most of KH6SB had been shipped, except for a transceiver sitting on a card table. The building was nearly deserted. By July 1st, if all went well, the remaining stuff would be packed and gone, and Steve would be flying home to the Denver, Colorado area.

As I shook hands and said goodbye to Steve, he handed me a last gift—the final ionospheric reading of the sounder, with a comparison to the previous sunspot cycle (fig. 1).

"It looks as if the cycle may bottom out sooner than expected," said Steve, "but you never can tell."

Aloha, Steve. We'll miss your big signal on the bands. We hope to hear KH6SB/Ø on the air one of these days. Mahalo.

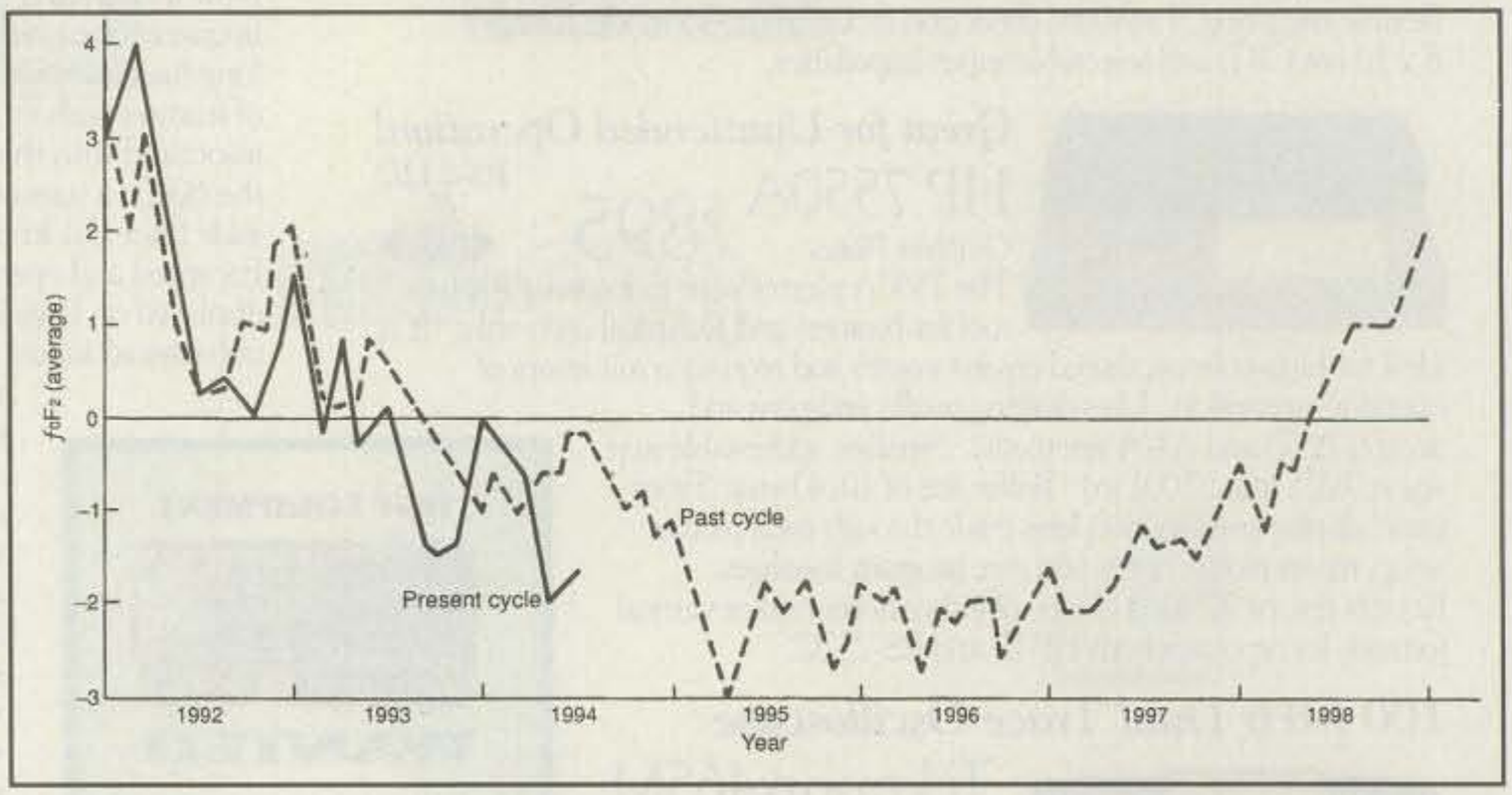


Fig. 1– A comparison of the present and past sunspot cycles hints that the forthcoming minimum may bottom out sooner than expected. It would be nice if the sunspot count started to climb in late 1996! Time will tell. Shown are the average ionospheric soundings taken at Maui, Hawaii.

The Log Periodic Dipole Array: Something For Nothing?

Ah, well. Even though the sunspot cycle is headed for the cellar and the bands are dry as dust, things will be looking up eventually. Perhaps by 1998. And that's only three years away. Time to start thinking about a new antenna system.

The spectrum of interest for a lot of DX-minded amateurs is the region between 14 and 30 MHz. Remember 10 meters in 1989–91 when the sunspot cycle was at its maximum? I do. The band was open from California to all of Europe, Africa, and Central Asia with booming signals. Fifteen and 20 meters were just as good, and both the 18 and 24 MHz bands had plenty of great DX signals on them.

So what about a multiband beam for the coming DX period when the sun once again cooperates with the eager amateurs? I've seen multiband Yagis advertised, but they either have a lot of aluminum up in the air or a multiplicity of traps. Or perhaps both. As far as I'm concerned, I like DX as well as the next guy, but I don't like an aluminum forest hanging over my head.

A lot of fellows think like I do on the subject of antennas. Some of them have turned to the log-periodic array, the beloved antenna of military and diplomatic communications. LPAs come in all sizes, and perhaps a modest one will suffice for the DX-minded amateur who is not enthusiastic about swinging a big multiband Yagi over his home.

48 Campbell Lane, Menlo Park, CA 94025

Basic LPDA

The basic log-periodic dipole array (LPDA) physically resembles a truncated, multi-element Yagi. All elements are fed from a transmission line which runs along the center of the array. The line is transposed so that the proper phase shift occurs between each element.

The longest element is about a free-space half wavelength at the lowest operating frequency, and the shortest element is about 40 percent of a free-space half wavelength at the highest operating frequency. Spacing of the elements decreases as element length decreases. The feedpoint of the antenna is at the apex (fig. 2).

Since all elements are split at the center for the feedline, the mechanical assembly of the LPDA can get a bit messy. In some designs all elements are mounted above a single boom in insulated collars, in the manner of a Yagi driven element. The transmission line is transposed between elements as it runs along the boom.

Another scheme is to use two parallel booms, acting as a feedline, with the elements cross-connected to each boom, to maintain the proper phase relationship. Either idea provides mechanical problems for the builder.

Even though LPDA construction is complicated, the prospect of a multiband antenna, without traps or other gimmicks, is appealing, especially if the antenna assembly isn't too large, physically. How much gain and front-to-back ratio can a designer get from a modest LPDA?

The most modest LPDA design I have seen is in *The ARRL Antenna Book*, 16th edition, page 10-5. This array is shown in fig. 3. It is built on a 10 foot boom. A 4-to-1 balun is used to match the average input impedance of the antenna to a coax line. The term "average impedance" is used, as the input impedance varies with frequency.

The antenna parameters given in *The Handbook* indicate an average gain of

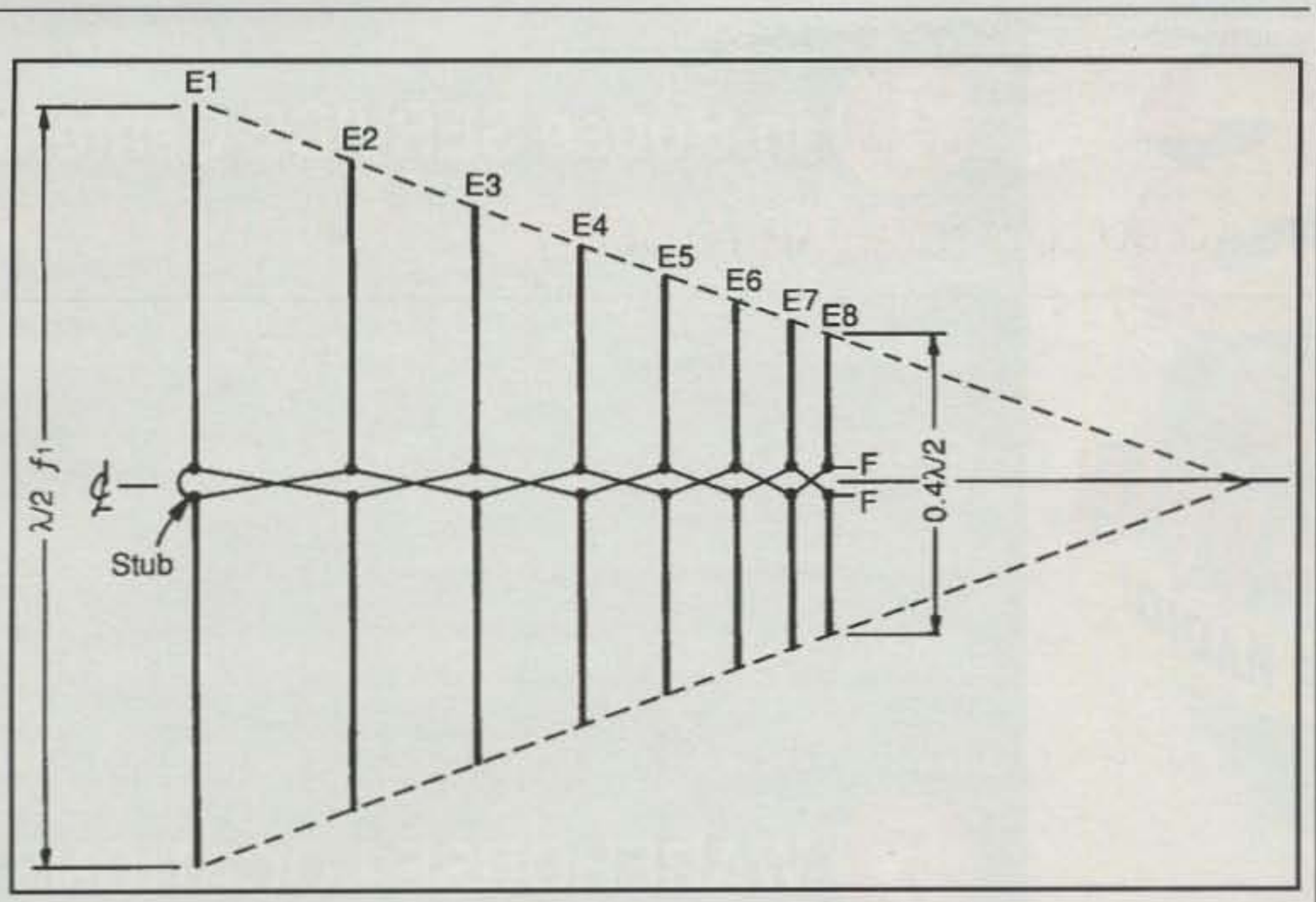


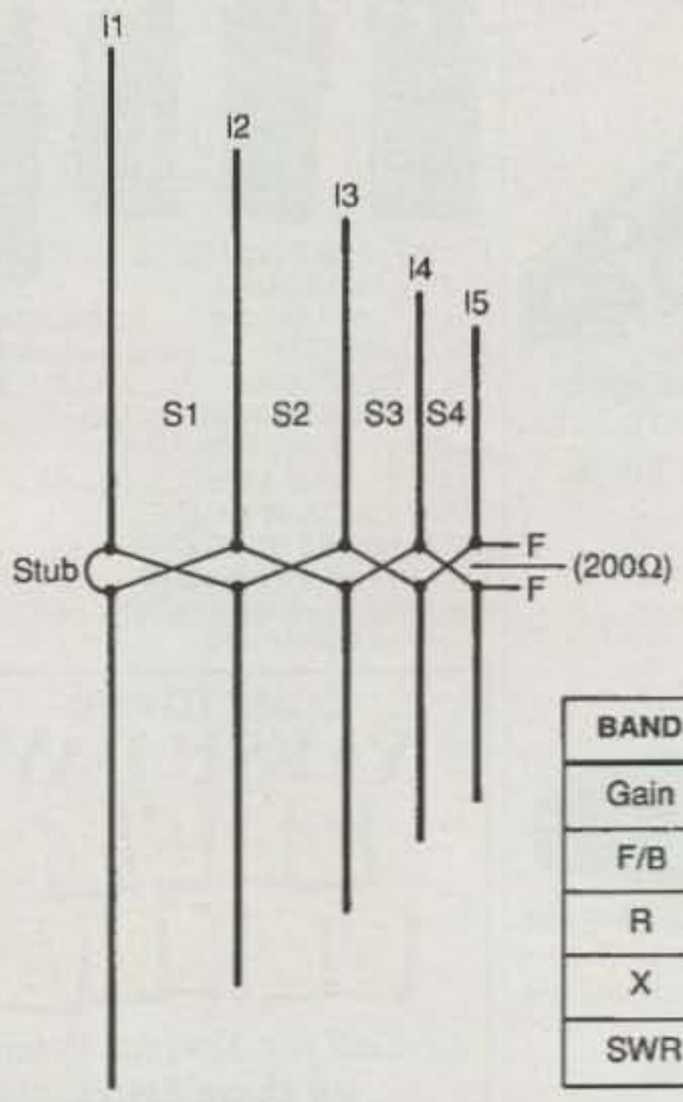
Fig. 2– Log periodic dipole array resembles a truncated triangle. Longest element is about a free-space half wavelength. Shortest element is about 40 percent of a half wavelength at highest operating frequency. Elements are split at the center and fed with a transposed transmission line at the apex. A short stub is placed across the feedpoint of the longest element.

3.2 dBd, with a "reasonable" front-to-back ratio.

That doesn't sound very encouraging, does it?

Computer Analysis Of The LPDA

This little antenna is a nice one to check out on an antenna analysis program.[1] The results are given in the table of fig. 3. Gain varies from 3.06 dBd at 14 MHz to 3.96 dBd at 28.5 MHz. Front-to-back varies from 6.71 dB at 14 MHz to 10.36 at 28.5 MHz. Not very impressive. The input impedance varies over a wide range, with the result that using a 4:1 balun the coax SWR on the four bands runs between 1.76 and 3.38. This indicates that an antenna tuning unit is probably required at the station for most solid-state transmitters. A tube-type rig, with a pi-network output



LEGEND:

I1 = 27.243'	S1 = 3.269'
I2 = 21.794'	S2 = 2.616'
I3 = 17.436'	S3 = 2.092'
I4 = 13.948'	S4 = 1.674'
I5 = 11.159'	

Stub at I1 = 6"

Gain = dBd
F/B = dB

BAND	18 MHz	21MHz	24 MHz	28 MHz
Gain	3.06	3.05	3.68	3.96
F/B	6.71	6.92	8.04	10.36
R	128	102	349	90
X	+194	–56	+22	–5.1
SWR	3.38	2.16	1.76	2.23

Fig. 3– Mini LPDA antenna for 18–28 MHz is built on a 12 foot boom. Operating characteristics are given in the table.

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FT-890/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 32 memories plus two VFOs per band • 100w • automatic antenna tuner • IPO • DDS • FSP • automatic 10 meter repeater offset • selectable CTCSS encode • requires 13.5VDC @ 20A • 9⅝"w x 3⅝" x 9½"d, 12.3 lbs.
FT-890 • above, without antenna tuner.

FT-900/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOS.

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stage, probably would be able to compensate for these SWR values, and the tuning unit would then not be required. An azimuth pattern of the array at 24 MHz is shown in fig. 4.

Is A Little LPDA Worth The Effort?

Aha! That's a good question! One nice thing about the LPDA is that it radiates everything put into it. A trap dipole for these bands would have six traps of dubious efficiency. A real competitor of the little LPDA might be a 18 MHz dipole fed with an open-wire line—in other words, a center-fed "Zepp." Like the LPY, it would require a tuning unit. However, it is cheaper to build and less obtrusive in the air, but it has less gain and no front-to-back ratio at all.

Is it worthwhile then to have a 5-element LPDA beam on a 10 foot boom that will provide a modest amount of gain and "reasonable" front-to-back ratio for four bands? You'll have to be the judge of that! For more information, I refer you to *The ARRL Antenna Book*, Chapter 10.

Another Amateur's Thoughts

One day not long ago I was enjoying lunch with Hank Olson, W6GXN. It was a warm, lazy day and we sat under an umbrella in the courtyard of a small restaurant. Most of the other diners had left, and we were alone, chewing the fat, as amateurs do when they have a bit of spare time.

The talk eventually turned to early postwar receiver design and some of the popular devices that were thought to improve receiver performance, but in many instances did exactly the opposite. Hank had been through this period in a professional capacity, and I enjoyed listening to his thoughts. The following is a capsulation of his remarks.

R9ers & Other Devices To Degrade Receiver Performance

At a vintage radio swapmeet I encountered an old Millen R9er amongst the collection of junk the various purveyors were hawking. The old Millen job gave a tug at my covetous feelings, which I thought were long gone.

When I was young and broke, I'd have almost sold my little brother into slavery for such a unit. This was the magic preselector that "dug out the weak ones" on 10 and 6 meters. (It could also be used on 20 meters with the proper coils.)

Looking in a dog-eared *1949 ARRL Handbook*, I found the R9er was only $29.95. And the *Handbook* was a modest $2.00.

The R9er used a single 6AK5, which was the hot new amplifier tetrode developed during WW II, which amateurs came to love for gain and hate for instability.

Life was simple in those days. If a signal was too weak, amplify it. If signals were being QRMed, add another conversion to the receiver with a lower (sharper) IF. It seemed that the more front-end gain and the more conversions a receiver had, the better.

Amateur designs had plenty of both. And some commercial receivers followed the trend. One popular receiver covered 550 kHz through 54 MHz, plus the FM broadcast band (88–108 MHz)! It seemed to do everything, but it was prone to birdies and overload.

The R9er and other high-gain preselectors, such as the RME DB-20, were helpful in rejecting images and provided plenty of gain. This made the receiver S-meter very sensitive, and a signal that was, say, S2 could be boosted to a needle-pinning S9-plus. Of course, in most cases the background noise came up an equal amount. This was pretty impressive.

When the skip was absent on 10 or 6 meters, background noise was low and any boost in gain was helpful. A good preselector, such as the R9er, really helped in this situation.

However, once the band opened for DX, antenna noise was so great that almost any noise figure was acceptable in an amateur receiver. The additional gain of the preselector didn't improve receiver sensitivity since that was limited by the antenna noise. But it did decrease the dynamic range of the total receiving system!

Many high-gain receiver front-end designs appeared in the amateur magazines, but until the relationship between noise figure, antenna noise, and receiver overload were understood, a lot of fellows got into trouble with receivers

having a poor balance between front-end gain, and gain distribution through the rest of the receiver.

The rush of noise contributed by two high-gain RF stages might have been comforting, but it wasn't much help when the receiver was burdened by many strong, local signals.

I agreed with what Hank said. In fact, I remember a local amateur who built a 20 meter DX receiver that had no RF stage at all. Antenna input went directly to a low-noise triode mixer, copied from the front-end of a radar receiver. I think it was a 6J4 VHF tube. He used a high-Q input circuit, with an air-wound 20 meter plug-in coil and adjustable link coupling to the antenna. He followed the mixer with an adjustable gain IF strip and plenty of audio gain. He shifted his gain as far back down the receiver chain as he could. He had a 455 kHz crystal lattice filter for selectivity. I listened to this set many times and always thought it was a winner.

We decided we still had a few moments before leaving this pleasant lunch, and our thoughts turned to the post-war amateur receiver. Hank had some interesting thoughts along this line:

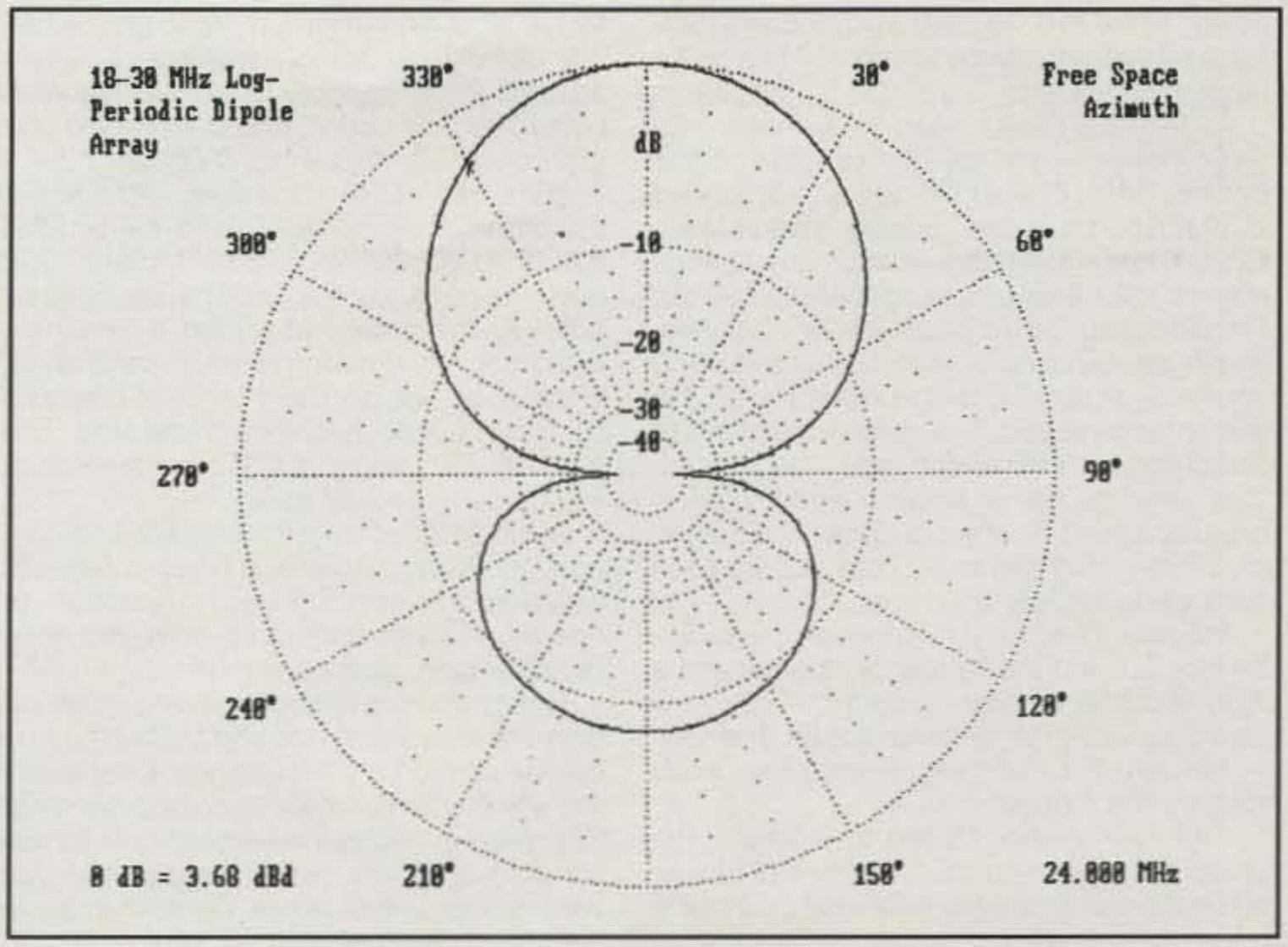


Fig. 4– Polar plot of short-boom LPDA at 24.9 MHz.

The God Father: The Collins 75A-1

During WW II, Collins Radio Co. revolutionized HF radio communication with a state-of-the-art military transmitter, their ART-13, designed for use in aircraft. This beautiful 200 watt phone/CW rig covered 2 MHz to 18.1 MHz and had multi-channel remote control and a radically new, high-stability VFO.

The multi-channel system wasn't much use for receivers designed for amateurs, but the new VFO allowed the design of a radically new receiver.

An early post-war military receiver, a companion to the ART-13, was the 51H-1, which used the permeability-tuned oscillator (PTO)

design of the ART-13, plus a novel conversion scheme that provided a tuning dial that had a readout in kiloHertz.

As far as amateur radio was concerned, these new designs quickly resulted in the Collins 75A-1 receiver which was announced in 1947 and hit the HF receiver market like a rocket! Here was a receiver for amateur bands only. Image rejection was specified as 50 dB. The old-fashioned bandspread dial was gone, and in its place was a slide-rule dial, reading frequency accurately to about a kiloHertz! This was unprecedented. The effect at the plants of Hallicrafters, Hammarlund, and National (the "big three" traditional amateur-band receiver manufacturers) must have come like a lightning bolt out of the blue! They just couldn't compete in this arena!

The principles first shown in the Collins 75A-1—that is, accurate frequency readout and a high order of frequency stability—are now commonplace in HF receiver design. The newer transceivers have exceptional frequency stability and readout.

Take the Kenwood TS-950, for example. The specs call for a frequency accuracy of plus or minus 0.5 ppm (parts per million) at the 20 MHz reference frequency, over a temperature range of –10 to +50 Celcius. Digital readout is to 10 Hz. This beats the old 75A-1 specs by orders of magnitude. Still the 75A-1 led the way, and the modern receivers are direct descendants of that gigantic revolution in receiver design.

The principles underlying the 75A-1, over the decades, have led to even better receiver designs that are just beginning to surface. For instance, if one increases the IF frequency, say to 100 MHz, and uses a sharp IF crystal filter, it is possible to achieve multiple-conversion advantages in a single conversion receiver: better image rejection, plus bandwidths commensurate with SSB and CW operation.

Some new receiver designs use a VHF IF system with up-conversion to the amateur bands. This provides excellent image rejection. A second, low-frequency IF provides selectivity. The choice of a high IF eliminates many birdie and mixing problems and annoying images. The excellent series of articles by Dr. Ulrich Rohde, KA2WEU, in the May, June, and July, 1994 issues of *QST* provide an insight into modern receiver design.

Some state-of-the-art receivers use an IF near 100 MHz, plus crystal filters to provide a bandwidth of about 6 kHz. In addition, the design uses a parametric up-converter, which provides gain, as the first mixer.

This technique not only gives a mixer with gain and reasonable noise figure, but the mixer can be driven by a large-signal local oscillator, which affords enhanced dynamic range. Receivers of this type have been built for special projects where the HF receiver is in close proximity to a high-power transmitter, for example, on the same ship.

Voodoo Telephone Messages

I've been plagued with odd-ball telephone calls (usually around dinner time). The phone rings, I answer it, and nobody is there! Not a sound. No background noise, no heavy breathing. After ten seconds or so the connection is broken.

Before we left our extended lunch period, I mentioned this mystery to Hank. He had received the same sort of calls over the past months. What was going on?

After batting the problem back and forth, we decided that the mysterious calls are due to a form of telephone solicitation, such as somebody calling to sell you insurance, or an interest in a time-share vacation home—or perhaps half-interest in the Brooklyn Bridge.

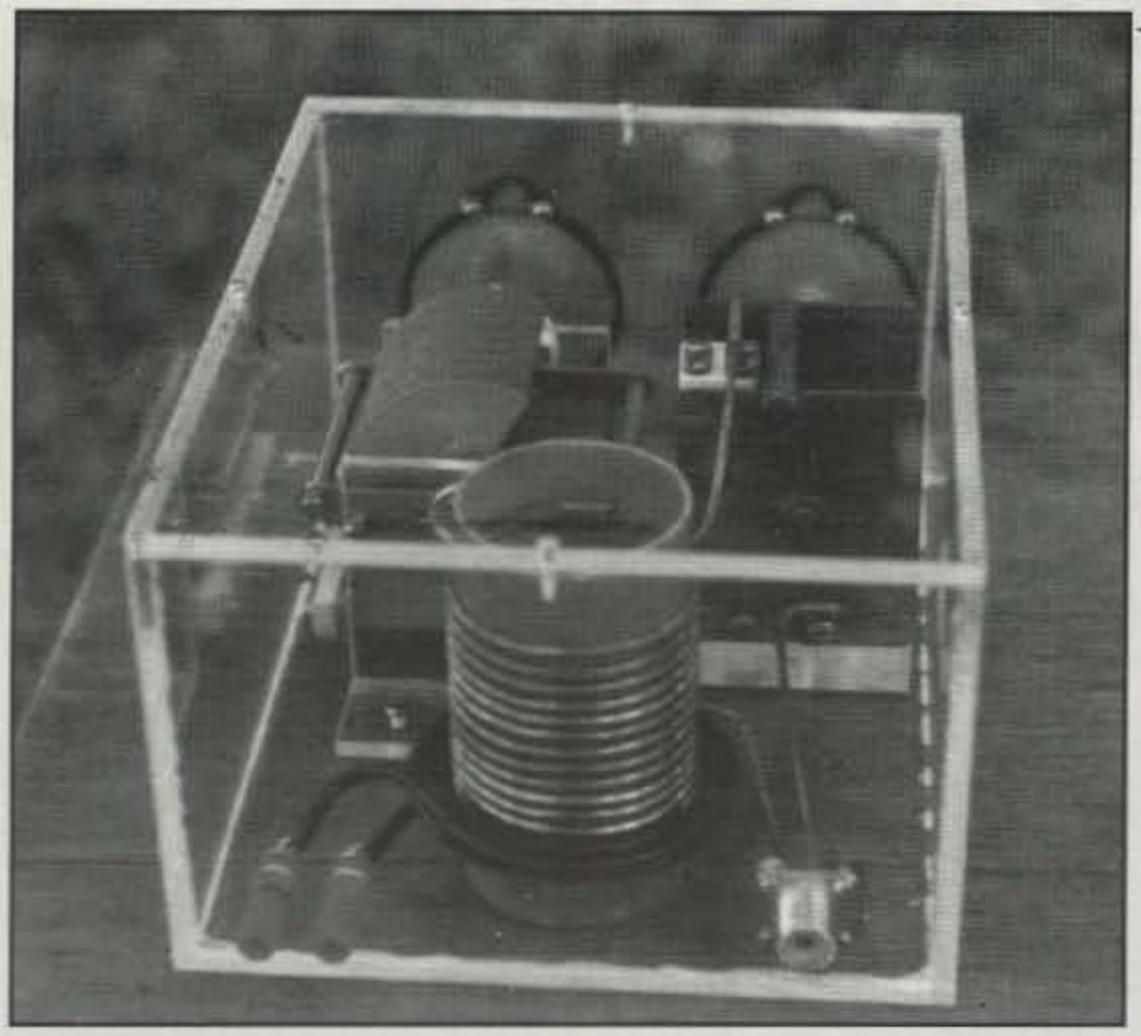
We think some of these "shot in the dark" phone calls are automated, and the calling device calls numbers in numerical sequence. If someone answers, the device switches the call to a live person, on the alert with a hard-sell spiel.

If this sequence gets out of sync, or the live person is busy with another call, the automated device simply breaks the connection, leaving the recipient frustrated and angry.

If there are any readers connected with the phone system, or who otherwise can verify this theory, we'd like to hear from them! Most of all, how do you turn the durned automated phone calls off? They are a pain.

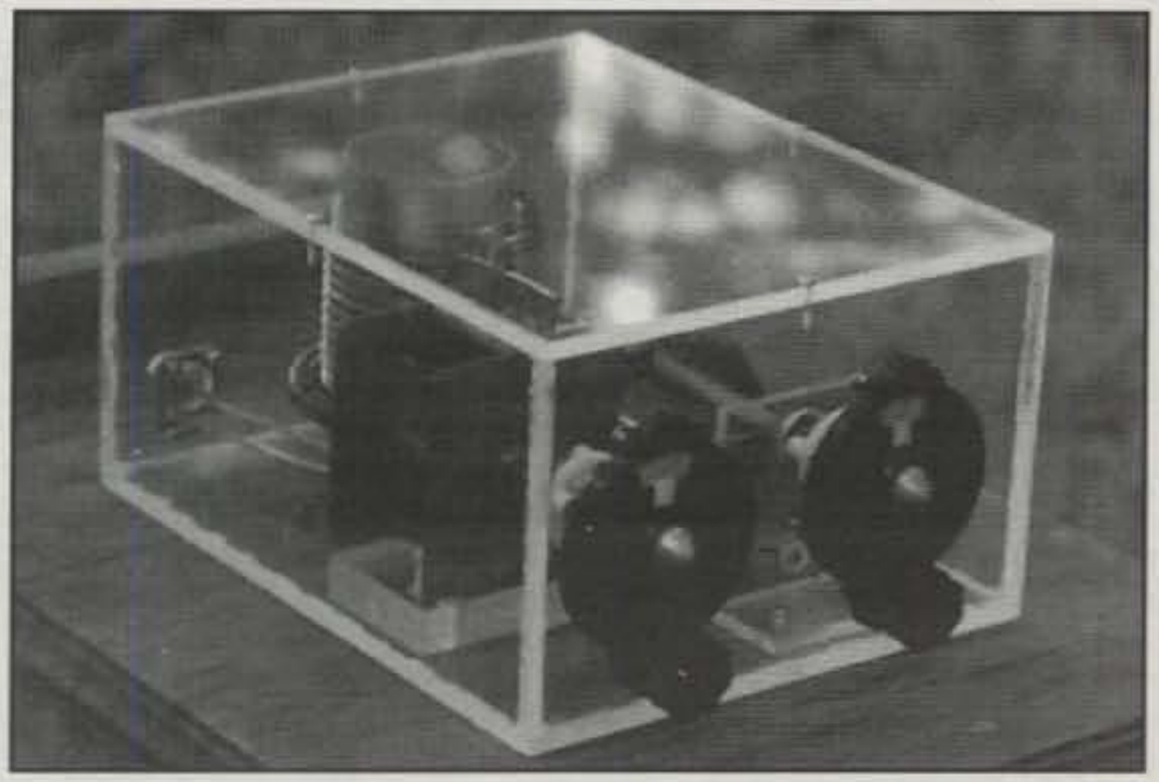
From the Mailbag

Richard, W1QWJ, reports excellent re-



The Z-match tuner of WD4NGG is built in a plastic box. Dials are National "Velvet Vernier." Two output links are used for coax and twin-line feed systems.

Front view of the WD4NGG Z-match tuner.



sults with the Z-match antenna tuner I described in recent columns. He says he wound the coil with No. 10 self-supporting wire. He found the capacitors at Fair Radio Sales, catalog #C-1003 for the single section, 400 pF, .02 airgap unit. The dual section capacitor, 600 pF, .02 gap is catalog #3G-600. Rich uses the Z-match with a 160 meter inverted-V fed with 400 ohm ladder line. He operates the antenna on all bands up to 10 meters. He also has a center-fed dipole, 102 feet long, with ladder-line feed for operation from 80 through 10 meters.

Todd, WD4NGG, also reports good luck with the Z-match and an inverted-V having 50 foot legs. He doesn't mention his feedline, but says the antenna works well on all bands, 80 through 10 meters. He is . . . "amazed at all the good signal reports I am getting."

Bob, K4CSV, sent me pictures of a Z-match tuner built in a plexiglass box by Todd, WD4NGG. It has two National "Velvet Vernier" dials for adjustment. Great job, Todd!

Bob also says he bought a Harvey-Wells "Bandmaster Z-matic" at a hamfest and says the circuit resembles the Z-match. He uses it with an inverted-V fed with 300 ohm line. Thanks to Bob and Todd for the interesting information.

Thanks to the following for their interesting letters. I really appreciate the input: VK2AU, W5INU, VE7MJY, WA3ZOR, K6BSU, WA5JCI, K6OPZ, and W5KFT. Good show!

73, Bill, W6SAI

Footnote

1. MN4.5 Antenna Analysis Program by Brian Beezley, K6STI, 507½ Taylor St., Vista, CA 92084.

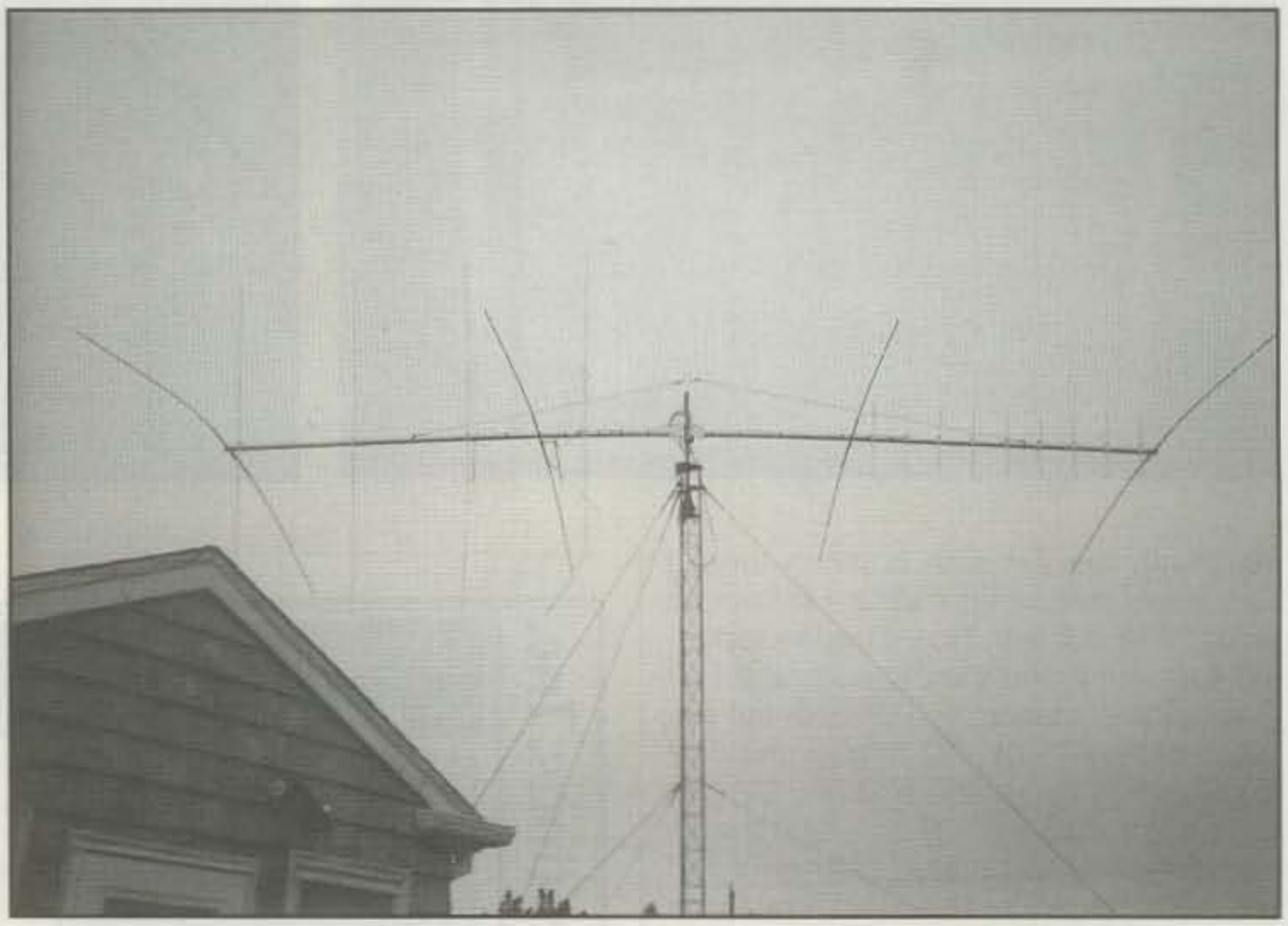
ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Notebook—Part III

Last time we got together we featured a variety of antennas and accessories topics. We're straight ahead on the same track this month, so let's get started. First we turn to one of our favorite topics, that of antennas.



Vin Santo, Jr., WN1S, has three monobanders that share a common 40 ft. boom for operation on 20, 10, and 2 meters. His impressive design can easily be scaled or sized for other bands or for different boom lengths. He reports the combo to be a good performer on all three bands.

Antenna Notes

Happy Hoisting: The WN1S Tri-Monobander. Vin Santo, Jr., WN1S, submitted an interesting description of his HF/VHF beam antenna installation. He has three monobanders which share a common 40 ft. boom for operation on 20, 10, and 2 meters. His impressive design (see photo) can easily be scaled or sized for other bands or for different boom lengths.

Vin chose these three bands to "put the aluminum where the activity is" during lulls in the sunspot cycle. The dimensions for the antennas were taken directly from *The ARRL Handbook*. The back of the array is the front for the 10 meter beam portion; vertical polarization for 10 meters affords useful operation locally when the band isn't open. Vin reports no undesirable interactions on 10 and 2 meters, which both use vertical polarization in his unique boom-sharing arrangement.

The array is comprised of 4 elements each on 20 and 10 meters, with 9 elements on 2 meters. To cram in the last reflector element on 10 meters, the bottom of the reflector had to be bent outward, away from the insulated Phillystran® guy line supporting the top of the Rohn 25 tower. Doing this had no effect on 10 meter performance. The boom was taken from a large CB array; combining the leftover aluminum with some newly purchased tubing kept the total cost under $300.

Vin says only one boom-to-mast bracket is required and that wind loading is inherently reduced by combining all three monobanders. However, for an array of this size and weight (around 100 lbs.), it's advisable to use a large rotor and to pay particular attention to mechanical balance as with any other horizontal array. Vin used a heavy-duty Yaesu G-2700SDX rotor with a maximum vertical load of 1760 lbs. and a max wind load of 32 sq. ft. Trussing the boom also is necessary, and guying the tower at the top with a torque-arm assembly is also a good idea. A separate feedline for each antenna adds to overall reliability in the event antenna failure occurs on one band.

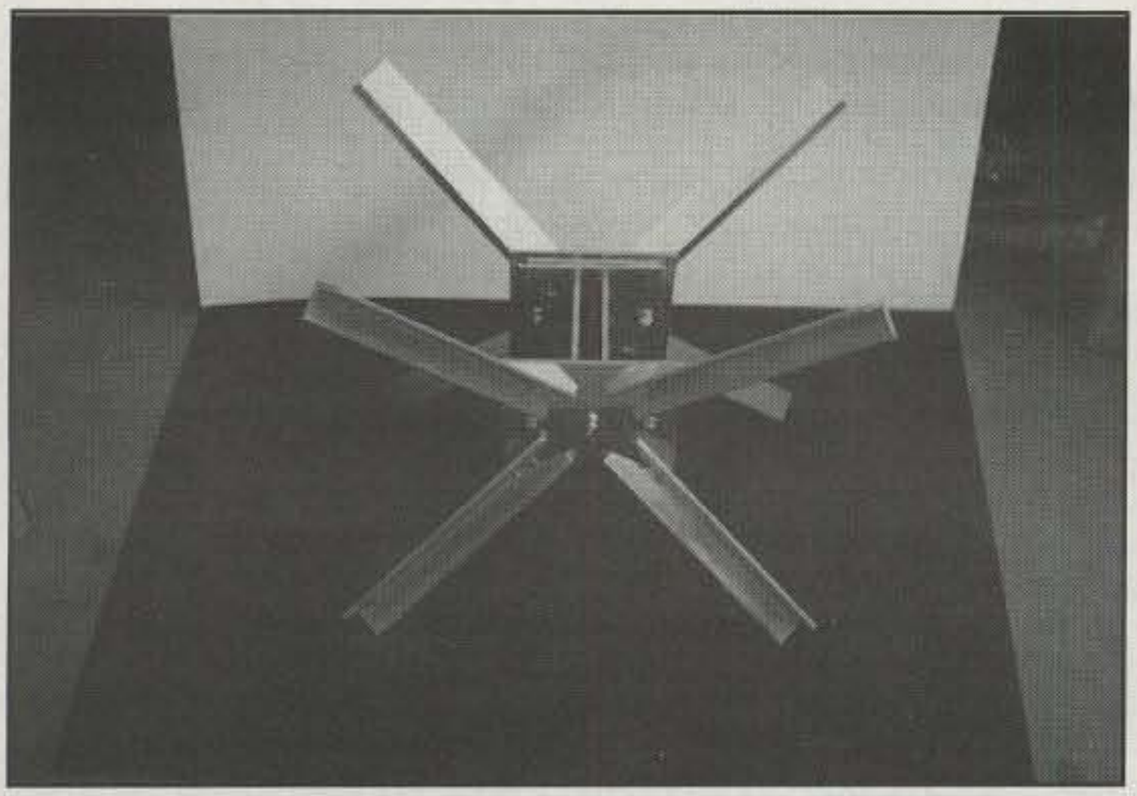
According to Vin, his combination array is a real eye-catcher, and it's also a high performer. It's been up for months and has survived several windstorms with gusts over 60 mph for an extended period of time. A tip of the hat to WN1S for sharing his antenna project with us!

Autek Research RF Analyst™. Autek Research has been turning out quality amateur radio accessories since 1972. For years Bill Onesky, N6WO, has offered the QF1-A Active Audio Filter as his main product. It was, and still is, a superb selectivity-enhancing device for SSB, CW, and AM receivers and transceivers. Less well known is the WM-1 Computing SWR Bridge and Wattmeter. It's a dual-meter unit that offers many impressive features. We have reported on both instruments previously.

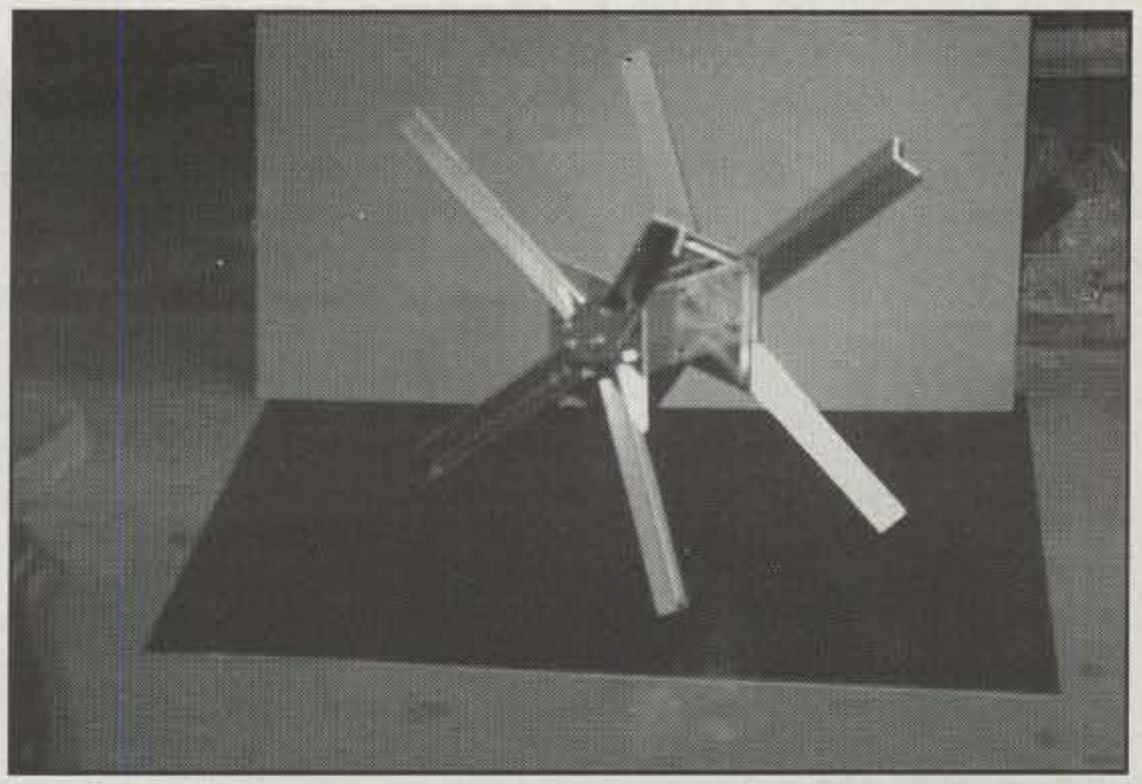
Now Autek Research offers an innovative new antenna accessory, one that is designed

The Autek Research RF-1 RF Analyst is intended to be the only instrument you need to adjust any antenna. It greatly simplifies the construction, measurement, and adjustment of antennas, transmission lines, tuners, and RF networks from 1.2 to 35 MHz. Besides measuring SWR with its built-in "transmitter," it's reportedly the first affordable digital impedance (Z) meter. The RF-1 also calculates L (inductance) and C (capacitance). (Photo courtesy Autek Research)

289 Poplar Drive, Millbrook, AL 36054



The heart of the Quad antenna is the spider mounting hub. Shown here is a typical Antenna Mart "Spyder Hub," fabricated from heavy-duty aluminum alloy for strength and durability. The newly offered King Diamond Quad features out-of-phase, multi-driven elements with a welded T-6 aluminum hub. (Photo courtesy Antenna Mart)



Here's another view of the Antenna Mart Quad "Spyder Hub." Note the high-strength aluminum construction. The spiders and many other parts and accessories, including ginpoles and an RF remote switch, may be purchased separately from the Quad assemblies. (Photo courtesy Antenna Mart)

especially to compete head-to-head with the several HF antenna measurement devices offered by MFJ Enterprises. It's the Model RF-1 RF Analyst™.

The RF-1 is digitally based, with a microprocessor for digital readout of *everything*, not just frequency. It's also intended to be the only instrument you need to adjust any antenna. As such it greatly simplifies the construction, measurement, and adjustment of antennas, transmission lines, tuners, and RF networks from 1.2 to 35 MHz in five overlapping bands. A "one stop" device, it effectively combines several instruments in a tiny (4.5" x 2.5" x 1.5") pocket-size package.

Besides measuring SWR with its built-in "transmitter" (a low-distortion sine-wave generator), it's reportedly the first affordable digital impedance (Z) meter. The RF-1 also calculates L (inductance) and C (capacitance) by combining the measured Z and the known frequency.

While it's a highly accurate instrument over its design range, it's easy for even a beginner to use on a first antenna project. Its oscillator tunes outside the amateur bands to easily find system resonance. There's little need to take your antenna up or down. You can climb your roof or tower just once, getting adjustments right the first time.

Besides making basic measurements of SWR, Z, L, C, and other important parameters, the device can be used to precisely adjust quarter-wave and half-wave transmission lines, measure cable loss, check balun and RF transformer characteristics, measure SWR on

lines other than 50 ohms, check the effects of adding radials to a vertical antenna, adjust your antenna tuner without transmitting (great for SWLs), measure trap resonant frequency, produce a sine-wave RF signal, and more.

This handy, 7 ounce multi-purpose instrument is powered by a 9 volt battery and has a bright ½ inch LCD display usable in direct sunlight. It's $129.95 plus $6 shipping/handling.

For detailed specifications, contact Autek Research, 4143 W. Waters Ave. #120, Tampa, FL 33614 (813-871-3805).

Terramar Systems Company Match All®. There's no such thing as a free lunch, and most of us know that a random length of wire and a little black box is unlikely to perform better as an antenna than a multi-element Yagi. But there is a time and a place for everything, and the Terramar Systems Match All HF Automatic Antenna Matcher can simplify portable, mobile, avionics, and marine operation on the amateur bands, especially with modern solid-state transceivers that are sensitive to high SWR. The device instantly matches your HF amateur transceiver to your antenna (longwire, vertical, whip, or dipole) with less than a 1.5:1 VSWR on all HF bands from 160 through 10 meters.

The Match All is, according to the manufacturer's literature, a wideband RF transformer that does not depend on resonant lengths of radiating wire to attain proper tuning and radiating results (although efficiency is dependent on the nature of the RF load). Getting more specific, the Match All is a solid-state, nonresonant, broadbanded, constant impedance, induction coupled, automatic matching device sealed in an aluminum shielded cavity. The unit is about 8" x 4" x 2" and weighs 25 ounces; power rating is 150 watts. It's $99 plus $4 shippimg/handling. A 15-day money-back guarantee is offered.

For more information, contact Terramar Systems Company, 3299 SW 11th Ave., Fort Lauderdale, FL 33315 (305-523-3123).

LF Engineering Low Frequency Products. There is renewed interest in LF, ELF, and VLF experimentation, especially in view of the recent ARRL and FCC consideration of a LF amateur band to formalize the 1750 meter "experimenter's band" at 160–190 kHz. LF Engineering has capitalized on this interest with a new line of communications products to support diverse LF and MF interests.

Besides the firm's traditional line of LF communications equipment, their new catalog offers products for "natural radio" signal reception at ELF and VLF, low-frequency countermeasures, and improved MF AM broadcast band DXing. Also new is the LFCAD software, a collection of some 40 LF design computer programs. Other products include a VLF converter and preamplifier, a LF active gain antenna, a 1750 meter transmitter, H-field loop and E-field receiving systems for direction finding and natural radio reception, an LF subcarrier receiver, and more.

For a free catalog, contact LF Engineering Co., Inc., 17 Jeffry Road, East Haven, CT 06513 (203-248-6816).

New from Antenna Mart. Recently, proprietor Bill Wall, KC4UZ, made us aware of several new products for 1994. These include UPS-shippable Quad kit assemblies up to 35 ft. in boom length; the King Diamond Quad with out-of-phase, multi-driven elements featuring a new welded T-6 aluminum "Spyder Hub"; a 2 meter packet antenna; a 2 meter high-performance Quagi; two-piece heavy-duty fiberglass spreaders; economy spreaders; a mast pipe extender adapter kit; a complete two-piece mast pipe kit; and a nonconducting mast pipe extension kit.

Perhaps the most notable new product is the AMQ-2-5-SB, a low-cost, short boom, 2-element, 5-band (10/12/15/17/20 meter) Quad. It's lightweight and has a short, 10.2 ft. turning radius. It can be mounted in diamond or square configuration and claims about 5–7 dBd forward gain and 12–19 dBd F/B ratio. The $299 antenna is complete with no other parts or options to purchase.

For more information, contact Antenna Mart, P.O. Box 699, Loganville, GA 30249 (404-466-4353).

Mosley 1994 Catalog. A new 35-page 1994 Mosley catalog is available. It lists a variety of beams, dipoles, and verticals that the firm sells factory direct. The 8½" × 11" catalog has all the familiar Mosley classics, among them the TA series beams and the RV-series verticals, but there's lots more.

Some additions to the product lineup include the CL and TW multiband WARC-capable beams and the three-element Super-33 for 17, 20, and 40 meters. Special catalog pricing is offered on the MY series lightweight, low-wind-load VHF/UHF Yagis and the DI-2 "Super Omni" VHF/UHF 5/8-wavelength groundplane.

For a catalog, contact Mosley Electronics, Inc., 10812 Ambassador Blvd., St. Louis, MO 63132 (1-800-325-4016). They'll also include a thick stack of user references and "brag letters" along with the catalog.

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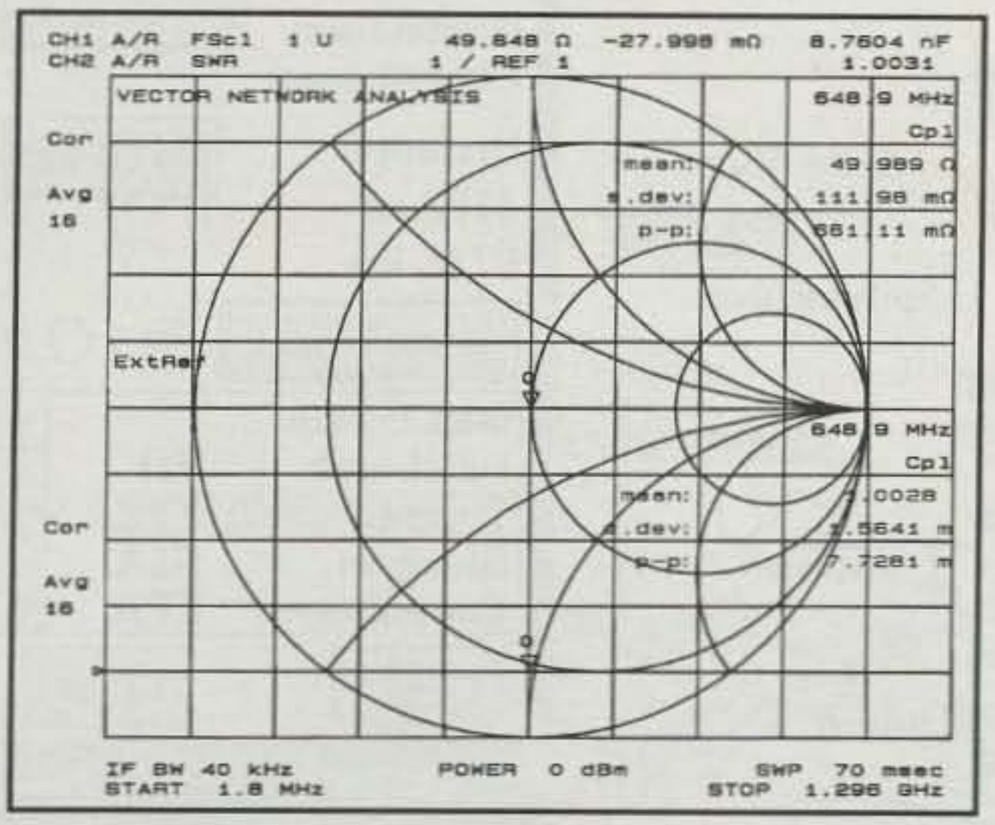

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Credit cards not accepted. Send $32 plus $3 shipping for 1 hr. video of independant electrical system for the home to: Mr. J. Bourgeois, Suite 235, 3701 Division St., Metairie, LA 70002. Please mention where you saw this ad. Your order will be shipped within 72 hours.

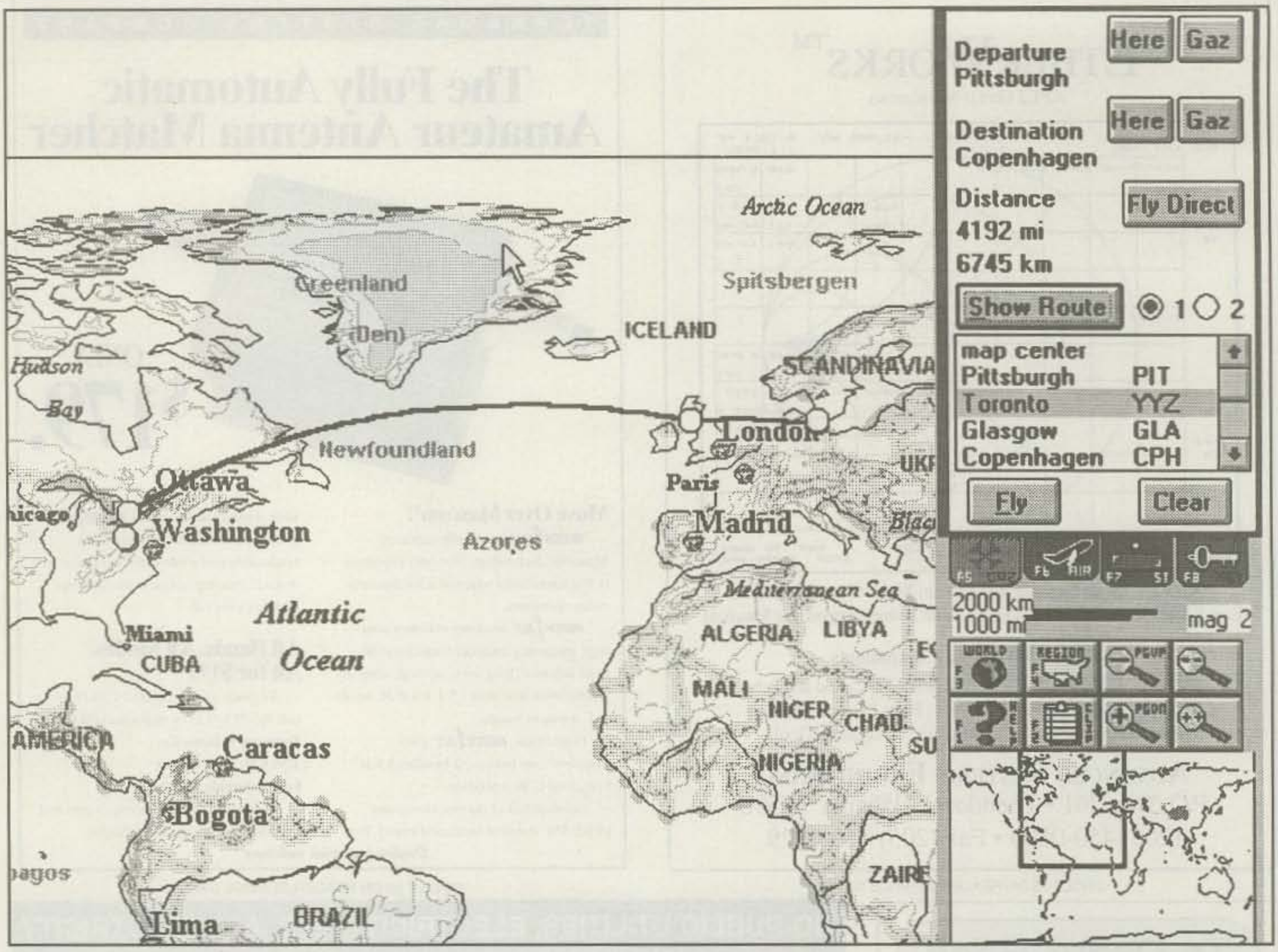

Fig. 1– DeLorme Mapping's CD-ROM based Global Explorer™ is a "computer globe" that presents the world in much greater detail than any computer or printed atlas. The program helps you stay on top of a rapidly changing world and keep abreast of world events. It's a also a serious travel reference and a useful educational tool for the youngsters. (See text for details.)

Hustler Antenna Update. Hustler is an old-line antenna supplier well known for its CB, monitor, and amateur antennas. The amateur line includes the popular 4-BTV, 5-BTV, and 6-BTV HF fixed station verticals and numerous HF/VHF mobile antennas, mounts, and resonators. Hustler has a new 25-page amateur antenna catalog that details all these products and others.

Several new products are shown in the catalog. Prominent among them are the premium Spirit series antennas originally designed for the professional communications market; they are now available for amateur frequencies. The Spirits have an offset radiator (OSR) design with phased half-wave radiators said to yield precise radiation angle control and wide bandwidth. The antennas feature a white extruded fiberglass radome combined with a 2 ft. long heavy-wall aluminum base to offer stability and rigidity even in winds to 130 mph. The new antennas are available in configurations from 144 MHz to 1.3 GHz.

For a catalog, contact Newtronics Antenna Corp., One Newtronics Place, Mineral Wells, TX 76067-9563 (817-325-1386).

Soft Side Notes

Global Explorer. One of the big advantages of CD-ROM based software is the ability to use large databases and extensive graphics—data that would otherwise fill up one's hard drive. One such capable product noted in the April column was DeLorme's Street Atlas USA™, Version 2.0. It's a computerized street map that provides a detailed, virtually seamless database of the whole country. With it you can zoom in on every city, town, and rural area. The database contains more than 12 million street segments and 1.1 million geographic and manmade features.

DeLorme has another equally impressive product, Global Explorer™. It is, in effect, a "computer globe" that presents the world in much greater detail (and offers PC users more functionality) than any computer or printed atlas. The program helps you stay on top of a rapidly changing world and keep abreast of world events. It's also a serious travel reference (keep that in mind when planning your next DXpedition!) as well as a useful educational tool for the youngsters (see fig. 1).

Besides its easy-to-use software engine, Global Explorer contains an unprecedented database of geographic information. The program features full-color maps of the entire world. You can zoom in and out through 15 levels of magnification, taking in a world view or a detailed perspective of any part of the earth. You can scroll or pan views of any portion of the planet.

The DeLorme maps feature detailed topographic information, as well as national and provincial boundaries, bodies of water, urban areas, major highways, elevation data, and land coverage patterns. There are indexed, searchable references to more than 120,000 places and street maps of 100 cities throughout the world. The program also features descriptions of 20,000 of the most interesting historical, cultural, geographical, and social features in the world, in more than 100 categories. You can search the database of descriptions to find information on any of the features within these categories.

Another interesting function is Global Explorer's network of world air routes. With it you can ask for an air route between any two cities; the program will search its database to display two options for likely commercial air routes between the two locations and also show approximate travel distance. If you start or end in a city that doesn't have an airport, the program draws a line to the nearest airport and adds in that mileage.

For information on the $169 program and the publisher's extensive mapping products, contact DeLorme Mapping, P.O. Box 298, Freeport, ME 04032 (1-800-452-5931, ext. 8000).

Thoughts on Software Support. Software support has been described variously as good, bad, or indifferent, depending on one's vantage point. Today it's also becoming quite expensive. True, many software publishers provide excellent product support. Such firms have a solid service strategy, their top management is involved in customer support, managers keep tabs on the level of support they actually provide, and they have invested heavily in developing a solid service infrastructure. Often suppliers go to great lengths to help solve customers' software problems. However, support generally is uneven: you never know what level of support (if any) you're *actually* going to get.

Often what you really need is simply good advice to help you diagnose or resolve a problem. Generally software technical support has been free and unlimited, although rarely does support include an 800 number hotline. Most software publishers traditionally have offered free support for the life of the product, while some limit free support to 90 or 180 days and then offer extra cost continuing-support plans.

Many software publishers (including some like Microsoft and WordPerfect, which have given free service for years) have decided that technical support should be a profit center and have established for-a-fee "dial-900" support for out-of-warranty products that may be used in lieu of, or in conjunction with, various service plans. Typically, you're charged $2 or more per minute, with the costs appearing on your telephone bill. Alternately, customers are charged a per-minute or flat rate for service, billed to a credit card. So far we haven't seen much of these trends in amateur radio software—at least, not yet.

One firm offering tailored support services is Microtech Software, which operates the Microtech Technical Support Help Line. Microtech bills itself as a "third party application enhancement software company" that tries to fill the gap between the original software manufacturer's warranty and the user's actual usage of the program.

Microtech offers various options which include unlimited operating system support for a single PC, a quarterly newsletter, bulletins, support for specific application software, and discounts on other products and services. All technical support is provided by FAX or U.S. mail, or through the Prodigy or CompuServe online services.

More information is available from Microtech Software, 917 Boston Post Road, Fairfield, CT 06430-6013 (203-454-6666).

One enterprising Florida firm, Software Support, offers round-the-clock, third-party help for over 125 IBM PC and Macintosh software titles, charging users $2.95 per minute on its 900 lines. They also offer 90-day and full-year 800-line service policies. Some PC vendors have arranged with the firm to offer low-cost unlimited technical support policies for the application software packages bundled with their PCs.

Further information is available from Software Support, 30 Skyline Drive, Lake Mary, FL 32746 (1-800-756-4463).

Hams and Online Services. Most of the major online communications utility services offer a variety of features such as news, weather, and sports; E-mail; online shopping; travel; bulletin boards and forums; multi-player games; online chatting; investment advice;

educational services; reference databases; files for downloading; and much more. Popular services include Prodigy, CompuServe, and America Online, among others.

Perhaps the most popular features of these services are the forums that let you talk with others via messages posted in the forums. Forums also allow you to communicate directly with computer manufacturers and software publishers for the latest information, advice, and software bug fixes. Let's briefly examine three of the major services that have special interest areas for amateurs, SWLs, and scanner buffs.

+*America Online*. AOL, with over 600,000 members, is a low-cost and rapidly expanding online service that has begun to challenge CompuServe in many areas, especially with its very attractive graphical user interface. AOL also has challenged Prodigy by slashing its online charges and increasing the free hours included with the $9.95 monthly fee. There's access to Internet, including E-mail, and new services are added regularly. The AOL software supports the Macintosh, DOS, and Windows.

Amateurs, SWLs, and scanner buffs will appreciate AOL's Ham Radio Club, which features an American Radio Relay League (ARRL) section where you can access the ARRL Information Service, a mail server that lets you retrieve information files on various amateur radio topics. You also can E-mail ARRL staffers, use several specialized message boards, download software, and participate in online conferences. The host for the AOL Ham Radio Club is Terry Stader, KA8SCP.

Contact America Online, Suite 200, 8619 Westwood Center Drive, Vienna, VA 22182 (1-800-827-6364).

+*CompuServe*. The 1.5-plus million member H&R Block subsidiary's wide variety of services and databases makes it a first choice among many researchers, PC power users, and professionals. It gives you access to electronic mail, travel services, financial information, software, shopping, and much more. CompuServe has over 350 online forums.

Among these is the HamNet Special Interest Group (SIG), a forum open to all CompuServe users, not only licensed amateurs. HamNet is a vast resource of computer software, amateur radio newsletters, information on technical developments, and FCC regulatory information. The SIG is dedicated to amateur radio and related topics, including shortwave listening and scanning. Membership is free, and the net welcomes new users.

Messaging and teleconferencing also are available on HamNet, there's an online swap shop, and several amateur radio vendor firms offer online support. The HamNet main System Operator (SysOp) is Scott Loftesness, W3VS (CompuServe ID 76703,407). You can access HamNet by typing "GO HAMNET" at any "!" prompt. Of course, you must be a CompuServe member to use HamNet.

For more details, contact CompuServe at P.O. Box 20212, Columbus, OH 43220-0212 (1-800-848-8199 or1-800-848-8990). One popular pricing option is $8.95 per month for unlimited access to more than 50 basic services. CompuServe can be used by practically any PC, and proprietary software isn't needed.

+*Prodigy*. The Prodigy Information Service has been in operation for about five years; it's a joint IBM-Sears project. It's also grown to be one of the largest services, mainly due to the colorful, easy-to-use proprietary software used to access it. The software is available in Macintosh, DOS, and Windows versions.

Prodigy claims more than two million users, more than any other online service. It offers many consumer-oriented options and graphical screens that are easy for computer beginners and students to navigate. The service has E-mail only access to Internet, but—like CompuServe—it allows access to the popular specialized computer utility service, ZiffNet.

On Prodigy you can obtain amateur radio information in the Homelife bulletin board, found under Radio Hobbies. From this selection you can access over 300 amateur radio topics and participate in online discussions with other users.

For details on rates and various membership plans offered, contact Prodigy, P.O. Box 4064, Woburn, MA 01888-9961 (1-800-822-6922). Basic "core" membership cost is $14.95 per month, although some special Prodigy services are extra-cost options.

Book Nook

New Opus de ON4UN. John Devoldere, ON4UN, needs no introduction to those active DX-wise on the low bands, particularly on 160 and 80 meters. He has achieved spectacular success as a contester on these two bands, and his outstanding achievements are not the result of blind luck. Rather, they are the result of the professional approach he takes to hamming, which John shares with readers of his new 1994 book. It's *Antennas and Techniques for Low-Band DXing*, Second Edition.

John's 393-pager, which consists of 14 chapters, is unique in that it covers both antennas and DX operating strategies for 160, 80, and 40 meters. The book includes in-depth techniques and tips, antenna designs, and information on software culled from the author's many years of experience and that of other active antenna experimenters, DXers, and contesters. The book also has a strong low-band propagation section.

The first edition was good, but in this edition large portions were rewritten: in the antenna chapters excellent use is made of the latest and most powerful computer analysis and modeling tools. The equipment review section has been updated, and the book includes a unique new list of topnotch low-band DXers with their scores as well as their equipment and antennas.

John's book is $20 from the American Radio League, 225 Main St., Newington, CT 06111-1494 (203-666-1541).

Geo-Monitor. The *really* low end of the spectrum arguably can be used for earthquake monitoring. It's a speculative field—the validity of which is questioned by many authorities—that involves carefully monitoring ELF, VLF, and LF ranges to investigate electromagnetic radiation caused by "earthquake precursors."

Reportedly, an experimenter who operates an earthquake detection network noted low-band radio and magnetic anomalies on Saturday, January 15, 1994, just two days before the big southern California earthquake that caused so much damage. The experimenter is said to have predicted an imminent quake exceeding 6 on the Richter scale.

For those interested in this type of experi-

mentation, *Geo-Monitor* thoroughly covers earthquake activities worldwide and contains many descriptions of electronic equipment used for earthquake precursors. The monthly newsletter covers amateur and scientific earthquake prediction, geophysical monitoring, cave exploring, and even topics such as unusual animal behavior prior to earthquake episodes.

Geo-Monitor is published by Vincent T. Migliore; a subscription is $22/year domestic and $30 overseas airmail. For more information, contact Geo-Monitor, 65 Washington St. #400, Santa Clara, CA 95050 (408-749-6770).

New from McGraw-Hill. There's just one book this month, gang, and it's for the spreadsheet crowd. It's *Excel for Windows: The Complete Reference*, by Martin Matthews and Stephanie Seymour. The book clocks in at about 1300 pages. It provides what may just be the best single reference on Excel for Windows, Version 5. No matter what your level of computing experience, you'll likely find answers to your questions between its covers. Part 1 is designed to get you up and running fast, while Part 2 provides a comprehensive desktop reference. There also are features such as installation instructions, handy keyboard commands, and toolbar summaries. The text is $34.95 in bookstores. It's from Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (1-800-227-0900).

Short Bursts

So What's the ASP? If you are a shareware author, or are otherwise involved in marketing shareware software, consider joining and supporting the Association of Shareware Professionals (ASP). The ASP is a professional organization which has as its purpose the strengthening of the shareware (user-supported) software channel as an alternative to commercial (retail) software. Its members subscribe to a code of ethics for shareware programming, distribution, marketing, and support. One of ASP's top priorities is to promote a high degree of professionalism among shareware authors.

Included are standards on software support, registration payments, and the full functionality of software (no crippling of shareware versions is allowed). They've also set up the "ASP Ombudsman" to mediate disputes between ASP members and customers. Membership includes shareware authors, programmers, and publishers; disk copying services (vendors); bulletin board systems (BBSes); and others in the field. ASP also publishes a master catalog of shareware products offered by ASP members.

Information on the Association of Shareware Professionals is available on the CompuServe ASP/Shareware Forum on IBMNET by typing "GO ASPFORUM" or "GO IBMNET" at any "!" prompt. Or write to the ASP Executive Director, 545 Grover Rd., Muskegon, MI 49442-9427 (616-788-5131).

Wrap-Up

That's all for this time, gang. Next month more "Antennas and Accessories" topics of current interest. See you then.

Overheard: It's a whole lot easier to get forgiveness than permission from your spouse to buy that do-it-all new rig.

73, Karl, W8FX

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

The Art of Node Configuration

Configuring nodes is an art. Some say the art is lost. Just ask any dedicated node sysop, however, and you may discover a wealth of knowledge and learn that the art of node cconfiguration is alive and well.

In this month's "Packet User's Notebook" we will attempt to pass along some of this knowledge to the new and aspiring node sysops.

The Node Knows

A few weeks ago I was discussing a node routing problem with Rick Card, KD4JKX, president of the Southeast Emergency Digital Association Networks (SEDAN). Rick needed a solution that would enable two nodes to communicate with one another during daylight hours when there was no path between them. At night or during periods of long VHF propagation the nodes could link, but during the daylight hours there was loss of any path between them.

Rick stated that his QTH was between the two nodes and that he could connect to either one of the nodes, but during the daylight hours other users could not traverse the two nodes. A few users of the system utilize his station as a digi between the nodes because he has the MYAlias command set to "KD4JKX-4."

These nodes use the X-1J2 firmware, which accepts digipeated connects between nodes. Most nodes that use the **NORD><LINK** "Hans Georg Giese, DF2AU" (Northern German Packet Group) TheNET foundation code will allow this form of connecting.

I told Rick about some of my experiences with the same kind of problems, which we had encountered with nodes back in 1987 and 1988. I recalled the days (and nights) when David Hopper, WD4JKH, and I experimented with different ways to make nodes recognize each other and to make nodes link when there were no paths between them. Rick was quick to ask how we resolved the problem without having to build a complete node site in between the other two nodes.

Rick Had The Answer

Without knowing it, Rick had given me the answer to his problem. He had mentioned that a few users knew his (MYAlias) digipeat call sign (KD4JKX-4), and they used it to bridge the link between nodes "AD4DN-7/ILM" and "KE4JSY-7/LBNC." "ILM" is near Wilmington, North Carolina, while "LBNC" is at Long Beach, North Carolina. Rick is located at Carolina Beach, North Carolina, almost mid-point between the two nodes.

To bridge the gap, or make a path between nodes "ILM" and "LBNC," there would need to be a locked route between them; the locked route would need to use the digipeater "KD4JKX-4" to complete the path. This meant that both "ILM" and "LBNC" would need to have special routing added to each node. To do so would require sysop-level changes or additions.

First the sysop would need to connect to node "ILM" and present the password to enter the sysop command mode. He would then make this addition using the "NODES" command:

N KE4JSY-7 + LBNC 108 5 0 KE4JSY-7 KD4JKX-4

At node "LBNC" the sysop would again enter the sysop command level and issue this NODES routing addition:

N AD4DN-7 + ILM 108 5 0 AD4DN-7 KD4JKX-4

If at a later date a node were to be installed at or near Rick's QTH, the path could be removed by using the same steps as described above, with one exception. Where we applied the + (plus sign) we would use the – (minus sign).

The Syntax

Now that we've "drawn the map before the road was built" or "put the horse before the cart," as it were, look at the syntax for this node routing procedure, as shown in Table I.

Similar Routing Techniques

There are still more routing techniques which may be utilized with node path defining applications. One of these routing techniques is similar to the one we've just discussed. In this application there is no need for a digipeater in the path, yet there is a need to "lock" the path. The main reason is due to path changes with changing propagation.

Let's assume that 85% of the time node A has a near perfect path to node B, yet in the wee hours of the morning node A

211 Luenburg Drive, Evington, VA 24550

[NODES] [KE4JSY-7] [+] [LBNC] [108] [5] [0] [KE4JSY-7] [KD4JKX-4]

[Node]	**"N"**	**(Nodes command)**
[NodeCall]	KE4JSY-7	**(Target Node Call)**
[+/–]	+	**(+ (plus)add/(minus) – remove)**
[NodeAlias]	LBNC	**(Target Node Alias)**
[RouteQuality]	108	**(establishes a route quality)**
[ObsolenceCt]	5	**(# of broadcasts before retiring)**
[Port]	0	**(Port number, 0 = Radio & 1 = RS-232)**
[NodeCall]	KE4JSY-7	**(Target Node Call)**
[Digipeater]	KD4JKX-4	**(Digipeater Call)**

Table I– Node "ILM" routing to node "LBNC" is our example.

(Install at node "A") **[NODES] [B] [+] [LBNC] [108] [5] [0] [B]**

[Node]	**N**	(Nodes command)
[NodeCall]	**B**	(Target Node Call)
[+/–]	**+**	(+ (plus)add/(minus) – remove)
[NodeAlias]	**LBNC**	(Target Node Alias)
[RouteQuality]	**108**	(establishes a route quality)
[ObsolenceCount]	**5**	(# of broadcasts before retire)
[Port]	**0**	(Port number, 0 = Radio & 1 = RS-232)
[NodeCall]	**B**	(Target Node Call)

Table II– The syntax used at node A.

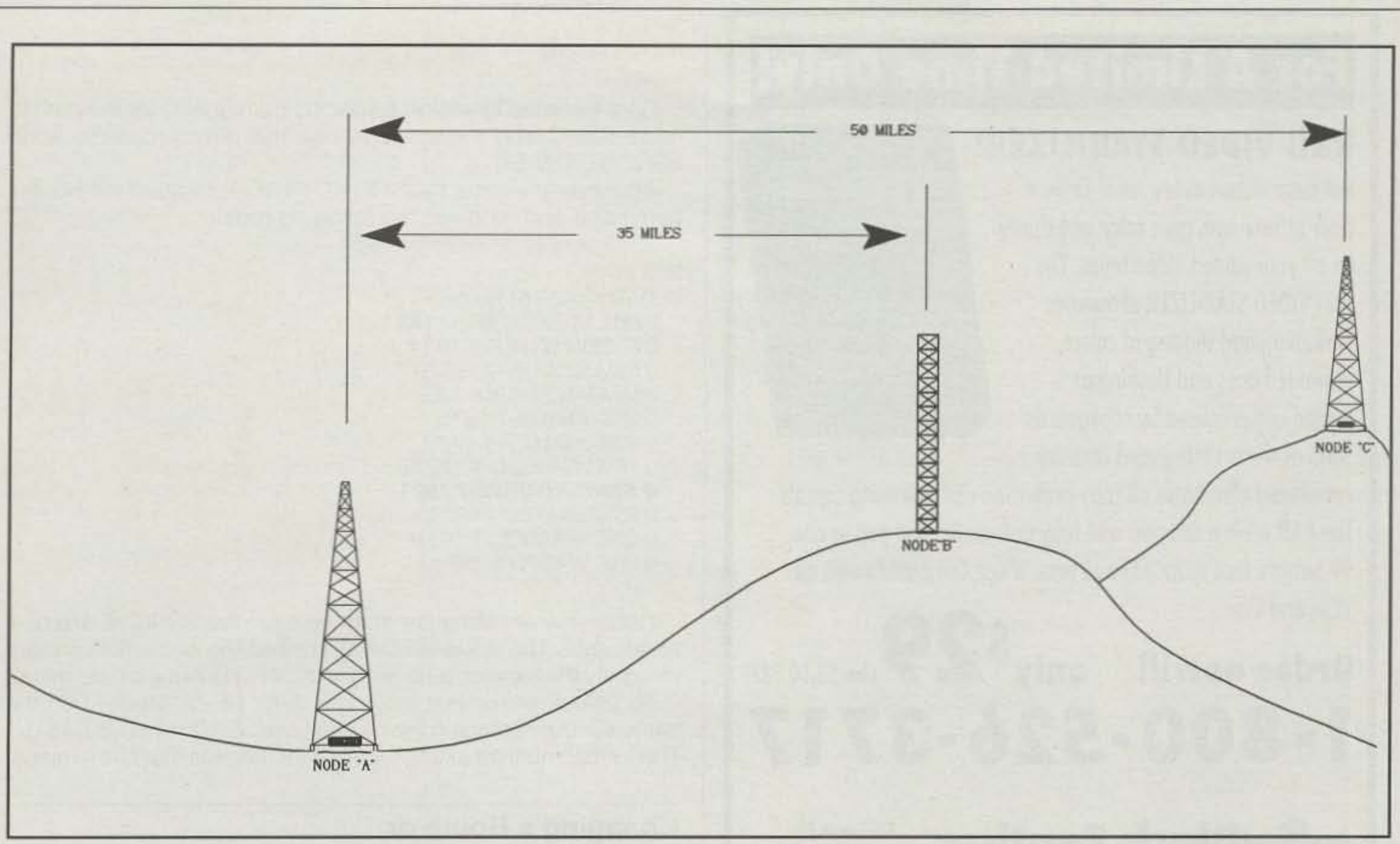

Fig. 1– Locking the path from node A to node B will ensure that node A and node B will be the path of choice, even if late-night or long-path propagation gives false indication that a better path exists between nodes A and C.

begins to see a 99% path to node C.

During these few hours, or even minutes, node C broadcasts a node list that node A interprets as a better path than the path to node B and updates its routing to send all packets through node C rather than node B. It may be an hour or more before another update occurs, and during this hour node A has traffic to send across the network of nodes. Suddenly, without notice, the path between node A and node C has diminished or become lost. If node A has not maintained an alternate path to node B, then the originating station may see a "Failure with" message from the distant node (see fig. 1).

To maintain the path between node A and node B we can use the following fixed, or "locked," path between nodes A and B. Here is where we apply a procedure to the one we used earlier. In this case we omit the digipeater in the locked path string. The syntax used at node A is shown in Table II.

The locked path will need to be applied to both nodes A and B. If the two nodes are operated by different sysops, there must be a cooperative effort between the sysops to make the locked route addition at the same time.

(Install at node "B") **[NODES] [A] [LBNC] [108] [5] [0] [A]**

No longer will node A revert to any other path away from node B.

With a little study of this procedure the sysop soon learns that several variations of this application may be used to ADD, DELETE, and LOCK paths to and from nodes.

Locking Routes

In a few instances I've resorted to locking "routes" to a neighbor node. You may display the routing for a particular node; the following notation is used. The "greater than" symbol (>) indicates a route in use. The first number is the route quality, the next number is the obsolescence count (0 = locked route), and the last number is the port in use (0 = HDLC; 1 = RS232). Next is the neighbor node. The display might appear as follows:

I type and [Enter] **N MVA**. The node responds with:

```
SEDAN:K4ABT-7| Routes to MVA:KC4SUE-7
>192      6    0      KC4SUE-7
 144      4    1      KD4BNQ-7
   0      4    0      N4ZRT-7
```

The last line displayed with a zero (0) route quality is known as a "trivial" route and is not usable.

Today It Happened

I connected to the local node K4ABT-7/SEDAN on 145.770 MHz and issued a connect to node "WAKE" at Fuquay Varina, North Carolina. While waiting for the connect to complete, I glanced over at another packet station screen and saw that "SEDAN" was attempting a poor route to node "WAKE." I gave node "SEDAN" the command **N WAKE**, and it returned the following routes to WAKE.

```
SEDAN:K4ABT-6| Routes to: WAKE:KD4RWE-6
 >108     6    0    MVA:KC4SUE-7
  108     3    0    WNC:WA4GSO-7
```

I knew that SEDAN should see WAKE with better quality via the Seven Springs, North Carolina node SSNC:KD4RWE-7. Somehow node SEDAN had stored the route to SSNC through routes that were not as good as the direct route through SSNC, and the other routes were through four nodes where the path through SSNC would involve only one node. Here is how I locked the route to node SSNC:

R 0 KD4RWE-7 + 192

Here I wanted to assign a specific path quality for the path to node SSNC and I wanted to use the direct route to node SSNC/KD4RWE-7.

After I set the route to SSNC/KD4RWE-7, I issued the Routes command and received the following routes:

R
SEDAN:K4ABT-6} Routes:
0 MTLAKE:KD4BNQ-7 **192** 1
0 CVSDN:W4BLD-7 192 1
0 MVA:KC4SUE-7 192 21
0 MODAN:KD4JKX-7 192 1
0 DVA:KN4UN-7 192 3
0 GNC:KD4NFP-7 192 7
0 WNC:WA4GSO-7 192 18
0 SSNC:KD4RWE-7 192 !
0 RVNC:K4YEC-7 192 3
0 CNC:WB4QOC-7 192 8
0 SNC:WA4PVI-8 192 13

Notice the exclamation mark (!) after the SSNC/KD4RWE-7 routes edit. The node (SEDAN) applied the exclamation mark to signify the locked route entry to KD4RWE-7 (italics are mine).

To unlock or remove the route that I've installed, I use the same syntax, replacing the plus (+) sign with the minus (–) sign. The format must be exact, except that the plus must be a minus.

Changing a Route or The Route Quality

To change the route quality of an existing route (not a sysop locked route) that is already in the routes table, simply type in the same route as shown in the routes list, changing only the path quality number. Again, after the routes list edit is complete, a routes list will display the route with an exclamation mark following the entry.

Using the above routes list for our example, we will modify/edit the path quality to node MTLAKE as follows:

R 0 MTLAKE:KD4BNQ + *188*

Next we send the R, or routes, command to the node, and we receive the following routes:

R
SEDAN:K4ABT-6} Routes:
0 MTLAKE:KD4BNQ-7 *188* !
0 CVSDN:W4BLD-7 192 1
0 MVA:KC4SUE-7 192 21
0 MODAN:KD4JKX-7 192 1
0 DVA:KN4UN-7 192 3
0 GNC:KD4NFP-7 192 7
0 WNC:WA4GSO-7 192 18
0 SSNC:KD4RWE-7 192 !
0 RVNC:K4YEC-7 192 3
0 CNC:WB4QOC-7 192 8
0 SNC:WA4PVI-8 192 13

Notice that we've changed the path quality from node SEDAN to node MTLAKE from 192 to ***188***.

Locking a route at a lower or higher quality can provide precedence of selection when several routes are available and the node is using automatic routing.

There are many variations of the NODES and ROUTES commands. It doesn't take a rocket scientist to soon realize how node configuration can become an art, and in fact, a means to reroute even a user callsign.

A brief syntax of the routes/path quality format follows.

ROUTES [port] [nodecall] [+] [pathquality] (to add or change)
ROUTES [port] [nodecall] [–] [pathquality] (to delete/remove)

With some node types, the above format may force callsign validation ON.

Dealing With The Password

I thought I had completed this month's column until I asked Jean Ann, WB4EDZ, to proofread it for me. Well, I thought wrong. She catches on fast, and she pointed out that I had given the "good stuff" as to what and how to make the changes, but then she added, "How do you get into the sysop's command level?"

Why, of course! How could I have overlooked such an important point? There might be several potential sysops who have stayed away from node "sysopping" due to something as small as not understanding how to deal with TheNET passwords.

The "SYSOP" Command

The SYSOP command allows an authorized sysop or network manager to establish his credentials prior to making privileged changes using PARAMS, MODE, NODES, ROUTE, INFO, CTEXT, BTEXT, or other commands associated with the X-1J2 version of a TheNET node. This also includes allowing the sysop or manager to perform a "warm" or "cold" start of the node using RESET or RESET A.

SYSOP uses a randomized validation algorithm which makes it difficult for an unauthorized user to masquerade as a sysop or network manager. The following text explains how the X-1J password is applied and executed by the X-1J sysop or network manager.

Here is an example of an X-1J node password:

T H I S I S A P A S S W O R D
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Using our password example, we number our password letters in numerical order.

If you need to set parameters, change *beacon text, connect text,* set *DEV*iation meter calibration, or make "**MODE**" changes; connect to the node and type **Sy**sop or **MA**nager. You should receive 5 numbers. These numbers correspond to a sequence of letters or characters that are used in your password.

The following is an example of the reply from the node after I connect to the node and send the word **SY**sop or **MA**nager to the node. The node responds with:

7 8 15 1 2

Comparing the numbers received to the letter above that number in my password string, I respond to the five numbers with:

APDTH <Enter>

Notice there are no spaces when I send the corresponding five characters to the node. There will not be a reply from the node. You may also enter letters or numbers before or after the five letters of the password, as long as you make sure the five characters are in the order called for by the numbering sequence of the password. In addition, they must be all together, there are no spaces, and they must be in the correct case (CAPS, etc.) as that of the password programmed into the node.

Another example of my response could be:

V**APDTH**ERE <Enter>

To determine if you have entered the correct sequence of let-

ters or numbers, use the "P," or parameter, command to make a test of the password entry. Send a P, then wait for the 26 parameters to be sent to you from the node as shown in the following example:

SEDAN:K4ABT-7} **50** 108 192 255 4 2 1500 20 100 2 2 100 3 3 600 300 180 2 2 8 50 18000 0 0 2 1

If the first number is 50, try sending another number to the node, as in this example:

P 66 <Enter>

If your password entry was correct, the node will allow you to make a change in the first number of the parameter list, and you should see the following appear on your screen:

SEDAN:K4ABT-7} **66** 108 192 255 4 2 1500 20 100 2 2 100 3 3 600 300 180 2 2 8 50 18000 0 0 2 1

Notice that the first number changed from **50** to **66**. Be sure to return parameter number one back to its original value by sending the P and the original number—e.g. P 50 <Enter>.

A note of interest: If at any time you make a mistake when setting BBS, CText, BText, INFO, or other text entries, use the asterisk (*) to erase or delete the text and re-enter it. As an example, you send:

CT SEDA**n** node etc.

To clear the CText SEDAn node etc., send the node:

CT *

This will clear the CText entry.

Reset

Oh no! This sysop level command can be used to warm-start the node, or it may be used to cold-start the node and set the node with the original (default) settings.

A "RESET" without any spaces or text following it, only a carriage return, will permit the sysop to reset (warm-start) the node remotely.

To perform a cold-start and replace the node parameters with default (EPROM burned in) settings, the remote sysop must perform a RESET[space]*(asterisk). Simply stated:

RESET *

Another way to perform the reset is to send the node RESET[space]RESET [Enter], simply stated:

RESET RESET<Enter>

Node Photographs

The response to our request for photos of your nodes has been so favorable that I'm going to extend the offer to have your node or packet station photos displayed in this column. Send a sharp, black-and-white or color photo, with a written description, to me at the address shown at the beginning of this column. Then watch for your node as it becomes a "star."

Happy Packeting!

de BucK4ABT @ KQ4OK.VA.USA.NA

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice-Technician Licensing Course—Part VI

This month we will continue on in our amateur radio licensing course, and will cover radio-wave propagation.

Radio-Wave Propagation

Ultraviolet radiation from the Sun is mainly responsible for ionizing (charging) particles in Earth's atmosphere.

• The ionosphere is the area in Earth's outer atmosphere where enough ions and free electrons exist to assist the propagation of radio waves.

• The ionized layers that form above Earth are called ionosphere layers.

• Daily ionization is maximum at midday, causing the LUF (Lowest Usable Frequency), MUF (Maximum Usable Frequency), and FOT (Frequency of Optimum Transmission) to have maximum ionization at midday. This condition is heightened during peaks of the sunspot cycles.

• Daily ionization is minimum shortly before dawn, since it decreases during the night.

The length of a sunspot cycle is about 11 years.

• The present cycle should bottom out during 1995.

• The next cycle should peak about the year 2000.

• More sunspots result in more ionization.

• During periods of maximum sunspot activity the higher frequency bands (10 and 15 meters) provide optimum long-range (DX) communication opportunities.

• During periods of minimum sunspot activity the FOT drops into the lower frequency bands (40 and 80 meters), providing improved DX opportunities on those bands.

Since ionization is primarily due to ultraviolet radiation from the Sun, the designations of the ionosphere layers are easily remembered as F, E, and D, since energy is fed from the Sun to Earth.

The **D-layer** is about 45 to 55 miles above Earth. Essentially, it absorbs 80 and 40 meter signals during the daytime, making it almost impossible to work long-distance (DX) contacts on these bands during daylight hours. The D-layer is the ionosphere layer that is closest to the Earth's surface. It is the least useful long-distance communications layer. Minimum D-layer losses occur just before dawn. Good DX antennas transmit and receive signals at a low angle; the radiation and reception associated with such antennas suffer more loss because they pass through more of the D-layer.

45527 Third Street East, Lancaster, CA 93535-1802

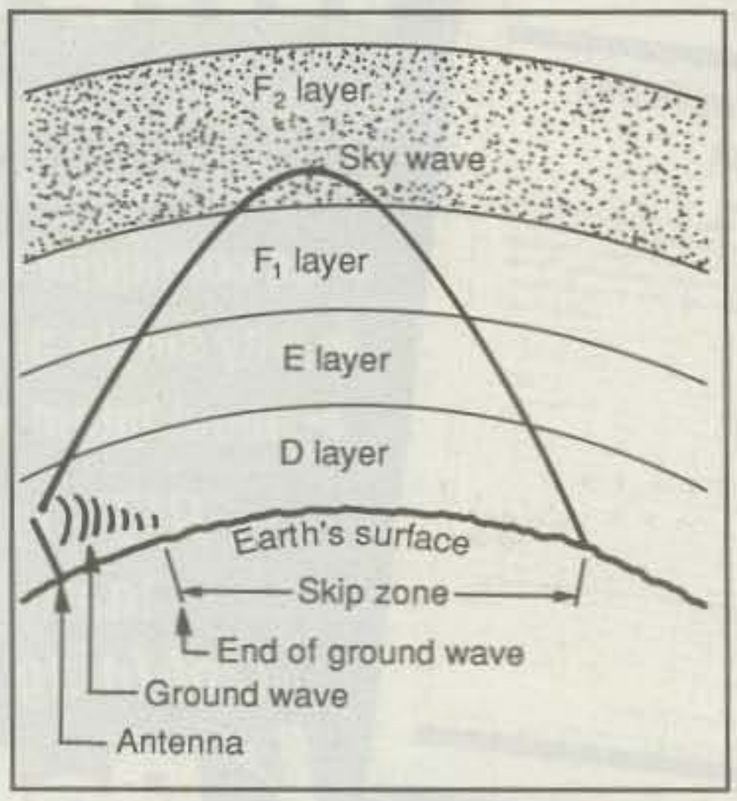

Fig. 1– Sky-wave propagation.

Absorption (heating) loss in the D-layer is maximum at midday for all frequencies.

The **E-layer** is about 65 to 75 miles above Earth. It is the lowest altitude ionosphere layer that is useful for DX communications. Ionized clouds occasionally form in this region. They are called sporadic-E and they can produce unusually good communication opportunities above 21 MHz, and extending up through the VHF and UHF bands. Sporadic-E clouds may drift days or weeks, providing good communication opportunities day and night. Sporadic-E communications are particularly welcome when regular DX operating conditions are poor. Unusually strong 10 meter signals from stations about 500 miles distant may indicate good long-range communication opportunities on the 6 and/or 2 meter bands. The E-layer extends 6 meter communication ranges.

The **F1-layer** forms about 90 to 120 miles above Earth. This is a thin layer which is not very useful for DX communications.

The **F2-layer** forms about 200 miles above Earth. This layer is usually 50 to 95 miles thick and is the most useful layer for DX communications. The single-hop distance of a sky wave refracted off this layer is about 2500 miles.

Skywave propagation involves radio waves which refract off ionosphere layers and return to Earth at distant points. Such signals can then reflect off Earth's surface and subsequently be refracted back to Earth off an ionosphere layer.

• A single-hop sky wave leaves an antenna, and it travels up to an ionosphere layer which refracts (bends) it back to Earth at a distant point.

• A multi-hop sky wave is initially a single-hop signal. However, it again travels up to an ionosphere layer which refracts it back to Earth at a more distant point. These hops can occur several times. Multi-hop DX contacts are common.

As evening approaches, the radiation from the Sun strikes Earth's ionosphere layers less directly and ionization levels decrease. When this happens, the **F2-layer** merges down into the **F1-layer** and the resultant combination F-layer then merges down into the E-layer. The resultant E-layer, F1-layer, and F2-layer combination then merges down into the D-layer. The D-layer loses its ionization charge throughout the night. In the morning, sunlight increases D-layer ionization, and the upper ionosphere layers break away and move up to their normal daytime altitudes.

The lowest usable frequency (LUF) is the lowest frequency that can be used to communicate between two specific spots on Earth.

The maximum usable frequency (MUF) is the highest frequency that can be used to communicate between two specific points on Earth. It is also called the critical frequency, since frequencies above the MUF pass through our ionosphere layers and travel out into space.

The frequency of optimum transmission (FOT) is the best frequency to use to communicate between two specific points on Earth.

The maximum usable frequency (MUF) is the highest frequency that can be used to communicate between two specific points on Earth. It is also called the critical frequency, since frequencies above the MUF pass through our ionosphere layers and travel out into space.

The frequency of optimum transmission (FOT) is the best frequency to use to communicate between two specific points on Earth.

The LUF, MUF, and FOT are ionized by ultraviolet energy from the Sun. More sunspots result in increased ionization.

Groundwave communications involve two (or more) stations working each other using radio waves which travel along

(over) the Earth's surface between the antennas. Ground wave exists on all bands. Groundwave propagation can be used to communicate between two nearby stations which are separated by a hill.

The skip zone is the area between where the groundwave fades out and where the first hop of the sky wave returns to Earth.

Backscatter communication can be used to work stations in a skip zone.

• Received signals are weak and distorted.

• Backscatter communication is undependable.

Sky-wave communication ranges are much greater than groundwave communication ranges.

Line-of-sight propagation involves radio signals which travel in a straight line between the transmit and receive antennas.

• Most VHF and UHF communication is via this direct propagation method.

• Most VHF and UHF signals are not subject to sky-wave propagation.

VHF and UHF signals can be reflected off buildings and other metallic obstructions.

Ionospheric ducting occurs in the troposphere, which is close to Earth. This propagation method is called *tropospheric ducting.*

• The troposphere is the atmosphere area that immediately surrounds Earth; it is our weather-active blanket.

• Tropospheric ducting occurs when a temperature inversion creates a sandwich effect wherein a warm (thinner) air mass is located between a pair of cold (thicker) air masses. Radio signals bounce along this sandwich corridor, eventually returning to Earth through a break in the lower cold layer, providing long-distance VHF (2 meter) communications.

• A stable high-pressure system may cause a tropospheric ducting condition to develop.

• VHF communication ranges can extend several hundred miles due to a temperature inversion being present over a large area.

256 DX Group

This group meets on 14,256 kHz starting at 2200 UTC and ending at about 0230 UTC. Everyone who can be heard by the net controller is welcome to participate. If poor propagation conditions make it impossible to work foreign (DX) stations, an informal gathering is conducted on the net frequency.

This group publishes "The 256 Bulletin," which is issued six times per year. The subscription rate for Americans is $12 per year, and subscriptions should be mailed to Zareh Amadouny, VE2DWH, 18 Nisko, D.D.O. Quebec Province, Canada H9G-2R5. Any money that remains after all bulletin expenses have been paid

Thirteen-year-old Micah Greenbaum, N1QMM of Duxbury, Massachusetts is shown here flanked by (left to right) Fred Greenbaum, WA2UDV, and Don Greenbaum, WB2DND. When Micah initially started operating on the 15 meter code segment as a Technician-Plus amateur, one of his first contacts was with his father, who was operating as A61AD in the United Arab Emirates. Micah has worked 80 countries already. His father (Don) and grandfather (Fred) are very proud of him.

is spent supporting amateur radio activities such as donating equipment and QSL cards to DX stations. A sample bulletin may be obtained by sending one dollar (or two (IRCs) to VE2DWH.

Communication Subject Postage Stamps

If you are interested in collecting postage stamps related to communication subjects, one good source of this information is Phila QSL Infos, APP 16, 30 Avenue Chautemps, F-45200 Montargis, France. The yearly overseas subscription rate of their 16-page monthly newsletter is 120 French Francs. Major banks can provide current money exchange rates.

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

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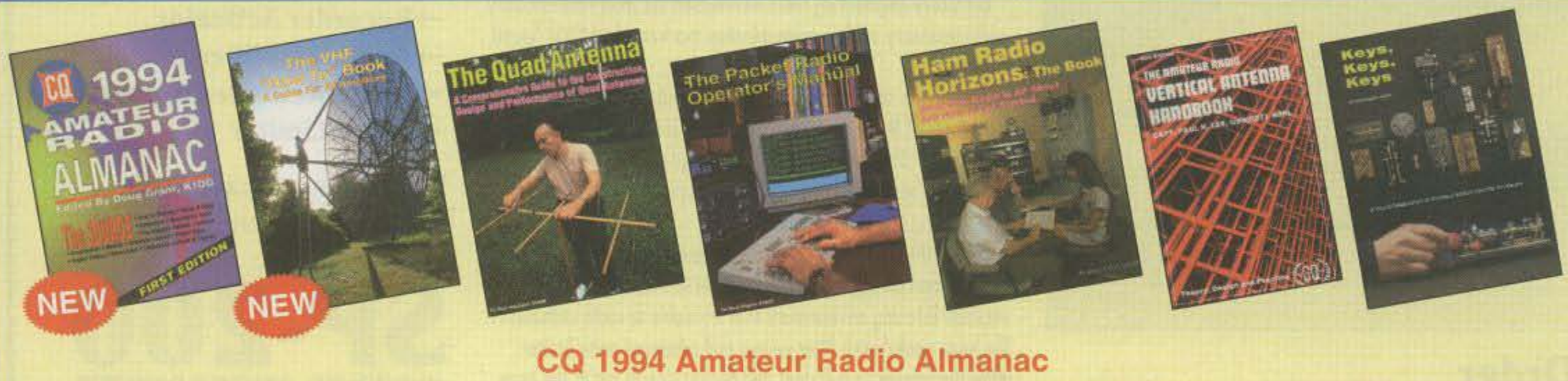

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CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

The Fine Art of Soldering

There is nothing more mundane to the experienced workshop devotee than soldering parts into a PC board or joining two pieces of wire. Conversely, the relative newcomer to the electronics construction pastime is frequently unable to produce a proper solder joint, or is likely to ruin a circuit board quickly through a lack of understanding about how much heat to use and which type of soldering iron is best suited for the task. This month we will examine some basic soldering techniques that should provide secure electrical joints without harming the components that are soldered into the circuit.

Choice of Irons

You should never send a boy to do a man's job, or vice-versa. All too often we see experimenters trying to use a 25 or 40 watt pencil type of soldering iron to solder a large metal area on a chassis, or when attaching connectors to RG-8 coaxial cable. The result is generally a lumpy, grayish, and granular solder joint that cannot be relied upon, especially when the joint is stressed. This is what is called a **cold solder joint**. The iron must have a suitable wattage rating to ensure that the parts to be joined with solder reach a temperature which allows the free flow of the solder. The larger the metal surface, the greater the heat needed, and the longer it takes to produce the required surface temperature.

For heavy work, such as soldering to a metal chassis, I recommend a 100 watt regular soldering iron, or a soldering gun that has a 100 watt and 250 watt switchable option. I have an old American Beauty standard soldering iron with a 500 watt rating. It's surprising how many times that brute comes in handy, such as when it is necessary to solder antenna wires outdoors in the winter months of Michigan. An alternative approach during the cold weather is to use a propane torch. This is tricky, since the flame can quickly melt coax cable or burn the antenna insulators. The miniature pencil-type torches that use butane are more practical for outdoor soldering where AC power is not available. They produce a tiny pointed flame that is easy to control.

P.O. Box 250, Luther, MI 49656

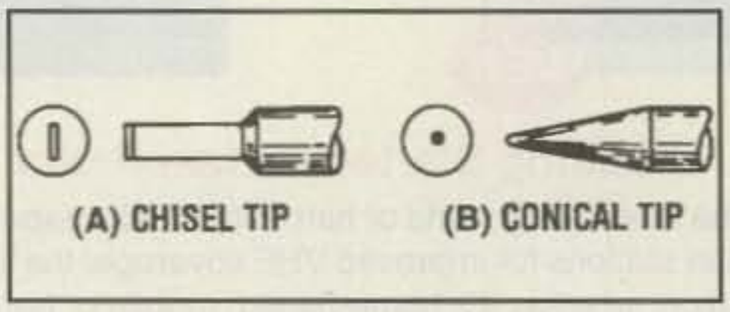

Fig. 1– Copper tips for pencil types of soldering irons. A chisel tip is illustrated at (A) and a pointed conical tip at (B).

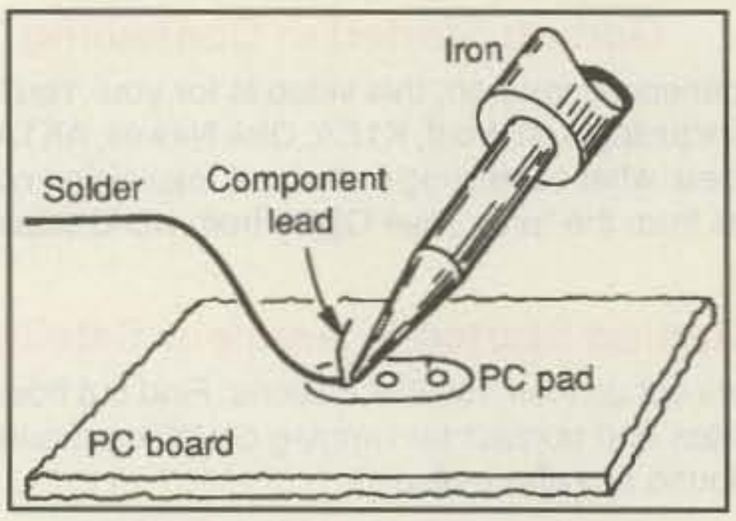

Fig. 2– Proper soldering calls for heating both surfaces before feeding solder to the joint, as shown above.

For light-duty soldering, such as wiring microphone connectors and installing parts on PC boards, I recommend a 25 or 30 watt soldering pencil. I prefer a conical tip that tapers to a point (fig. 1[B]). This small tip area helps prevent unwanted bridging of molten solder onto adjacent PC board traces. Chisel-shaped soldering iron tips are not useful for most fine work. Plated tips last much longer than plain copper tips, and I recommend them even though they cost more than unplated tips.

Which Solder To Use?

Quality solder should always be the order of the day if you want proper results. The ratio of tin to lead is what determines how effective a particular brand of solder will be in practice.

Solder that is 60% tin and 40% lead is recommended for most electronics work.

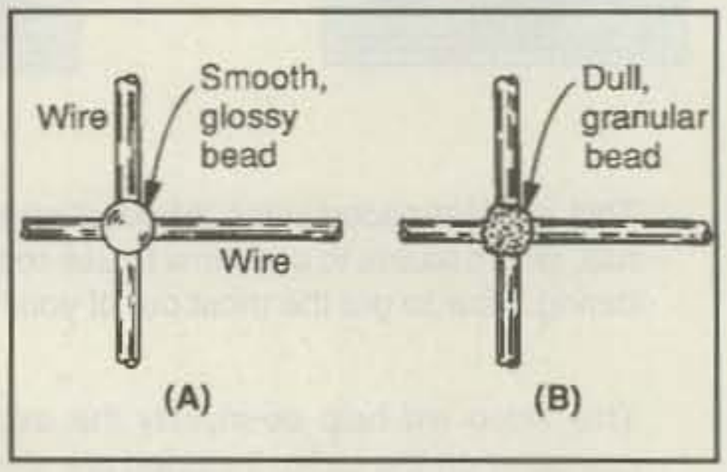

Fig. 3– Proper soldering produces a shiny, smooth bead of solder, as at (A). A cold-solder joint is usually granular, gray, and jagged, as seen at (B).

Kester "44" rosin core solder is pretty much the standard among experimenters in the USA. Ersin multicore solder (made in the UK and sold here) is a top-rated brand also.

The diameter of the solder is an important consideration, too. Fat solder (16 gauge) is best for heavy work on metal chassis and such. For routine PC-board work and other small-parts soldering I suggest 0.020 inch diameter (25 gauge) solder. Beware of cheap solder. It is often hard to melt and will not produce a solder joint with integrity.

Warning: Never use plumber's acid core solder on electronics equipment. It is highly corrosive and can eventually ruin a piece of apparatus. Also, avoid breathing the fumes from solder. The fumes from rosin and lead are potentially harmful, so do your soldering in a well-ventilated area or one that is equipped with an exhaust fan. This applies mostly to long-term soldering and not necessarily to the more casual assembly of equipment associated with experimenter's projects.

Soldering Paste

Although it is seldom necessary to use soldering paste, such as Kester SP44 rosin flux, there are times when paste is essential. It is required when using solder that does not contain rosin, and it is helpful when attempting to solder oxidized surfaces. The solder terminals on some imported jacks, for example, will accept solder more readily if they are first coat-

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ed with paste. This is because some of the metallic plating on foreign-made components seems almost immune to solder, no matter how hot you make the surfaces. It is helpful when working with these stubborn metals to abrade the surface with fine sandpaper before applying the paste. In fact, the paste may not be necessary if you remove the plating material first.

Making A Good Solder Joint

The correct amount of heating of both surfaces when soldering is the key to success. The correct procedure (fig. 2) calls for placing the soldering-iron tip on the two (or more) conductors that will be joined by solder. Hold the tip in place until all surfaces are well heated. Keep the tip of the iron in place and quickly feed the solder to the joint. When sufficient solder has melted over the conductors to provide an acceptable bead, remove the iron and allow the joint to cool. Do not stress the conductors until you are certain the joint has hardened. A quality joint will have a glossy, smooth bead of solder (fig. 3). A cold-solder joint (insufficient heat or rosin) will appear granular and dull gray, as in fig. 3(B).

Excessive heat can ruin capacitors, resistors, and other critical components—especially ICs, diodes, and transistors. Too much heat can permanently change the value of resistors and capacitors. When in doubt, grip the transistor or diode lead, for example, near the device body with long-nose pliers and allow the pliers to act as a heat sink during the soldering period. Sustained contact with a soldering iron can cause the PC board traces to lift 5 from the phenolic or glass-epoxy base material, thereby ruining that part of the PC board. When this happens it becomes necessary to make awkward and sometimes ugly repairs to the board with bus wire jumpers and home made copper-foil pads that you must glue to the PC board with epoxy cement.

Summary

Few builders can become an overnight success when they are armed for the first time with a soldering iron. Good soldering requires intuitive judgment and expe-rience. It is wise to practice soldering on something other than a costly project before you dive headlong into the assembly of that newly purchased kit. Save those high-wattage irons for the jobs that require a lot of heat, and use the low-wattage iron for light-duty and PC-board work.

73, Doug, W1FB

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WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

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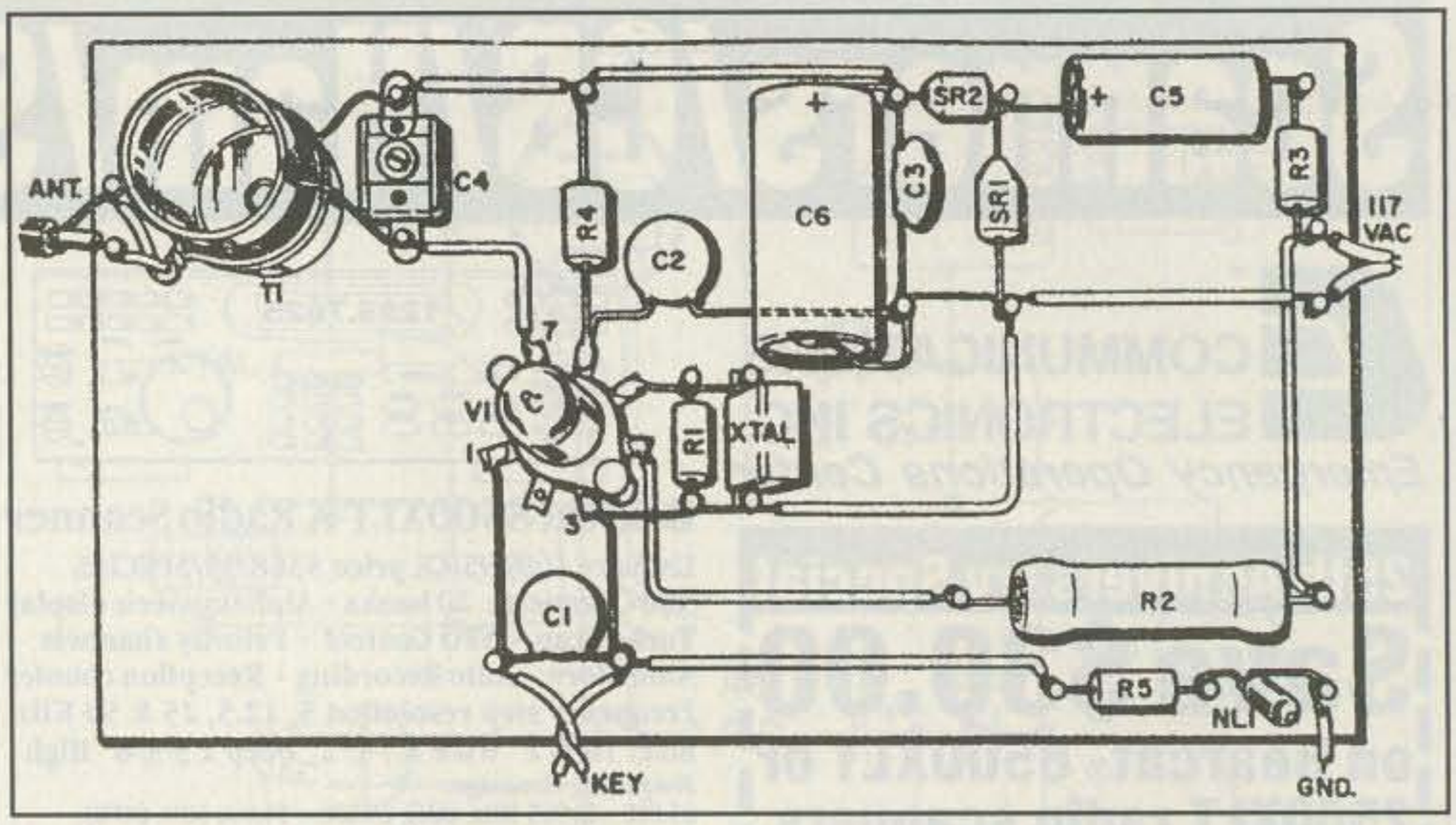

Fig. 4– Pictorial diagram of the "Bare Essentials." This easy-to-duplicate schematic makes home reproduction a cinch.

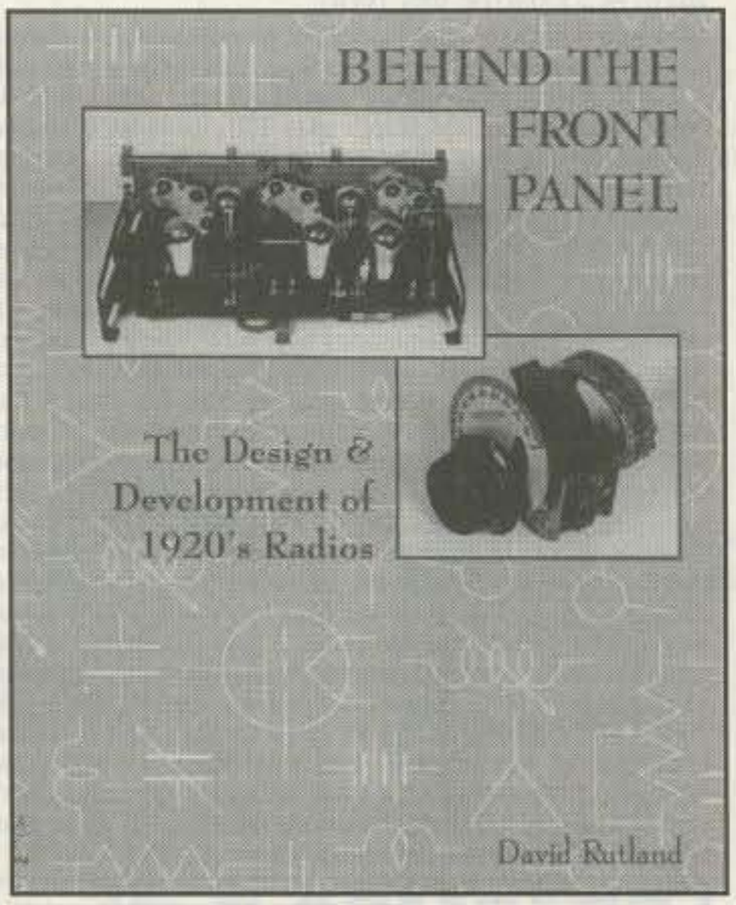

Fig. 5– Wren Publishing's new book Behind The Front Panel *is a fascinating study and photo tour of radios of the 1920s. (Details in text.)*

enameled wire and close-wind 23 turns for 40 meters or 46 turns for 80 meters. Drill two small holes above and below the plate coil so the wire can be threaded through for holding in place. The antenna pickup coils are five turns of No. 20 solid, insulated hookup wire wound directly over the plate coil and held in place by twisting their ends together (see fig. 4). After assembly and checkout, frequency, key the transmitter, and then quickly tune padder C4 for smooth oscillation and maximum output. If desired, you can then touch a milliamp meter's leads across the key to check power. The input will typically be 50 ma with 300 to 350 volts, or 15 to 17 watts. Now combine your "Bare Essentials" transmitter with a classic Knight, Hallicrafters, or National receiver (Where, oh where have all those neat SW-54s gone? I continue searching in vain!), and you have a true "warm and glowing" ham rig!

Notes on Receivers

Using old-style AC/DC shortwave receivers on today's bands can be a barrel of fun. There is a special glamor to big, full-range dials and moving pointers which show where you have been and where you are going as you tune, and it cannot be equalled by modern digital readouts that only show where you are. Getting those receivers perking after years of neglect, however, calls for some minor "resurrections." Here are some quick tips to help you in that direction.

If the tubes do not light up at turn-on, suspect those with the highest filament voltage first (50L6, 35Z5, etc.). Replacing the AC line cord and volume-control/on-off switch (plus adding a "NL1 and R5" circuit such as that included in the "Bare Essentials") is also a good idea.

After turn-on you may (probably will!) notice a continuous hum that can over-

connected to chassis ground. Replace them one lead at a time with capacitors of equal or greater ratings. I use 100 mFd at 700 VDC capacitors obtained at hamfests for a dollar apiece. They are overkill, but work great (they're good for use in low-power transmitters, too). If you hear lower level hum after clearing up loud hum, proceed to replacing smaller (.01 mFd) bypass capacitors. The nice point here is simple AC/DC receivers have a low number of capacitors and resistors. You can replace all of them in a few hours and at relatively low cost. Complement your work with a spare set of tubes, and you have a fun rig that will capture interest for many years.

Revisiting Radios of the 1920s

If you like studying early-model radios (and who doesn't!), check out David Rutland's new book *Behind The Front Panel* due to be released this month (see fig. 5). The book focuses on developments in radios of the 1920s, and includes introductory and concluding chapters on crystal sets and superhets. Over two dozen makes of early broadcast radios are discussed, and forgotten designs such as the neutrodyne, superdyne, Hazeltine neutralization, regenaformers, and spider web coils are highlighted in both print and diagrams.

Author Rutland does a good job of using basic schematics to explain how old battery-powered sets work and the purpose of various designs. He also discusses the inventors behind the designs to add historical flavor. A large number of super-sharp photos and descriptions of genuine rare radios bearing names such as Freed-Eisemann, Grebe, King, Atwater Kent, Remler, General Radio, National, and Thorola are included in the 186-page book (just viewing the photos is a treat!). *Behind The Front Panel* is not a homebrewer's "build 'em" guide like a radio handbook, but it is fascinating reading and I am sure you will enjoy it. The book is available for $18.95 from Wren Publishers, P.O. Box 1084, Philomath, Oregon 97370 (503-929-4498).

Wrap Up

That winds down the column for this time, gang. I wish you the best of luck in getting those old-time rigs going again in high style. In fact, I continue operating 30 meters week nights to see who is first, second, etc., to hit the newer bands with an older or unusual rig. I also still have some Wild Woody WARC keys to give to appreciative fans. See you on 30!

Next month I have a very special QRP column lined up featuring a wide variety of topics. Stay tuned!

73, Dave, K4TWJ

CQ World-Wide DX Contest All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World-Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	WB9HAD('87)	27,181	157	23	54
3.5	K1ZM('92)	223,971	742	28	93
7.0	W7XR('92) (Opr. W7WA)	363,900	834	34	116
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('88)	1,270,478	2,298	39	148
28	WØZV('88)	1,145,368	2,158	39	142

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
K1AR (1992) 7,810,446	1.8	24	10	21
	3.5	239	15	73
	7.0	311	26	88
	14.0	969	39	133
	21.0	913	33	125
	28.0	1,292	32	119
	Total	3,748	155	559

QRP

KR2Q('90)	1,246,974	1,069	106	305

Low Power

N8II('92)	1,864,747	1,424	114	365

Assisted

WM5G('92) (Opr. KRØY)	6,631,513	2,800	171	662

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1990) 11,193,606	1.8	32	12	30
	3.5	197	18	76
	7.0	154	26	95
	14.0	1,370	39	167
	21.0	1,167	38	165
	28.0	1,517	37	170
	Total	4,437	170	703

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
N2RM (1992) 19,603,032	1.8	95	14	41
	3.5	485	23	98
	7.0	721	32	128
	14.0	1,654	40	178
	21.0	2,367	40	178
	28.0	1,688	36	170
	Total	7,010	185	793

CW

Single Operator/Single Band

1.8	W1BYH('93)	48,552	279	15	53
3.5	K1ZM('92)	416,160	1,059	30	106
7.0	K1ZM('90)	839,520	1,783	34	125
14	KM1H('93) (Opr. KQ2M)	1,001,035	1,892	39	146
21	W7WA('89)	772,146	1,647	39	119
28	K1ZM('89)	732,564	1,447	37	134

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
N4RJ (Opr. KM9P) (1992) 5,851,152	1.8	34	13	27
	3.5	170	21	65
	7.0	687	34	104
	14.0	696	37	114
	21.0	709	35	107
	28.0	670	32	92
	Total	2,966	172	509

QRP

AA2U('92)	1,188,000	938	118	332

Low Power

N8II('92)	2,008,982	1,419	135	368

Assisted

K3WW('93)	5,056,464	2,499	160	547

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1989) 9,383,459	1.8	36	16	33
	3.5	313	26	75
	7.0	920	35	100
	14.0	1,139	37	128
	21.0	773	39	123
	28.0	920	37	129
	Total	4,101	150	588

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1992) 19,473,615	1.8	106	16	59
	3.5	726	29	107
	7.0	1,862	37	141
	14.0	1,721	39	156
	21.0	1,584	37	154
	28.0	1,128	34	136
	Total	7,127	192	753

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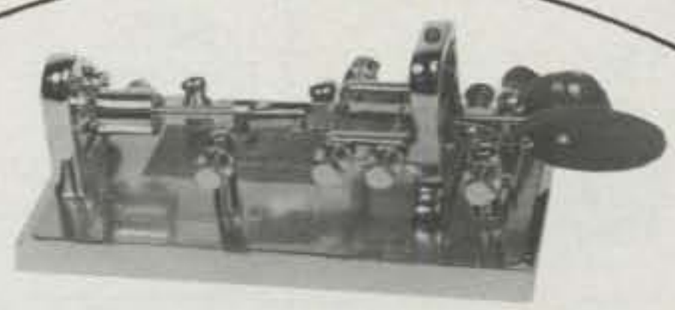

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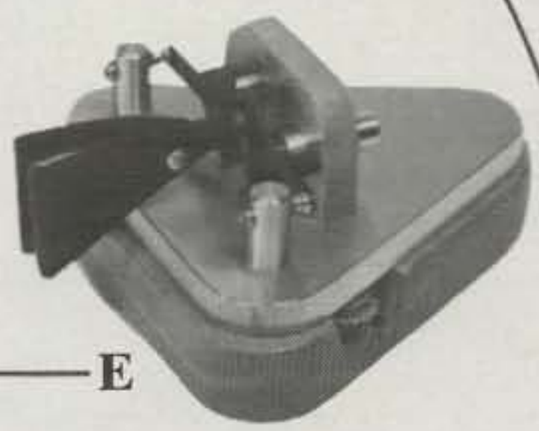

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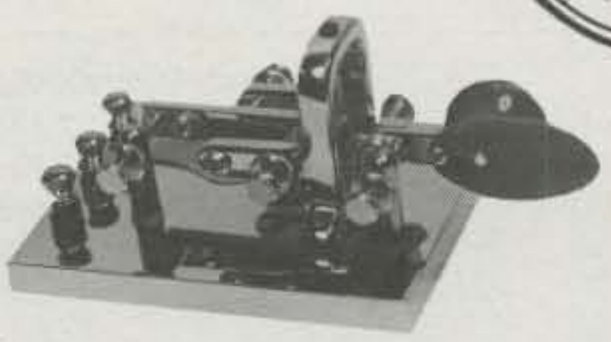

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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

Number groups after calls are: year of operation, total score, contacts, zones and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band
WORLD RECORD HOLDERS

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	P4ØR('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	PJ9U('93) (Opr. OH1VR)	1,199,968	2,637	34	120
14	ZXØF('93) (Opr. PY5EG)	2,111,420	3,699	36	157
21	ZW5B('93) (Opr. N5FA)	2,834,228	4,524	39	173
28	ZV5A('91)	2,984,166	5,154	37	156
	AFRICA				
1.8	IH9/IV3PRK('89)	81,344	447	9	53
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8RCT('87) (Opr. OH2MM)	859,362	1,959	32	115
14	5Z4BI('92)	1,478,932	2,752	39	143
21	EL2CX('89)	2,242,968	4,445	34	135
28	ZD8Z('91) (Opr. N6TJ)	2,341,866	4,521	33	141
	ASIA				
1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	UW9AF('83)	222,192	554	19	53
7.0	H21A('92) (Opr. 4N4OO)	736,422	1,812	32	107
14	RFØFWW('87) (Opr. UF6FFF)	1,447,128	2,894	40	147
21	JAØJHA('92)	1,430,856	2,912	37	130
28	JH1AJT('88)	1,421,070	2,409	38	163
	EUROPE				
1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	HA8IE('90)	361,343	1,455	35	116
7.0	S59UN('92)	875,875	2,419	37	138
14	OH2BH('92) (Opr. OH2IW)	1,870,170	4,008	39	154
21	CQ4A('90) (Opr. CT1BOP)	1,757,780	3,912	38	141
28	YU3ZV('88)	1,541,603	3,219	39	134
	NORTH AMERICA				
1.8	VE3BMV('86)	52,240	662	14	26
3.5	TI1C('92) (Opr. TI2CF)	498,037	1,695	31	108
7.0	TI1C('93)	1,052,057	2,669	34	123
14	VP2KAA('81)	2,011,185	4,186	37	150
21	V26N('93) (Opr. KW8N)	2,159,460	4,623	36	150
28	VP2ET('88) (Opr. K5RX)	2,423,880	5,137	37	143
	OCEANIA				
1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	V7MHZ('92)	680,720	1,759	36	98
14	ZM1BIL('83)	1,334,232	2,635	38	136
21	AHØAB('82) (Opr. JA3DOC)	1,923,840	4,509	36	108
28	KD7P/NH2('88)	2,309,304	4,885	38	123
	SOUTH AMERICA				
1.8	YV2IF('92)	18,700	191	9	25
3.5	P4ØR('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	PJ9U('93) (Opr. OH1VR)	1,199,968	2,637	34	120
14	ZXØF('93) (Opr. PY5EG)	2,111,420	3,699	36	157
21	ZW5B('93) (Opr. N5FA)	2,834,228	4,524	39	173
28	ZV5A('91)	2,984,166	5,154	37	156

Single Operator/All Band

AF	CT3BH('90) (Opr. OH2BH)	14,892,102	7,177	166	531
AS	EX6F('84)	6,362,000	4,648	113	387
EU	S52AA('92)	7,134,192	4,378	151	473
NA	KP2A('93) (Opr. CT1BOH)	13,202,298	8,691	148	506
O	YJ1A('90) (Opr. OH1RY)	9,516,731	6,429	160	381
SA	HC8A('92) (Opr. N6KT)	16,316,568	8,318	160	508
QRP	PJ2FR('87) (Opr. K7SS)	3,171,166	3,212	100	234
Low Pwr.	TJ1GG('92) (Opr. I2VXJ	5,925,760	5,052	96	298
Asst.	CH3EJ('93)	8,167,096	4,472	157	592

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	125	11	25
HC8A	3.5	357	20	51
(Opr. N6KT)	7.0	638	28	74
(1992)	14.0	1,166	34	111
16,316,568	21.0	2,031	36	127
	28.0	4,001	31	120
	Total	8,318	160	508

Multi-Operator/Single Xmtr.

AF	EA8AGD('88)	17,172,672	8,203	157	547
AS	YM5KA('90)	15,056,664	7,609	164	548
EU	IQ4A('90)	17,255,700	7,253	183	717
NA	VP2EC('92)	16,287,152	7,434	183	685
O	KH2S('91)	11,095,392	7,086	145	387
SA	PJ1B('93)	22,596,570	9,386	164	646

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	111	10	24
PJ1B	3.5	937	25	94
(1993)	7.0	1,055	29	114
22,596,570	14.0	2,011	38	147
	21.0	1,829	32	139
	28.0	3,443	30	128
	Total	9,386	164	646

Multi-Operator/Multi-Xmtr.

AF	EA9UK('93)	37,140,597	13,547	179	744
AS	EW6V('82)	18,746,136	10,100	142	544
EU	LX7A('89)	26,578,978	14,947	175	751
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KHØAM('90)	35,730,600	16,309	179	565
SA	PJ1B('90)	57,610,400	19,655	189	803

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	531	19	50
PJ1B	3.5	1,335	24	99
(1990)	7.0	2,104	31	117
57,610,400	14.0	4,860	38	179
	21.0	5,395	38	176
	28.0	5,430	39	182
	Total	19,655	189	803

CQ World-Wide DX Contest All-Time CW Records

BY FREDERICK CAPOSSELA, K6SSS

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	UG6GAW('90)	164,430	851	15	55
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	C41A('93) (Opr. T93A)	1,307,944	2,972	34	133
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93) (Opr. K4UEE)	1,869,978	3,627	35	139
28	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8XS('88) (Opr. OH5XT)	516,390	1,649	24	81
7.0	OH7JT/CT9('88)	904,038	2,195	35	103
14	ED9ED('90)	1,444,436	3,063	37	121
21	CR3W('92) (Opr. DF5UL)	1,652,170	3,092	38	141
28	D68GA('92)	1,281,660	2,622	38	126

ASIA

1.8	UG6GAW('90)	164,430	851	15	55
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	C41A('93) (Opr. T93A)	1,307,944	2,972	34	133
14	7L1GVE('92)	1,181,937	2,255	40	139
21	4Z4T('91) (Opr. 4Z4UT)	939,900	2,240	36	120
28	4Z5DX('90)	826,759	2,003	39	120

EUROPE

1.8	GW3YDX('93)	154,376	1,030	19	73
3.5	ON4UN('93)	630,568	2,119	35	114
7.0	S59UN('92)	971,049	2,484	38	135
14	OH2BH('90) (Opr. OH6UM)	915,136	2,454	36	122
21	OH6MCW('89)	775,620	2,208	37	102
28	9H1EL('92)	794,846	2,249	39	120

NORTH AMERICA

1.8	VO1NA('93)	148,050	661	20	70
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	ZF2TG('92) (Opr. WQ5W)	1,087,862	2,985	31	111
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	V29W('90) (Opr. KD6WW)	1,110,512	2,829	37	115
28	J79DX('89) (Opr. AA5DX)	859,360	2,661	33	98

OCEANIA

1.8	KH6CC('93)	68,250	547	18	24
3.5	VR3AH('76)	178,560	956	24	40
7.0	VK6LW('92)	533,696	1,453	31	93
14	ZL3GQ('91)	1,148,418	2,396	36	126
21	N7DF/NH2('89)	1,205,776	2,977	37	99
28	KD7P/NH2('88)	1,037,608	2,456	38	105

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P4ØR('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	PJ9U('92)	1,171,864	2,655	30	118
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93)	1,869,978	3,627	35	139
28	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

Single Operator/All Band

AF	EA8EA('91) (Opr. OH2MM)	13,225,295	6,490	171	514
AS	JY8VJ('92) (Opr. DL1VJ)	8,031,168	4,900	141	432
EU	ZB2X('93) (Opr. OH2KI)	6,129,904	4,606	147	491
NA	TI1C('93) (Opr. N6TR)	9,123,817	6,335	159	448
O	AH3C('90)	6,798,363	4,539	172	335
SA	P4ØW('93) (Opr. W2GD)	11,139,048	5,883	161	478
QRP	HI8A('91) (Opr. JA5DQH)	3,316,768	3,320	117	325
Low Pwr.	7Q7XX('92) (Opr. JH1ORL)	3,257,128	2,798	112	280
Asst.	K3WW('93)	5,056,464	2,499	160	547

WORLD RECORD

Station	Band	QSOs	Zones	Countries
EA8EA (1991) 13,225,295	1.8	254	14	57
	3.5	567	21	64
	7.0	1,114	30	90
	14.0	1,405	37	108
	21.0	1,374	36	100
	28.0	1,776	33	95
	Total	6,490	171	514

Multi-Operator/Single Xmtr.

AF	EA9EA('91)	13,096,080	5,854	170	582
AS	TA5KA('90)	13,915,044	7,201	175	527
EU	LZ9A('89)	9,962,386	5,342	200	626
NA	J6DX('93)	11,691,029	7,180	159	532
O	KH2S('92)	7,249,952	4,306	169	399
SA	4M5I('93)	11,222,746	6,051	147	475

WORLD RECORD

Station	Band	QSOs	Zones	Countries
TA5KA (1990) 13,915,044	1.8	181	10	49
	3.5	962	23	69
	7.0	2,037	31	84
	14.0	1,231	38	96
	21.0	1,518	36	112
	28.0	1,272	37	112
	Total	7,201	175	527

Multi-Operator/Multi-Xmtr.

AF	CN5N('90)	33,659,256	14,179	178	644
AS	VS6WO('92)	17,799,960	9,841	190	570
EU	LX7A('89)	20,497,632	12,735	189	705
NA	KP2A('88)	32,325,150	15,198	191	631
O	KHØAM('92)	23,951,385	11,253	190	527
SA	PJ1B('88)	38,415,760	14,921	194	672

WORLD RECORD

Station	Band	QSOs	Zones	Countries
PJ1B (1988) 38,415,760	1.8	717	17	65
	3.5	1,447	24	83
	7.0	3,119	37	133
	14.0	3,791	40	140
	21.0	2,997	39	134
	28.0	2,850	37	117
	Total	14,921	194	672

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

The Future of Amateur and Commercial Radiotelegraphy

Simply stated, the days of manual radiotelegraphy as a radio operator licensing requirement are numbered. It will disappear from the commercial sector within five years. Can amateur radio then be far behind?

The London-based International Maritime Organization was formed in 1959. One of its goals is to enhance safety of large ships at sea through improved radiocommunication technology. IMO membership consists of representatives from the various countries that control nearly all the world's ocean-going vessels.

The 1960 and 1974 SOLAS (Safety of Life at Sea) Conventions prescribed that all passenger and cargo ships of more than 1600 gross tonnage be equipped with radiotelegraph equipment and qualified operators.

In 1972 the IMO began a study of satellite communications. It resulted in 1979 with the formation of the International Maritime Satellite (INMARSAT) organization, which is also based in London. Shipping companies now had a way of international communications through four geostationary satellites. Except for the extreme north and south polar regions, together they cover nearly all of the earth's surface. Besides automatic distress alerting and the transmission of maritime safety information, INMARSAT provides high-quality voice, telex, data, and fax communications to and from suitably equipped vessels.

The 1979 SAR Convention (International Convention on Maritime Search and Rescue) invited the IMO to develop a global maritime distress and safety system (GMDSS) including high-tech telecommunications.

Working with other worldwide organizations, IMO developed and tested the various GMDSS equipment and procedures. The ITU (International Telecommunication Union, a worldwide United Nations organization) established the regulatory framework by which GMDSS could be implemented. The 1983, 1987, and 1992 World Administrative Radio Conferences approved amendments to the ITU Radio Regulations providing frequencies, operating procedures, and radio personnel for the GMDSS.

On November 9, 1988 at the conclusion of a two week London conference, the IMO notified the world that GMDSS had been given the go-ahead by world shipping leaders. It would eventually spell the end of Morse code at sea. A statement issued afterward called the decision "... one of the biggest advances in maritime communications since the introduction of radio."

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)

Old Maritime Communications

Up until the adoption of GMDSS, maritime communications for large ocean-going vessels required that a radio operator keep watch on international distress frequencies. Ships had to carry radio equipment capable of transmitting over minimum specified distances. Any vessel receiving a distress signal would proceed as quickly as possible to assist the vessel in trouble. This distress communications plan was intended primarily for ship-to-ship rather than ship-to-shore operation.

The old system also required all passenger ships and large cargo ships to be able to monitor Morse telegraphy on 500 kHz. That meant a Morse qualified radio officer was required to be on board. In addition, a radiotelephone system on 2182 kHz and 156.8 MHz provided for common distress communications. The ITU regulations also required all radio amateurs to be Morse code proficient, since it was believed that HF radiotelegraphy was very beneficial in emergency situations.

New Maritime Communications

Comparing GMDSS maritime communications to manual Morse telegraphy is like comparing a space ship to a bicycle. There simply is no comparison.

GMDSS radio equipment is considered in terms of communications range, or "sea areas," as it is called. There are four different GMDSS radio equipment carriage requirements for ships at sea. Basically, these are (1) direct VHF, (2) direct MF, (3) satellite, and (4) equipment for areas that cannot be covered by the first three modes.

Sea Area A1—is within the VHF radiotelephone coverage of a coast station which has continuous DSC (digital selective calling) alerting available.

Sea Area A2—is within the communications coverage area of a shore-based MF (medium frequency) coast station operating in the 2–3 MHz band which has continuous DSC alerting available. Excludes sea area A1.

Sea Area A3—is within the coverage of a INMARSAT geostationary satellite in which continuous alerting is available. Excludes sea areas A1 and A2. The INMARSAT satellite system covers nearly the entire earth's surface.

Sea Area A4—is the remaining sea areas excluding A1, A2, and A3. These areas are in the extreme Arctic and Antarctic.

A timetable was established by the IMO for phasing in GMDSS and phasing out manual telegraphy. The GMDSS regulations apply to all ships over 300 gross tons and all passenger ships. Last year all large vessels were required to carry automatic radio beacons that can be received by satellite and a NAVTEX receiver.

After 70 years of continuous monitoring, the U.S. Coast Guard has now discontinued watch on 500 kHz, long considered the primary frequency for distress alerting! They transmitted their last message on July 31, 1993. The advent of satellite and digital technologies has now made Morse code obsolete on the high seas.

All new ships constructed after February 1, 1995 must comply with all the GMDSS requirements. Older vessels have until February 1, 1999 to comply.

Automatic Distress Alerting

On August 1, 1993 the carriage of float-free or portable satellite beacons operating on 406 MHz (and to a lesser extent on 121.5 MHz) became mandatory for all ships of 300 tons and over. These automatic shipboard beacons (EPIRBs, an acronym for emergency position-indicating radio beacons) are monitored by low-altitude (600 miles up) satellites. The airborne versions of this device are called ELTs (emergency locator transmitters). The land versions are called PLBs (personal locator beacons).

EPIRBs send a 5 watt burst of RF ener-

gy for one-half second every 50 seconds to one of the orbiting COSPAS-SARSAT satellites, an international space system for search of distress transmissions. An on-board satellite repeater downlinks the data on 1544.5 MHz in real time. The information is also simultaneously stored for later retransmission.

This digitally-coded information, which is received by a network of ground stations, includes the identity of the ship (or aircraft), the country of origin, time of position, and the nature of the distress. An option allows the ship's position to also be automatically up-loaded from on-board navigational equipment. The low satellite altitude and (VHF/UHF) frequencies were selected to provide the optimum (Doppler shift) location information, up-link power requirement, and shortest interval between passes.

The COSPAS-SARSAT network—originally developed by Canada, France, Russia, and the United States—has now been joined by many nations. There are two (Russian) COSPAS and two (United States) SARSAT satellites currently in orbit. SARSAT stands for search-and-rescue satellite-aided tracking.

Digital Selective Calling

DSC, automatic digital selective calling, is an important part of the GMDSS. Frequency shift keying employing a ten-bit error-correcting code is used to directly transmit distress and other information back and forth between ships and coast stations.

The emission may be FM, phase modulated, or audio modulated SSB. All ships within receiving range of a coast station's transmission can receive the transmission, but only the specified ship can respond.

The data is transmitted on special MF, HF, and VHF frequencies designated for DSC channels. Ship and coast stations maintain watch on DSC frequencies in much the same fashion as was previously performed by radiotelephone and radiotelegraph operators.

Search and Rescue Radar Transponders

SARTs (search and rescue transponders) are the primary GMDSS means for locating ships in distress or their survival craft. The portable or float-free SART operates in the 9 GHz band and responds to ordinary 9 GHz ship or airborne radar. They can be activated manually or automatically when placed in water. When switched on, a SART will only transmit signals when interrogated by an external marine or aircraft radar.

By an audible tone or small light, the SART also notifies persons in distress that a rescue ship or aircraft is nearby—with-

in 5 miles. A battery provides about 96 hours of SART stand-by service.

SARTs show up as a distinctive line of blips on a radar screen of a rescue vessel or aircraft. The dotted lines change to a concentric circle when the rescue craft approaches within 1 mile.

Maritime Safety Information System

MSI (maritime safety information) is transmitted to ships at sea over the NAVTEX system and the INMARSAT SafetyNET. NAVTEX is an international English-language direct-printing telex service used to distribute navigational and weather warnings. A single frequency (518 kHz) is used worldwide. Its range is about 400 miles offshore.

Radio Operator Requirements

Morse code will continue to be required on older ships constructed prior to February 1, 1995. Four years later, however, even these ships must carry full GMDSS equipment. At that point the 100 year reign of Morse code as the foundation of ship's distress and safety messages goes the way of the horse and buggy.

All GMDSS equipped ships must carry at least two FCC-licensed GMDSS Radio Operators. This license allows routine dial twisting, including some basic adjustments. One of the operators is designated as having primary responsibility during distress incidents. To qualify as a GMDSS Radio Operator, you must pass Commercial Radio Examination Element 1 (Marine radio law) and Element 7 (GMDSS radio operation.) Both are multiple-choice written examinations.

Ships may elect to conduct equipment maintenance at sea, in which case an FCC-licensed GMDSS Radio Maintainer must be on board. On-board licensed technicians are not required, however, if the ship has shore-based maintenance and/or replacement equipment available that can be installed at sea.

The examination requirements for the GMDSS Radio Maintainer license are passing Element 1 (radio law), Element 3 (electronics), and Element 9 (GMDSS maintenance.) There are 24 multiple-choice questions in Element 1 and 9; 76 in Element 3 and 7. Passing mark is 75% answered correctly.

Examinations for commercial radio operator licenses—including GMDSS—are now administered by private organizations. Call 1-800-669-9594 for the test site nearest you or to obtain the needed study material. All question pools, including the word-for-word multiple choices and answers, are available and widely published. About 20% of the questions contained in a pool are actually asked in an examination.

What About The Commercial Radiotelegraph Licenses?

They will still be available, and needed, for at least another four years. The FCC field offices no longer administer any amateur or commercial radio operator examinations. Amateur exams are handled by VECs (volunteer examiner coordinators); commercial exams are handled by COLEMs (commercial operator license examination managers). Our organization, The W5YI Group, Inc., is the only one that administers both the amateur and commercial radio operator examinations.

The FCC recently (in July) released the final two commercial radio operator question pools to the public. These are written Element 5 (Maritime radiotelegraph procedures) and Element 6 (Advanced radiotelegraph). These questions, multiple choices, and answers have been incorporated into a single booklet which is now available from the W5YI Group at 1-800-669-9594. There are 284 possible questions in Element 5 and 609 in Element 6.

To become a Third Class Radiotelegraph Operator you need to pass written Elements 1 and 5 plus telegraphy Elements 1 (16 words-per-minute "CG"—code groups) and telegraphy Element 2 (20 wpm "PL"—plain language).

To obtain the Second Class Radiotelegraph Operator ticket you must additionally take written Element 6. You need to be able to transcribe Morse code groups at 20 wpm and text at 25 wpm to qualify for the First Class Radiotelegraph Operator certificate.

Unlike amateur radio Morse code testing, there is only one way to pass a commercial radiotelegraph examination. Examinees are required to receive the transmitted test message correctly by ear for a period of one minute without error.

The good news for Amateur Extra Class operators is that they obtain credit for commercial telegraphy examination Elements 1 (16 wpm CG) and 2 (20 wpm PL) without examination. Applicants for the Second or Third Class Radiotelegraph Operator certificate need only attach a photocopy of their Amateur Extra Class amatteuur ticket to obtain credit for these elements. Applicants for commercial radiotelegraph licenses may not, however, just pass the 20 words-per-minute amateur examination Element 1(C). You must hold an Extra Class amateur ticket to get the examination credit for commercial telegraph Element 1 and 2.

GMDSS Effect on Amateur Radio

The international radio rules still require amateur radio operators to be knowl-

edgeable in Morse code when their operation takes place in the medium- and high-frequency bands. It used to be that amateur radio operators had to be Morse proficient when they operated on frequencies below 1000 MHz (1 GHz). At WARC-59, the 1959 World Administrative Radio Conference, the level was dropped to 144 MHz. A further reduction was made at WARC-79 to its present 30 MHz. World Administrative Radio Conferences are where the various ITU nations meet to agree on use of the radio spectrum. Once ratified, their agreements have the force of treaty law.

Now that manual telegraphy is being phased out in the commercial radio sector, the question is should Morse code knowledge remain a requirement for amateur radio. Many amateurs (and professionals) do not think so. The computer and satellite have revolutionized communications, especially during the last decade or two. There are simply more reliable, accurate, and efficient wireless communications modes today.

An organized amateur group out of New Zealand is already spearheading an effort to amend the International Radio Regulations. They are proposing to modify RR2735, a part of Article 32, which regulates the Amateur and Amateur-Satellite Service. Rather than work with national amateur radio societies, however, they are going directly to the international regulators.

Radio Regulation 2735 currently reads: "Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz."

They want to change the wording to read, "Administrations may take such measures as they judge necessary to verify the proficiency in the use of Morse code of any person wishing to operate the apparatus of an amateur station." The key word is "may" rather than the current "shall."

The group is deadly serious. The Organization Requesting Alternatives By Code-Less Examinations, Inc. (ORACLE is their informal name) has already formed a corporation and has written its constitution. Its sole objective is to lobby nationally and internationally in opposition to Morse code proficiency as a mandatory component in the examination process for amateur radio licenses.

The group is administered by six New Zealand managers who may be reached at ORACLE, Inc., 90 Campbell St., Karon, Wellington, New Zealand, Attn.: Bob Vernall, ZL2CA (Internet address is vernall@corp.telecom.co.nz). They are particularly interested in reaching amateurs in various countries who also feel the amateur service telegraphy requirement is outdated.

ORACLE believes that amateur radio uses a wide range of communications modes and it is illogical to focus on just one of them. Here are a couple of paragraphs from their constitution:

"Choice of mode of transmission in the amateur service is basically interest driven. Individual operators are the deciding parties rather than any regulatory direction. Actual use of Morse code as a percentage of amateur radio contacts is generally decreasing with time, as interests diversify. SSB voice operation, using English language, is now the most common mode for international amateur communication. These factors suggest that there is no need to have mode-specific qualification requirements when so many modes are available.

"It is inconsistent that Morse code is the only single element in the amateur examination syllabus that places a pass/fail outcome on obtaining a license for operation in certain bands. Most of the other radio services have greatly reduced emphasis on Morse code, none being more obvious than in the maritime service with general conversion to GMDSS by 1999."

ORACLE also believes that the main intention today of the telegraphy requirement is to limit access to amateur bands below 30 MHz.

73, Fred, W5YI

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Knights of Malta 1AØKM

During the first week of July one of the strangest (and one of the rarest) amateur radio countries was on the air in a big way. **1AØKM** from the Sovereign Military Order of Malta made more than 19,000 contacts in a one-week, 'round-the-clock operation. This was the longest operation ever from this tiny "country," and it resulted in the most contacts. Many DXers worked 1AØKM for an all-time new country, despite low sunspot numbers and poor summertime band conditions.

While this operation was great news for most DXers, there were a few Italian operators who took a very negative view of it. The 1994 1AØKM operation was organized by a team different from those who had established SMOM as a separate DXCC country and those who had organized every previous 1AØKM operation. This earlier group initially expressed doubts that the 1994 team was properly licensed, or even that they were in SMOM territory. Neither suspicion was founded; the 1994 was indeed in the garden of Villa Malta and had valid operating permission.

This latest operation highlighted one of greatest anomalies in the DXCC program: How can a single building in the middle of Rome count as a separate DXCC country? The story of how SMOM became a new country for DXCC more than ten years ago is a long one, beginning nearly 1000 years ago. . . .

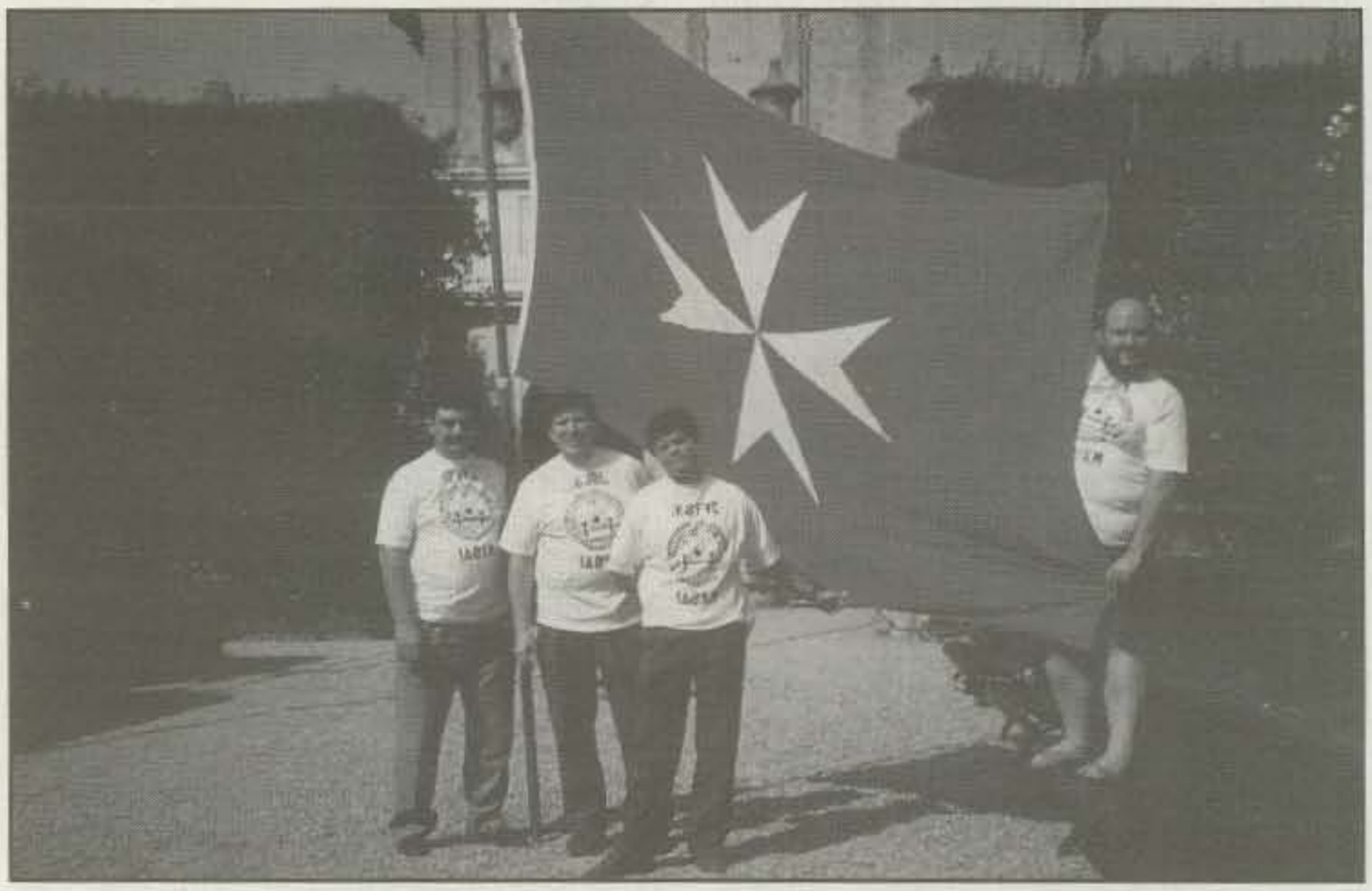
The Sovereign Military and Hospitaler Order of St. John of Jerusalem of Rhodes and Malta (SMOM) traces its history back to the middle of the 11th century. A group of lay Catholics from Amalfi, Italy, near Naples, established a hospital for Crusades pilgrims at Jerusalem. They chose St. John the Baptist as their patron saint (hence the formal name). They declared their independence and adopted their distinctive flag in 1099. The order received formal recognition in 1113 from Pope Paschal II, making it one of the very oldest lay Catholic orders. The fortunes of the Order varied widely over the next 800 years.

The Knights were driven out of Jerusalem in 1187. Another major defeat about 100 years later forced them to withdraw from the Holy Land to Cyprus. In 1310 they conquered the island of Rhodes, and ruled there for more than 200 years. In 1522 the Turks defeated them, forcing another retreat. The Order was homeless until 1530, when Emperor Charles V of Spain granted them the island of Malta. They repelled a Turkish invasion in the year 1565, and proceeded to defend their island and run their hospitals until the late 18th century.

In 1798 Napoleon seized Malta, and the Order fled to Russia, under the protection of Czar Paul I. Upon the Czar's death in 1801, the Order faded away. It was re-established in 1879 by Pope Leo XIII. In the past century the Order has returned to its original role, maintaining the St. John Ambulance Association and other health-related activities, including leper asylums and research.

The current SMOM has about 13,000 members, including some 1500 in the United States. Among the latter are J. Peter Grace of the Grace Company and Report, Alexander Haig, William Simon, and Bowie Kuhn. (A former member was Joseph Kennedy, but none of his sons joined the Order.) The Order has several properties within the city of Rome, including their headquarters on Via Compotti, and the 2.5 acre Villa Malta atop one of Rome's seven hills (Aventine Hill). Of particular importance to amateur radio, "the Order has the status of sovereignty among the world of nations," according to the *National Catholic Reporter*. Indeed, SMOM has diplomatic ties with 49 countries, including the United States and the Vatican.

This sovereignty and diplomatic recognition led a group of Italian DXers to approach SMOM about amateur radio oper-



1AØKM operators Giorgio, I2VXJ; Luciano, IØJBL; Francesco, IKØFVC; and Paolo, I2UIY display the SMOM flag at Villa Malta.

XE1BEF operated as XF4C from Clarion Island in the Revillagigedo group earlier this year.

P.O. Box 50, Fulton, CA 95439

The WPX Program

SSB

2465	EA8BZH	2468	IK4ADE
2466	EA9PB	2469	KD1CJ
2467	EA5GRM		

CW

2824	IK8TPJ	2830	KD1CJ
2828	FB1PFJ	2831	F5TFS
2829	IK4JOK	2832	WZ3Q

MIXED

1667	IK2MMF	1671	GM3EDZ
1668	VE6ACY	1673	JE1IZN
1669	EA5YJ	1674	N7WWQ
1670	KB5OHT		

Mixed: 450 JE1IZN, N7WWQ. 500 JE1IZN, VE6JAV, N7WWQ. 550 W2EZ, VE6JAV. 600 W2EZ, KB8NTY, VE6JAV. 650 W2EZ. 800 IZ-2044. 850 WWØE. 1000 F6CXJ. 1200 WK3Z. 1250 WK3Z. 1350 KC6X. 1400 KC6X. 2150 N4UH. 3350 N9AF. 3400 N4NO, N9AF. 3450 N4NO.

SSB: 350 EA9PB, IK4ADE, IK4SWX, DJ9SZ, KD1CJ. 400 EA9PB, IK4ADE, IK4SWX, DJ9SZ, KD1CJ. 450 EA9PB, IK4ADE, DJ9SZ, KD1CJ. 500 EA9PB, IK4ADE, DJ9SZ, KD1CJ. 550 EA9PB, DJ9SZ, KD1CJ. 600 EA9PB, DJ9SZ. 650 EA9PB. 700 EA9PB. 750 EA9PB. 800 EA9PB. 850 EA9PB. 900 EA9PB. 950 EA9PB. 1000 EA9PB. 1050 EA9PB, KC6X. 1100 KC6X. 1300 SP6FER. 1350 SP6FER. 1400 SP6FER. 1450 KC9DS. 1550 WA6SLO. 1600 WA6SLO. 1650 WA6SLO. 1700 WA6SLO. 2600 N4NO. 2650 N4NO.

CW: 350 IK8TPJ, IK4JOK, WZ3Q. 400 WZ3Q. 450 WZ3Q. 500 WZ3Q. 550 WZ3Q. 600 WZ3Q. 650 WZ3Q. 700 WZ3Q. 750 WZ3Q. 800 WZ3Q. 850 WZ3Q. 900 KC6X. 1150 KA1CLV. 1200 KA1CLV. 2900 N4NO. 2950 N4NO. 3400 N6JV.

10 Meters: KD1CJ, EA3CZM,T3ØJH.
15 Meters: EA3CZM, T3ØJH.
20 Meters: EA3CZM.
40 Meters: EA3CZM.
80 Meters: EA3CZM, T3ØJH.
160 Meters: T3ØJH.

Asia: EA3CZM.
Africa: EA3CZM, K8MDU.
No. Amer: EA3CZM, T3ØJH, KD1CJ.
So. Amer. EA3CZM, W9IAL, KA1CLV.
Europe: IK8TPJ, FB1PFJ, EA3CZM, IK4JOK, F5TFS, KD1CJ.
Oceania: EA3CZM, KA1CLV.

Award of Excellence: none.

Award of Excellence with 160 Meter Bar: none.

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB.

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 88101-9511 USA.

ations. In 1980 a major earthquake in southern Italy provided an excellent opportunity to get their foot in the villa, so to speak. The enterprising amateurs used their successful emergency communications effort to lobby for other amateur radio privileges, such as DXing. From the time of their first contact as 1AØKM (with WA4JDI, on November 29, 1980), the amateurs bet on separate DXCC country status for the Order. It was a difficult project.

Few amateurs (or non-amateurs, for that matter) outside of Italy had ever heard of SMOM. Despite comparisons to Vatican City, long recognized as a DXCC country separate from Italy, SMOM faced considerable doubt and confusion. The Italians persevered with a detailed documentary, legal opinions, examples of treaties, passports, coins, translations from Italian by US consulate staff, and much more.

The Italians worked to answer every concern of the ARRL and the DX Advisory Committee (DXAC) for more than ten months. A scheduled DXAC vote was delayed while yet more documents were provided. Finally, in 1981 the DXAC recommended that SMOM be added to the DXCC countries list.

This turned out to be only one more step toward separate country status. The Awards Committee at ARRL Headquarters wanted still more information. Later that year then-Communications Manager John Lindholm, W1XX, traveled to Rome, meeting with the petitioners and conducting on-the-spot research. John returned to Newington favorably impressed, and

Vlado, Z32KV, operated /ZA from the home of Mike, ZA1MH/K5KWG, in Tirana in May.

CIRCLE 61 ON READER SERVICE CARD

The WAZ Program

Single Band WAZ

20 Meter SSB

952 ..... K5LC

10 Meter CW

145 ..... BV2TA

17 Meter CW

15 ..... ON4ACG

20 Meter CW

447 ..... K5LC

30 Meter CW

7 ..... SM3EVR
8 ..... ON4AGX
9 ..... I4EAT

40 Meter CW

174 ..... BV2TA

ALL CW

56 ..... JK7DHP

All Band WAZ SSB

4191 ..... HB9LCW
4192 ..... EA5GJM
4193 ..... OH9MDV
4194 ..... KB5KKL
4195 ..... IK8IUR
4196 ..... K2AZ
4197 ..... GØHKD

CW/Phone

7480 ..... K4LDR
7481 ..... S57AV
7482 ..... K2AZ

RTTY

91 ..... I2WEG

WNZ

58 10 Meter SSB KB7RDK (25 Zones)
59 10 Meter SSB KA1UXT (25 Zones)

6 All CW WBØYWP (25 Zones)

160 Meters

37 Zone Endorsement OK1DOT

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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

5 Band WAZ

As of June 30, 1994, 393 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

W4YV
K6EID
I2TZK

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
VE7DX, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KM5W, 199 (26)
K1ST, 199 (26)
YZ1MB, 199 (23, 40m)
4X6DK, 199 (4)
I1POR, 199 (1)
ABØP, 199 (23)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
KL7Y, 198 (34, 36)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
EA2KL, 198 (22, 26)
DK2GZ, 198 (1, 24)
UY5XE, 198 (24, 27)

The following have qualified for the basic 5 Band WAZ Award:

OH3TY, 197 Zones
I2YWR, 172 Zones

Endorsements:

W4YV, 200 Zones
KG6VI, 161 Zones
K6EID, 200 Zones
K5PC, 194 Zones
NN7X, 196 Zones
I2TZK, 200 Zones

904 Stations have attained the 150 Zone level as of June 30, 1994.

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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

on September 29, 1981 SMOM was added to the DXCC countries list.

The announcement started a virtual flood of telephone calls and letters from Honor Roll members around the world who had missed the first 1AØKM operation. They hadn't paid attention to this apparent long shot, and wanted to ensure that they didn't miss the next opportunity to work 1AØKM.

Over the next few years the Italian team who obtained the first 1AØKM license operated for brief periods, usually a single weekend each year, making a few thousand contacts each time. This served to keep the country rare, at least outside of Europe. For DXers active in the first few years of SMOM activity, contacts with 1AØKM very not common, but neither were they extraordinarily difficult. *The DX Bulletin*'s Most Wanted Countries survey showed 1AØKM dropping in rank from 20th down to near 50th in the early 1980s.

The trend reversed in the late 1980s. The weekend operations became rarer. SMOM climbed the Most Wanted ranks, with occasional drops following 1AØKM operations. However, the last operation was in 1991, and SMOM had climbed into the Top 20 Most Wanted in the 1993 survey. In fact, 1AØKM was in the Top Ten for West Coast DXers!

The holders of the original 1AØKM license seemed to find this rarity a good idea. (At a presentation in Visalia one of

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 CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4689 F9RM	3115 SM3EVR	2820 IN3ANE	2371 I2MQP	2018 HA5NK	1829 SM6CST	1500 LU8DY	1227 ND3A	1008 CT1EEB
4542 9A2AA	3106 W1BWS	2795 YU7SF	2350 I2EOW	2013 N6JM	1829 W9IL	1478 DK7NP	1219 K9BQL	977 WB2PCF
4210 K2VV	3050 YU1AB	2752 YU7BCD	2323 K9QFR	1985 W8UMR	1818 G4OBK	1471 OE6CLD	1212 HP2CWB	943 VE6BMX
3561 EA2IA	3047 N4MM	2711 HAØDU	2321 K2POF	1985 9A1BHI	1809 NV9S	1376 KC6X	1206 WA3HUP	919 AA7TF
3527 IT9TQH	2973 ZP5JCY	2697 I1POR	2308 HAØIT	1959 WB4RUA	1777 W3KH	1362 I2EAY	1187 I1-50156	889 VE3OMM
3415 K6JG	2989 KA5W	2650 SM7TV	2239 K8LJG	1957 S51NU	1760 IK2ILH	1286 KØIFL	1186 JN3SAC	883 WU1F
3342 N4NO	2958 KØBLT	2618 K9BG	2232 WB2YQH	1949 W6OUL	1719 S58MU	1285 KSØZ	1174 WØIJE	796 OZ-2044
3303 VE3XN	2954 ZP5JCY	2584 N2AC	2216 K5UR	1943 K2OLG	1674 VE9RJ	1280 WK3Z	1167 OZ1ACB	759 JR3TOE
3261 W2FXA	2927 I1EEW	2548 IT9QDS	2213 S53EO	1928 WE2L	1598 CT1YH	1261 W9IAL	1117 NH6T	730 JA4DUD
3259 N6JV	2920 W9DWQ	2418 HAØHW	2139 W4UW	1918 VE3MS	1574 PY2DBU	1251 WØIZV	1093 AB5C	671 WB9IHH
3192 N9AF	2907 WA8YTM	2410 K9AGB	2138 KL7AF	1912 KS4S	1555 WB3DNA	1251 K9XR	1066 EA3CWK	655 W2EZ
3180 K6XP	2833 N4UU	2396 SM6DHU	2103 3A2LF	1867 KBØG	1552 CT1QF	1249 I1ZQD	1057 HB9DDZ	638 KD6CJ
3125 I2PJA	2823 PAØSNG	2392 4N7ZZ	2031 DK5AD	1848 WB2ABD	1516 HA9PP	1248 NE6I	1014 IT9JPK	605 VE6JAV

SSB

4524 F9RM	2591 OZ5EV	2183 WF4V	1819 N4UU	1588 YU7SF	1308 KBØC	1125 WØULU	909 NH6T	741 JR3TOE
3967 IØZV	2582 EA8AKN	2179 LU8ESU	1811 CX6BZ	1588 KAØZFX	1294 W6OUL	1100 HP2CWB	897 AA7TF	738 CT5FSB
3583 K2VV	2575 NJØC	2163 I8KCI	1802 WE2L	1560 LU8DY	1277 HP6AYV	1098 K9BQL	897 KAØIFL	703 JA4DUD
3521 IT9TQH	2572 F2VX	2147 W9DWQ	1802 CT1BY	1533 K8LJG	1272 K3IXD	1089 WB6SRK	878 SV3AQR	699 SM6CST
3448 ZL3NS	2516 I1EEW	2145 YU7BCD	1800 IK8GCS	1428 I6NOA	1272 W5ILR	1086 KC6X	866 EA1AX	674 KE4BM
3441 VE1YX	2504 PAØSNG	2089 I2EOW	1783 SM6DHU	1465 OE6CLD	1262 I3ZSX	1059 G4SDJ	865 T3ØJH	672 IØUVP
3179 F6DZU	2499 KA5W	2070 PY4OY	1773 IN3QCI	1446 K2EEK	1235 OE2EGL	1045 KBØG	845 CT1YH	666 N3DRO
3175 K6JG	2486 I4CSP	2039 CT4UW	1766 IK5ACO	1436 I8LEL	1234 K8MDU	1028 VE3MS	843 WU1F	651 S51NU
3116 I2PJA	2484 I1EEW	1986 CT1AHD	1751 KF7RU	1435 KS4S	1225 G4OBK	1020 EA2IF	822 EA3EQT	650 VE9RJ
2885 ZP5JCY	2397 I5ZJK	1980 EA5AT	1695 K2POF	1408 N2AC	1217 I1-21171	1011 CT1EEB	818 EA8BWW	620 UA1ZO
2848 CT4NH	2284 WA8YTM	1956 W4UW	1673 HAØIT	1388 WN5MBS	1196 IK2AEQ	977 K9XR	806 I6KYL	611 IK4HPU
2726 N4MM	2281 I2MQP	1930 KD9OT	1673 KL7AF	1342 CT1BWW	1176 HA5NK	932 ND3A	796 EA8BGY	601 HB9DDZ
2644 I6ZJC	2207 EA3AQC	1876 4X6DK	1650 WA6SLO	1339 IKØEIM	1161 NG9L	917 NE6I	774 EA1KN	
2631 EA2IA	2193 WA4QMQ	1876 K5UR	1608 N6FX	1327 DK5WQ	1148 F6FNA	915 WT3W	763 EA5DCL	
2601 N4NO	2186 I1POR	1842 EA2AOM						

CW

3640 K2VV	2500 YU7SF	1946 S51NR	1739 K2POF	1596 W9PWM	1422 IK3GER	1223 I2EAY	966 EA2CIN	768 JA3ARM
3520 IT9TQH	2487 N4UU	1887 EA7AZA	1708 SM6CST	1595 VE9RJ	1398 G4OBK	1200 IK2ECP	915 KC6X	749 AA6WJ
3510 WA2HZR	2361 N2AC	1882 KA7T	1703 N6FX	1555 I7PXV	1386 DJ1YH	1186 KA1CLV	898 WØJIE	706 HB9DDZ
3244 N6JV	2343 W9DWQ	1821 G3VQO	1698 G4SSH	1546 W5AWT	1351 VE3MS	1129 K9QFR	860 NE6I	658 HB9CSM
3242 W8RSW	2213 WA8YTM	1803 JA9CWJ	1680 K8LJG	1546 KBØG	1345 G4MVA	1072 JN3SAC	845 4X6DK	637 I2MQP
2998 VE7CNE	2204 KA5W	1803 TI4SU	1678 OZ5UR	1530 ZS6EZ	1338 KS4S	1051 EA6AA	830 PY4WS	622 VE6BMX
2786 N4NO	2202 YU7BCD	1795 S51NU	1653 W1WAI	1497 S58MU	1319 SM5DAC	1007 W9IAL	787 VE3OMM	619 KØIFL
2729 YU7LS	2155 G4UOL	1782 SM6DHU	1652 HA5NK	1454 W6OUL	1284 EA6BD	1006 AC5K	786 K9XR	612 K2LUQ
2629 K6JG	2069 N4MM	1768 K5UR	1650 OK1CZ	1441 VR2UW	1275 ZP5JCY	982 W4UW	775 ND3A	
2606 EA2IA	1963 W8IQ	1756 HAØIT	1650 KL7AF	1438 I1EEW	1263 LU2YA			

the original operators said that they intended to keep SMOM rare to keep it interesting.) Other DXers tried for permission on their own, so that by this summer there were some 50 pending applications. None had the support of a high-ranked member of the Order, however. Without such support the applicants did not have a chance of gaining permission to erect antennas and wires in the Villa Malta, an Italian National Monument visited by hundreds of tourists daily.

Then in stepped Francesco Valsecchi, IKØFVC, only 28 years old. This young DXer was able to engineer an operation that dozens of older, more experienced DXers had been unable to mount: a 1AØKM operation from SMOM. (The 1994 SMOM operators asked for another callsign to indicate that they weren't affiliated with the earlier 1AØKM operations, but this request was denied.)

It took more than a year for Francesco to secure the coveted permission, but he stuck with it and obtained the permit in late May. Further negotiations fixed the dates of the 1994 operation as the first week in July. Mid-summer is hardly a good time to mount a DXpedition to a Top 20 Most Wanted country, but the team of operators was not about to complain; they were happy to get permission at all.

While not having control of the date of the DXpedition was annoying, the Italians faced a far more serious restriction on their operation. The DXpeditioners were asked to install their antennas in such a way as they would not be visible from either the street outside nor from the lavishly landscaped gardens on the villa grounds! "Discreet" antennas do not a major DXpedition make. However, the team managed to overcome even this restriction.

They mounted a small tribander on a pneumatic mast in a 13 foot wide alley between the outer wall of the villa and a thick hedge. The boom of the antenna was only 4 inches less than the width of the alley! To keep the antenna out of sight, they could raise it only a couple of feet above the wall to operate, dropping it back into the alley when not in use. Despite the unfavorable locations, the

Mauro, I1JQJ; Francesco, IKØFVC; and Massimo, I8NHJ, at the operating site of 1AØKM in Villa Malta.

QSL Information

1B/DJ6SI to DJ6SI
1B1AB to GØITX
3B8/F5PXQ to F5KDZ
3D2KR to JH1GZV
3G1X to CE1IDM
3ZØMTP to SP3SLA
4J3M to UD6DJ
4K2BY to DL6ZFG
4K4POL to UAØKCL
4K7FA to OE3SGU
4K8DX to DL7ABL
4K9W to DL6KVA
4M5I to I2CBM
4N7ØDX to YU1DX
4N7DW to YU7BJ
4T6AA to OA4FW
4X1VF to K1FJ
4X5ØR to 4X4BE
5H3JB to NK2T
5NØ/DL9GMM to DL9GMM
5NØMVE to ON7LX
5R8DG to F6FNU
5Z4DU to KG4X
5Z4JD to F6AJA
6W1/F5PHW to F5PHW
7Z1IS to OE6EEG
8P9GU to DL7VOG
9A2PM to KA9WON
9G1MR to IK3HHX
9G1SD to NØNLP
9I2M to DL7VRO
9I2Z to DL7VRO
9K2USA to K8EFS
9K2ZZ to W8CNL
9MØA to JA9AG
9M6LS to N5FTR
9Q5CME to WA1ECA
9X5DX to F2VX
9Y4SF to WA4JTK
9Y4VU to W3EVW
A35MW to VK2BEX
BZ1QL to BY1QH
C21/MI to JR2KDN
CG1B to VE1AL
CP4BT to DL9OT
CQ7CBI to CT1CBI
D3C to F6FNU
D3X to CT1EGH
EA8AFJ to EA8AM
EA9UG to EC9KU
EG7ITU to EA7GFG
EK7DX to DL1VJ
ELØAB to K8JP
EL2LE to K4ZLE
EL2PP to N2CYL
ER5AL to YO4BII
EW1WZ to DL1OY
EXØA to DF8WS
EXØM to DF8WS
EX8DX to F1OJO/F5OJO
EX8MF to UM8MFO
EY8MM to DL8WN
EZ5AA to W5BWA
F5LGF/TT8 to F1LGF/F5LGF
FG5BP to KA3DSW
FK8FU to NA5U
FOØAKI to NX1L
FOØMIZ to JA1HGY
FR5ZU/E to VE2NW
FY5GJ to F2YT
GBØDH to GØLRE
H44/JA1OEM to JA1OEM
H44MS to DL2GAC
HBØ/DA1WA to DJØLC
HG1S to HA1KSA
HG275BCS to HA8PO
HP1XBH to W4YC
HP1XXZ to KD5JZ(94CB)
HR3/KD5M to KD5M
HT1T to SMØKCR
HV4NAC to IKØFVC
IYØORP to IKØUSA
J37ZY to NS8G
J6/AHØG to DK7PE
J8/AHØG to DK7PE
J87BZ to DL7FT
J88AQ to W2MIG
JD1BIE to JA8FCG
JH1ROJ/TG to JH1ROJ
JY3ZH to DJ9ZB
JY8HL to WD4HDL
KØSN/CY9 to KØSN
LX94IPA to LX1NX
N9JCL/CY9 to KØSN
OC4EI to OA4ANR
OM9SNP to OK3LA/OM3LA
OX3GX to WA3KSN
P29DK to N4EOF
P29NB to K3BYV
PA/F5KBF to F5NZO
PJ5/K3UOC to W1AF
PYØFF to W9VA
PYØFM to PY5CC
RU6LC/Ø to UA6LU
S21ZG to W4FRU
S79CK/C to I4LCK
SNØPR to SP6FER
SVØHS to DJ8MT
T32AF to K7EHI
T33CS to G4WFZ
T33KK to SM7PKK
T91ENS to DJØJV
T91ESP to DL3KCI
T93M to DL8OBC
T94ON to DL8OBC
T97M to DL8OBC
T97N to YU4EA
T97T to SM5AQD
T99W to DL1QQ
TG9AJR to WA1ECA
TK/DK7ZB to DK7ZB
TL8GR to F5XX
TL8NG to WA1ECA
TM5FB to F5XL
TM5FFI to F6KDF
TN1AT to F6FNU
TT8PS to F1OIJ/F5OIJ
TU2QW to F6EXQ
TU2XR to KEØLS
TU2ZR to SM3DMP
TU4EI to W3HCW
TU5DX to F6ELE
TZ6FIC to FF6KEQ/F6KEQ
TZ6WO to WB6EQX
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V63YI to JA3IG
VK1YD to K1IYD
VK3FBL/P to HB9AFI
VK4YI to VK4NGH
VK7RX to AB4XM
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VP2MH to KC4DWI
VP2MR to N5DXD
VP2VE to WA2NHA
VP5JM to W3HNK
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VP8PTG to G4RFV
VP9HE to KD8IW
VQ9FM to N4BPO
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VQ9LV to KY3V
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Z31PK to YU5XVD
ZA1AJ to OK2PSZ
ZA1J to I2MQP
ZD8AF to N2AU
ZF1CQ to W8BLA
ZF2SQ to WAØJTB
ZF2WQ to WB6SFA
ZK1NC to VK4CRR
ZK1OFM to W7QMU
ZK1TB to W7TB
ZK1WTU to N7WTU
ZS6MG to YU5FU
ZS9Z to ZS6EZ
ZXØF to PY5EG
ZYØFT to PY5TM
ZYØZFM to SM4NLL
ZZ5LL to PP5LL

operating team made almost 16,000 contacts on the higher bands, including several hundred with DXers on West Coast.

One serious problem was a church to the north of Villa Malta, directly in the path to Japan. With the severe height limitation, the operators were forced to beam directly into a stone wall just a few feet from their antenna. Signals to and from Japan were extremely weak. Europeans enjoyed excellent signals on all bands, and many European DXers were able to work 1AØKM on every available band and mode.

The operators included Francesco, IKØFVC, who is often heard as HV4NAC from Vatican City; Luc, IØJBL, a member of previous 1AØKM operations as well as the IAØPS Antarctica station; Ugo, IØCUT, another previous 1AØKM operator; Meo, IØER; Mauro, I1JQJ; Massimo, I8NHJ, who operated EL2PP in the CQ WW CW Contest last year; Giorgio, I2VXJ, ex-T5GG and TJ1GG; and Paolo, I2UIY, HF Contest manager in Italy. QSL this 1AØKM operation to IKØFVC.

DX News

BVØO will be active from Taiwanese Orchid Island October 8–10. This is a possible New One for Islands On The Air. They will be on or near the IOTA frequencies: 7055, 14260, 21260, and 28460 kHz. QSL to BV8BC, P.O. Box 222, Tai Tung 950, Taiwan ROC.

Eddie DeYoung, VK4EET, will be one of the communications officers for the Australian National Antarctic Research Expedition from Davis Base, beginning in mid-October and going to March 1995. He'll operate as **VI4ANT**, with QSLs via his new home address: 131 Plantain Rd., Shailer Park, Queensland 4128, Australia. Eddie will take an ICOM 751 and Hustler 4BTV vertical, but seeks dona-

tions of an amplifier, beam, and rotator to establish a permanent amateur radio station at Davis. He hopes to be assigned to Macquarie Island in the future.

Ken Holdom, ZL2HU, says he'll be on Pukapuka Island in the North Cooks December 17 to January 28, with exact dates dependent on flight schedules. He'll operate as **ZK1KH** on 3677, 7077, 10137 (SSB!), 14177, 14277, 18137, 21177, 21277, 24937, 28277, 28477, and 28577 kHz, with a Yaesu FT757 feeding two G5RV antennas. QSL direct only, with return postage, to P.O. Box 56099, Tawa, Wellington, New Zealand. He continues to seek donations to help cover the cost of the air freight of the amateur gear. If this operation is successful, he plans a **Kermadec ZL8** operation next year.

The Portuguese Telecom has changed the amateur radio callsign allocations. Regular prefixes remain the same: **CT1** and **CT4** from the mainland; **CU** for the Azores; and **CT3** for Madeira. Special prefixes from the mainland are now limited to **CT2, CT5, CT6, CT7, CT8, CQ1, CQ2, CQ4, CQ5, CQ6, CQ7, CQ8,** and **CS1, CS2, CS4, CS5, CS6, CS7, CS8.** Azores special prefixes are **CU1–9**. Madeira special prefixes are **CT3, CT9, CQ3, CQ9, CS3, CS9,** and **XX** (except XX9). **CR** prefixes are no longer issued to amateurs; instead they are reserved for the National Civil Protection service. Zero (0) prefixes are now reserved for VHF/UHF repeaters and are not available for general use. Single-letter suffix callsigns are reserved for multi-operator contest and DXpedition use. Single-operator special callsigns will retain the regular suffix; thus, CS6EEB is CT1EEB. Foreigners will sign CT1/ home call. There are a few CR- prefix stations currently active: CR5A, CR5EBD, CR6EDX, CR7A, CR8A, and CR8BWW.

The national Radio League of the Republic of Tajikistan (TARL) reports the following prefix structure: **EY4** Gornyl Badakshan (1 amateur) ex-UJ-R; **EY5** Kulab City (Khatlonskaya oblast) (0) ex-UJ-K; **EY6** Kurgan-Tyube City (Khatlonskaya obl.) (2) ex-UJ-X; **EY7** Khujant City (Leninabadskaya oblast) (27) ex-UJ-S; **EY8** Dushanbe City (28) ex-UJ-J; **EY9** Dushanbe City Region (4) ex-UJ-J,X; **EYØ, EY1, EY2, EY3** are reserved by TARL. Club calls have suffixes beginning with Z: **EY–Z**. The TARL QSL bureau is at P.O. Box 303, Glavpochtamt, 734025 Dushanbe, Tajikistan. License classes are Third (50W), Second (100W), First (200W), and Extra (200W; 500W in contests). Extras have 160 meter privileges above 1810 kHz, and 80 meters up to 3800 kHz. TARL president is Masud Tursoon-Zadeh, EY8AA; vice-presidents are Nodir Tursoon-Zadeh, EY8MM, and Alex Rubtsov, EY8CQ.

Popular Mexican amateur Bishop Sam-

uel Ruiz, XE3AXS, has been honored with a nomination to receive the Nobel Peace Prize. Ruiz, age 69, serves as Bishop of San Cristobal (Chiapas). Born in Irapuato, Guanajuato, Ruiz has labored diligently among Mexico's indians of the Chiapas region. The Nobel nomination recognizes Ruiz's peace initiatives and efforts to settle recent disputes between the Chiapas indians and the Mexican government. The final announcement of Nobel recipients is expected to come in early October. Ruiz is well known among American DXers and is highly revered by all of Mexico's amateurs.

The Northern California DX Foundation's Board of Directors re-elected Eric Edberg, W6DU, as president for another full term. All other officers were also re-elected for full terms: Lou Beaudet, K6TMB, Vice-President; John Troster, W6ISQ, Corresponding Secretary; Stanley Kaisel, K6UD, Recording Secretary; and Bruce Butler, W6OSP, Treasurer.

Josephine Clarke, WB6ZUC, and Kip Edwards, W6SZN, retired from the Board after many years of service. Bob Vallio, W6RGG, and Len Giraldi, K6ANP, were elected to fill their positions. Members John Troster, W6ISQ; Rusty Epps, W6OAT; Dave Lesson, W6QHS; Steve Thomas, N6ST; and Howard Brainen, WZ6Z were re-elected for another term.

In special acknowledgement, the Board gratefully thanks and highly commends Josephine Clarke, WB6ZUC, for her dedicated service to NCXDF. For more than ten years she has managed, organized, and overseen the Foundation's film library, one of the Foundation's most interesting activities. Under her aegis, the collections expanded from two slide shows to 128 different slide shows and video tapes with 450 copies for distribution to requesting organizations. In 1993 Jo shipped 364 shows to radio clubs all over the world.

Clubs interested in presenting a slide or video program from NCDXF may send an SASE to the NCDXF, P.O. Box 2368, Stanford, CA 94305, and request a listing of programs now available. These presentations are lent free of charge, but clubs are asked to pay postage.

Bill Kennemer, K5FUV, of the DXCC desk reports that the following operations have been accredited for DXCC (effective dates are day/month/year): **5B4/DL8KWS** (29/9/93); **5NØ/DL9GMM** (1/2/94); **5R8DY** (9/11/93); **5X1XT** (1/1/94); **6Y5/DL2OBO** (1/4/93); **V5SI** (1/3/94); **V59PI** (1/3/94); **VK9NJ** (23/11/93); **VP5/JM1GYQ** (1/1/93); **ZSØX** (31/1/94); **CO2/N6CL** (1/6/94); **CO2/KXØO** (1/6/94); **CO2/K7JA** (1/6/94); **CO2/WA7WMB** (1/6/94); **FOØRYD** (18/4/94); **HR3PWF** (13/1/94); **HR3/KD5M** (13/5/94); **P40XJ** (16/6/94); **8Q7AD** (26/9/93); **9A/SP2EXN** (30/3/94); **9G1PW** (17/2/94); **9N1HP** (30/11/93); **9N1UZ** (17/12/93); **9Q5EXV** (20/4/94); **9Q5TR** (4/3/91); **9X5DX** (5/12/93); **9Y4/I5JHW** (29/12/93); **A35RK** (4/5/94); **ET3VZ** (11/4/94); **J79W** (3/5/94); **J87BZ** (23/2/94); **S21ZX** (18/11/93); **T30NA** (17/9/93); **T5/OZ1FJB** (28/4/93); **T5/PA3CWM** (28/12/93); **T5/PA3DFT** (28/12/93); **T9/PA3DZN** (18/1/94); **T9/SP2EXN** (30/3/94) **3A/IK4CIE** (29/12/91); **3A/IK4IDW** (24/4/93); **3D2CK** (8/9/93); **3DAØSD** (24/3/94); **4K1/XE1L** (24/2/94); **R1A/K7FL** (186/93); **R3/G3MHV** (15/5/94); **R3/KA6ZYF** (15/5/94); **R3D/K7FL** (18/6/93); **R9/G3MHV** (25/5/94); **R9/KA6ZYF** (25/5/94); **RØ/G3MHV** (7/6/94); **RØ/KA6ZYF** (7/6/94); **T30P** (15/2/93); **UE9WTL** (31/5/94); **UE9WML** (31/5/94); **V63KW** (3/3/94); **VP2V/KR4DL** (16/6/94); **ZF2GT** (4/5/94); **ZF2MC** (23/1/94); **ZK1OFM** (3/5/94); **ZK1QMU** (3/5/94).

QSL Information

QSL World Cup special-event station **CP94USA** via the Radio Club La Paz CP1AA, Casilla 2111, La Paz, Bolivia.

N4EOF reports he is **not** QSL manager for P29DX. **P29DX** cards go direct or via P2 buro. N4EOF **is** manager for **P29DK**.

ZS8MI QSLs are coming out, since ZS1CDK has returned to the mainland. He expects to be caught up on direct requests soon.

ZS1DAS IOTA cards were delayed in printing, but are now being processed, and all should be out soon. Be patient.

EL2PP has not been able to get logs to QSL manager Toni, N2CYL, since April 5; be patient on more recent contacts.

QSL **R3/G3MHV, R9/G3MHV, UE9WTL/9, RØ/G3MHV, UE9WTL/Ø, R3/KA6ZYF, R9/KA6ZYF, UE9WML/9, RØ/KA6ZYF, UE9WML/Ø** via Terry Langdon, W6/G3MHV, P.O.B. 1489, Santa Monica, CA 90406.

QSL **ZF2SY** via Dick Bentley, K2UFT, 1507 Thornhill Ct., Dunwoody, GA 30338.

QSL **KH2HB, KH2HB/KL7,** and **HP4XXN** via Ricky Martin, Apdo. 2166, Balboa, Republic of Panama. QSL **KH2HM, KH2HM/KL7,** and **HP4XXP** to Lorena Martin at the same address.

QSL **ZA/Z32KV** via Vladimir Kovacesti, P.O. Box 10, Struga 96330, Macedonia.

QSL **VK6DX** since June 1993 via Bob Dalton, AB4ZD, 5049 Patillo Ch. Road, Burlington, NC 27217.

73, Chod, VP2ML

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2097	JA7DOT		

CW

901	KF8UN	902	JA7DOT

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320	OE2EGL/327	275	HP6AYV/296
320	I8LEL/326	275	KG6LF/287
320	AA4KT/326	275	WØIKD/279
320	W5LLU/324	150	KD4FAZ/158
310	EA3EQT/313	28 MHz	KF8UN
310	EA2AOM/310	28 MHz	N2PKX
300	KF8UN/306	28 MHz	JA7DOT
300	WB2NQT/303	3.5/7 MHz	KF8UN

CW Endorsements

320	AA4KT/327	320	YU1HA/326
320	WA8DXA/326	150	KF8UN/172
320	KB8DB/326	28 MHz	JA7DOT

RTTY Endorsements

310	K2ENT/312

Total number of active countries is 327. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

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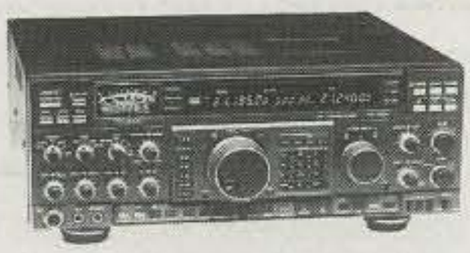

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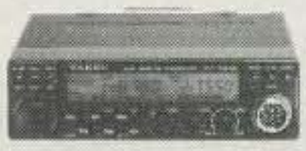

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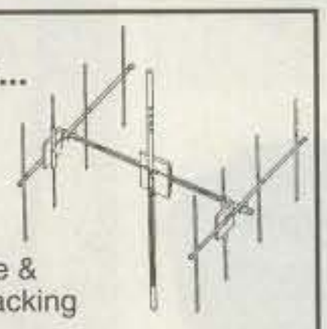

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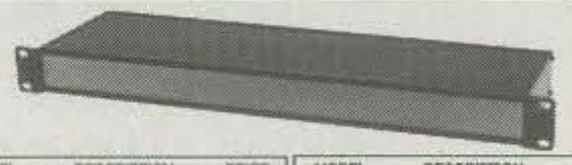

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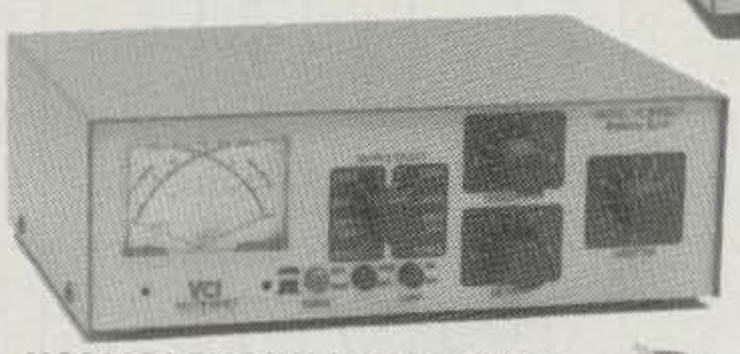

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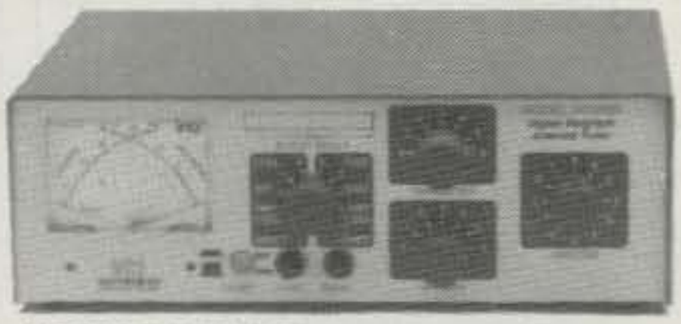

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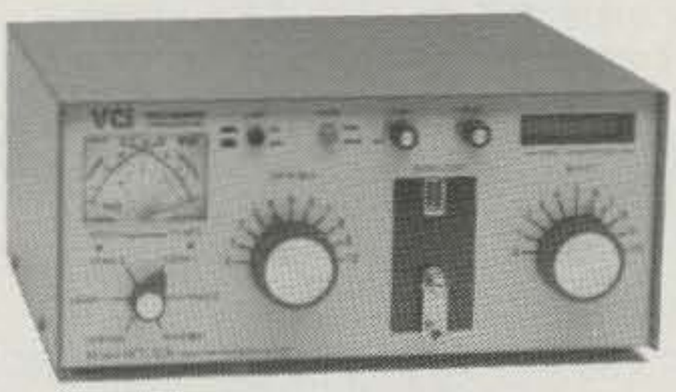

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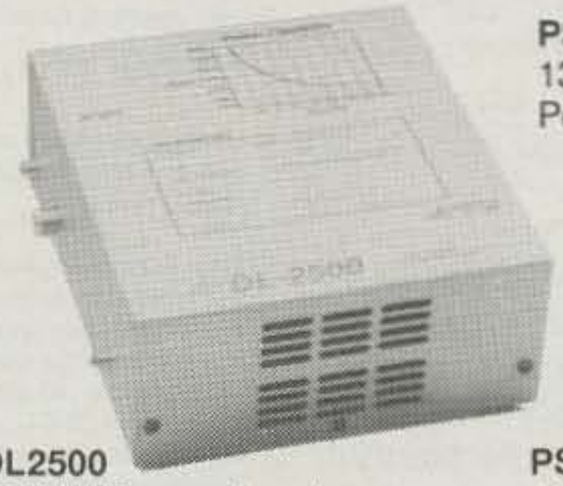

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PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1994 CQ World-Wide DX Contest will be held on the following dates:

Phone: 0000 UTC Saturday, Oct. 29 to 2400 UTC Sunday, Oct. 30
CW: 0000 UTC Saturday, Nov. 26 to 2400 UTC Sunday, Nov. 27

For the 44th consecutive year this month's propagation column is devoted to special forecasts and information applicable to both the CQ WW DX SSB and CW contest weekends. The accuracy of the forecasts for the previous 43 contests is considerably greater than 90%!

1994 Contest During Period Of Low Sunspot Activity

Sunspot activity has now declined to a point where Cycle 22 has entered its low phase. A smoothed sunspot count in the mid-20s is expected during the 1994 contest period. The last contest period to be held during similar solar conditions was 1984.

At the time of this writing, during early August, a long-range *CQ* day-to-day forecast based primarily on the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions indicates a high probability of at least Low Normal propagation conditions during the SSB contest weekend, October 29–30. There is a good chance of conditions increasing to High Normal or better to many areas of the world, particularly on October 30th. At the time of writing there seems to be little chance of a radio storm developing during the SSB contest weekend.

See the Last Minute Forecast box at the beginning of this month's column for more information concerning expected day-to-day conditions for the entire month of October. An updated day-to-day forecast for the SSB contest weekend will appear as a bulletin at the beginning of next month's column. The November issue of *CQ* should reach most subscribers before the SSB contest begins.

The Royal Observatory of Belgium reports a monthly mean count of 28 for June 1994. This results in a smoothed sunspot number of 39 centered on December 1993. Corresponding values of 10.7 cm solar flux were 77 for June 1994 and a smooth level of 95 for December 1993. The solar flux levels are those reported by the Dominion Radio Astrophysical Observatory at Penticton, B.C.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1994

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 10, 14, 23, 26-27	**A**	**A**	**B**	**C**
High Normal: 8, 11-12, 20, 24-25	**A**	**B**	**C**	**C-D**
Low Normal: 2-3, 6-7, 9, 13, 15, 17-19, 21-22, 28-29	**B**	**C**	**D**	**D-E**
Below Normal: 4, 16, 30	**C**	**C-D**	**D-E**	**E**
Disturbed: 5, 31	**C**	**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 S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from 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 band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on Oct. 1, fair (C) on the 2nd and 3rd, fair-to-poor (C-D) on the 4th, poor (D) on the 5th, etc. Fair conditions (C) are expected during the CQ WW DX SSB Contest weekend of Oct. 29 and 30.

Solar Count for 1994 CQ WW DX Contest

Cycle 22 is expected to continue to decline slowly but steadily. As mentioned previously, a smoothed sunspot count in the mid-20s and a smoothed 10.7 cm solar flux level of approximately 85 are forecast for October and November1994. This would be approximately 20 numbers lower than the count observed during last year's contest. By comparison, in 1989, when the present cycle was enjoying peak activity, the level during the contest period approached 160! Table I shows the level of solar activity recorded during past CQ World-Wide DX Contest periods since 1983, as well as predicted solar activity through 1996. Note that while conditions during the 1994 contest are not expected to be as good as they were during the past seven contest periods, they will be somewhat better than conditions expected during the 1995 and 1996 contest periods, when sunspot activity is expected to be even lower than the 1994 level.

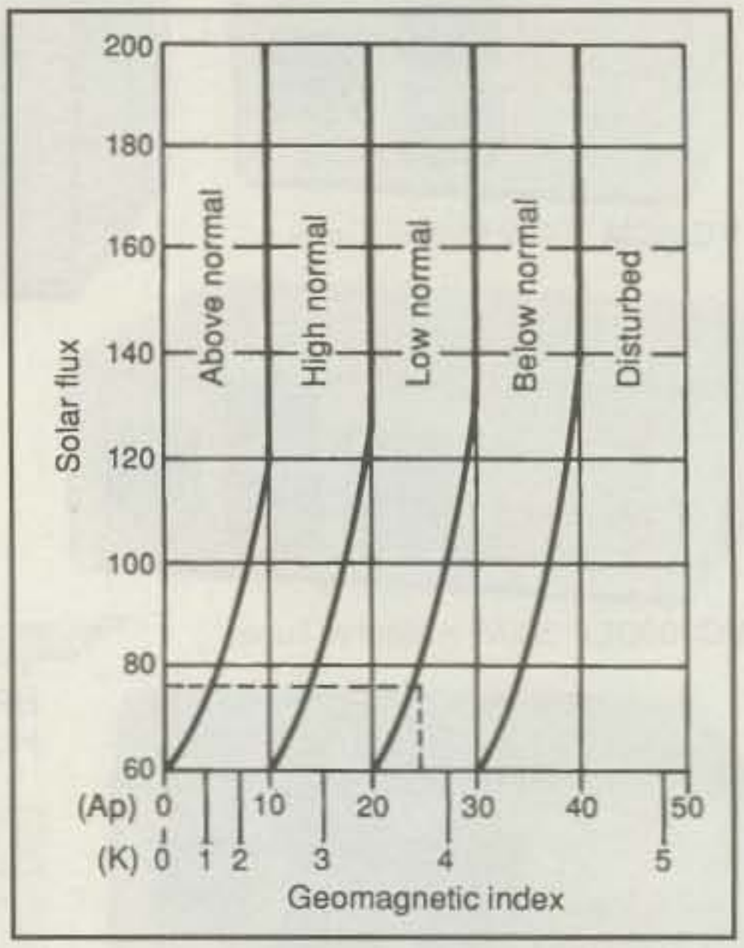

Fig. 1– Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 75 and Ap is 25; therefore, expect Below Normal conditions.

Statistically, this means that general DX contest conditions, particularly on the 10, 15, and 20 meter bands, are expected to be at their poorest level in light years. But don't despair. The ionosphere, although weaker, is not going to disappear. There should still be plenty of worldwide DX to be worked, but it's going to require more skill and patience to do it. While conditions are expected to worsen considerably on 10 meters and 15 meters, 20 meters should continue to be a world-wide DX band during the daylight hours, and nighttime DX openings on 40, 80, and 160 meters may actually improve a bit when compared to previous years of higher solar activity.

While the expected decline in solar activity and corresponding degradation of HF propagation conditions can rightfully be greeted with jeers, moans, and groans by DXers, it is part of the amateur radio

challenge, and it is what makes amateur radio so interesting. If you plan to participate in the 1994 WW DX Contest, the DX propagation charts and other information appearing in this month's column are designed to help you stay "sharp," and to make use of the ionosphere for piling up as many contest points as possible, despite the decline in solar activity.

General Conditions, Band By Band

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December, and centered on the contest periods.

10 Meters: With the bottom of the present sunspot cycle slowly approaching, very few DX openings are expected on this band. During High or Above Normal conditions look for some openings towards Africa and Europe before noon, towards Central and South America from a few hours before until a few hours after noon and towards the South Pacific during the afternoon.

15 Meters: Although DX conditions are not expected to be as good as last year, 15 meters should be a fairly good band during most of daylight hours. When conditions are Normal, the band should open to many areas of the world from shortly after sunrise through the late afternoon. Signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East, and the South Pacific should peak during the late afternoon. During Below Normal or Disturbed conditions, 15 meter openings will be spotty and of very short duration, if possible at all.

20 Meters: This is again expected to be the "backbone" band during the contest. During Normal conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon and early evening. During these peak periods, 20 meters should be the optimum band for DX, with openings usually characterized by strong signal levels. When conditions are Below Normal, 20 meter openings should be fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but Disturbed conditions.

40 Meters: The band is expected to open during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to Europe and Africa from an hour or so before sundown to about midnight in the MST and PST time zones, and to at least 2 AM in the CST and EST zones. Good openings towards Central and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two-hour period before sunrise. During most of the hours of darkness, 40 meters should normally be the optimum band for DX propagation. When conditions are Below Normal or Disturbed, openings will be spotty and considerably fewer in number.

80 Meters: DX propagation conditions are generally at their best on this band during periods of low solar activity. Some fairly good 80 meter DX openings are expected to several areas of the world during the hours of darkness and the sunrise period. When propagation conditions are Normal, signal levels should be strong on many openings. Even during Below Normal or Disturbed periods there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions normally to peak around midnight for openings towards Europe and Africa, after midnight and before sunrise for openings towards Central and South America, and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters: With longer hours of darkness, DX conditions on this band should improve. While DX conditions may not be as good on 40 and 80 meters, look for openings to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations in force on this band in many areas of the world, signals are likely to be weak and noisy, especially on phone. The best time for 160 meter DX is when a path is in complete darkness. Within this period conditions often peak just as the sun begins to rise at the easterly point on the path. The best forecaster for 160 meter DX (and 40 and 80 meters, as well) is a set of sunrise and sunset tables. For example, if the sun is expected to rise at 0700 GMT in western Europe, then this would be the best time to look for 160 meter openings between western Europe and the USA, plus or minus a half hour. Conditions on 80 meters can often also serve as an indicator for 160 meter openings. The band will often open at the same 80 meters seems to

Year	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96
Oct.	68	29	17	13	44	125	158	142	138	74	41	25*	17*	10*
Nov.	67	24	17	15	47	130	157	142	142	76	45	23*	15*	10*

*Table I– Smoothed sunspot levels recorded during CQ World-Wide DX Contest periods since 1983. An * indicates predicted values.*

Time PST	Areas to which openings should be optimum
00–03	No openings expected with a propagation index of (2) or higher. Some (1) openings should be possible to South America, South Pacific, New Zealand, and Australasia, but this means conditions should be High Normal or better. This is a good time to catch up on some sleep.
03–06	About the same as the previous block.
06–09	Should open in just about every direction: Europe, North Africa, Eastern Mediterranean and Middle East, most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, the Caribbean, Central America, and most of South America. This is the period in which to rack up points.
09–12	About the same as previous period, but signals getting weaker and openings falling off.
12–15	Western and southern Europe, most of Africa, most of the Caribbean, Central America, and the northern countries of South America.
15–18	All of the Caribbean, Central America and South America, most of Africa, the Pacific Islands and New Zealand, the Far East.
18–21	Another peak period, and a good time in which to increase scores. Most of Asia including the Far East; the Pacific Islands, New Zealand, and Australasia; Caribbean, Central and South America, but falling off; Antarctica.
21–00	South Pacific, New Zealand and Australasia, much of South America, Antarctica. A propagation index (1) opening to Europe and Africa.

Table II– Sample 20 meter operating schedule for a Western USA QTH.

CIRCLE 13 ON READER SERVICE CARD

CIRCLE 58 ON READER SERVICE CARD

peak on a particular path. With these tips and some patience, it should be possible to work many DX areas of the world on 160 meters during the contest.

WARC Bands

While the WARC bands are not yet included in the World-Wide DX Contest, expect 12 meter openings during the same time periods as shown for 10 meters, but with this band opening a bit more frequently than 10 meters. Seventeen meters should behave much as shown for 15 meters. Openings on 30 meters should resemble 40 meter openings during local sunrise and sunset times, but the band is expected to open less frequently than 40 meters during the hours of darkness.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. 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.

October 15 – December 15, 1994
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-02 (2) 02-03 (3) 03-04 (2) 04-05 (1) 19-21 (1)* 21-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & CIS**	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (3) 10-13 (2) 13-15 (1)	17-19 (1) 19-22 (2) 22-01 (1) 01-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	18-20 (1) 20-00 (2) 00-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Western Africa	11-14 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-20 (1) 20-02 (2) 02-03 (1) 20-22 (1)* 22-01 (3)* 01-02 (1)*
Eastern & Central Africa	10-13 (1)	08-12 (1) 12-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-01 (1) 22-00 (1)*
Southern Africa	10-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	NIL	09-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	05-07 (1) 18-21 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	NIL	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	05-07 (1) 18-20 (1) 05-07 (1)*
Far East	NIL	16-17 (1) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-08 (1) 17-19 (1) 05-07 (1)* 17-18 (1)*
South Pacific & New Zealand	12-16 (1)	12-14 (1) 14-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-01 (1)	23-00 (1) 00-02 (2) 02-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	14-16 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-21 (1)* 21-01 (2)* 01-04 (3)* 04-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	10-15 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	20-22 (1) 22-04 (2) 04-06 (1) 21-23 (1)* 23-03 (2)* 03-04 (1)*

amateur band from 10 through 160 meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these charts are given elsewhere in this column.

The information contained in the charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the contest. Experience gained during previous contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table II is an example of one of several types of plans that can be devised. For each three-hour period throughout the day it shows the areas of the world to which 20 meter propagation conditions are expected to be optimum. Only those openings shown in the charts with a propagation index of (2) or higher were used in compiling this plan.

A western USA QTH has been chosen for this example, but similar plans can be devised for other locations, for other bands or for multi-band operation, and for other time spans.

Radio Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level in the mid-20s. If actual conditions during the contest turn out to be *above normal*, DX openings on 10, 15, and 20 meters are likely to be somewhat better than shown in the charts. On the other hand, if Mother Nature should play a trick and produce a radio storm during the contest period, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outward from the polar regions, the more severe the storm becomes. Under storm conditions expect considerably fewer openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on 40, 80, and 160 meters are likely to become erratic as well. During certain types of storms conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on 40, 80, and 160 meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on 10, 15, and 20 meters during the daylight hours. Check the 40, 80, and 160 meter bands for possible openings to some

McMurdo Sound, Antarctica	NIL	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 06-08 (1)	03-06 (1)

Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	08-09 (1) 09-12 (2) 12-13 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	17-18 (1) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-03 (1) 18-20 (1)* 20-00 (2)* 00-02 (1)*
Northern Europe & CIS**	08-10 (1)	08-11 (1)	06-07 (1) 07-12 (2) 12-14 (1)	18-19 (1) 19-21 (2) 21-23 (1) 23-00 (2) 00-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	09-11 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	10-13 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-23 (2) 23-00 (1) 19-23 (1)*
Eastern & Central Africa	09-12 (1)	08-11 (1) 11-13 (2) 13-14 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-00 (1) 21-23 (1)*
Southern Africa	09-12 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	21-23 (1) 07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 18-20 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	Nil	14-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 17-19 (1) 05-07 (1)*
Far East	16-18 (1)	15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1) 02-03 (1)* 03-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-17 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	14-17 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-07 (1) 07-08 (2) 08-10 (2) 10-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	02-04 (1) 04-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-14 (2) 14-16 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-05 (3) 05-07 (2) 07-08 (1) 19-21 (1)* 21-00 (2)* 00-03 (3)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-15 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	00-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-05 (2) 05-06 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
McMurdo Sound, Antarctica	Nil	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1)	06-08 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-01 (1)	03-06 (1)

Time Zone: PST (24-Hour Time) WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-14 (2) 14-16 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Northern Europe & CIS**	Nil	07-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	21-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	Nil	07-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western Africa	09-11 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1) 19-22 (1)*
Eastern & Central Africa	Nil	09-12 (1)	06-09 (1) 11-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	07-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-20 (1)*
Central & South Asia	NIL	17-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	04-06 (1) 06-08 (2) 08-09 (1) 05-07 (1)*
Southeast Asia	15-17 (1)	14-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
Far East	14-16 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 23-01 (1)* 01-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	09-12 (1) 12-15 (2) 15-17 (4) 17-18 (2) 18-19 (1)	04-07 (1) 07-09 (3) 09-12 (2) 12-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (2) 22-02 (1) 02-04 (2)	21-22 (1) 22-05 (3) 05-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	11-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-03 (1) 03-05 (2) 05-07 (1) 07-10 (3) 10-12 (2)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1) 10-14 (2) 14-15 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	00-05 (1) 05-06 (2) 06-08 (3) 08-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-22 (1)* 22-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-14 (1)	07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (4) 15-16 (3) 16-17 (1)	01-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-03 (2) 03-05 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
McMurdo Sound, Antarctica	Nil	08-10 (1) 13-15 (1) 15-16 (2) 16-18 (1)	07-09 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	23-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)*

*Indicates best time for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

**Former European USSR.

areas of the world during the hours of darkness.

Do-It-Yourself Forecasting

If you have a modem-equipped personal computer, you can obtain a wealth of updated daily summaries of solar and geophysical activity and a daily HF propagation summary and forecast (updated every six hours) directly from the NOAA Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado. Information about a variety of other useful SESC services and products is also posted on the board.

The SESC bulletin board has been upgraded and is in operation 24 hours a day. Modem-equipped PCs can access the system at 303-497-5042. Either 300, 1200, or 2400 baud can be used. Protocol is the standard 8-bit data word with one stop bit and no parity. There is no charge for the data that can be obtained from the SESC bulletin board, but the telephone call is not toll-free. The program is very user friendly and menu driven. A wealth of propagation data is available, including propagation and solar reports, solar and geomagnetic data, and MUF predictions.

Another excellent propagation bulletin board service is provided by the Solar Terrestrial Dispatch (STD) BBS, located in

Stirling, Alberta, Canada. It can be accessed by dialing 403-756-3008. It provides on a very timely basis, loads of solar, geomagnetic, auroral, and ionospheric propagation data for both the professional and amateur. Much of this data is updated continuously and is often not more than a few minutes old when accessed. For more information about the STD-BBS, dial up the bulletin board directly, especially during the DX Contest periods, or call 403-756-2386 for a password.

Another new BBS featuring solar and ionospheric data has recently come online. This is the National Geophysical Data Center's (NGDC) Solar-Terrestrial Data bulletin board. It is dedicated to all areas of Solar-Terrestrial Physics and is now available for public access. Among the data contained in this BBS are 10.7 cm solar flux values, sunspot numbers, and statistics concerning sudden ionospheric disturbances. The board supports all baud rates from 300 to 9600 as well as ANSI and non-ANSI users. After answering a brief log-on sequence, a user is granted free and full access to file downloads and executable programs. All available files are scanned daily for computer viruses and no outside uploads are permitted. The BBS number is 303-497-7319.

Fig. 1 can be used with the updated values of geomagnetic activity (Ap or K figures) and the latest reading of solar flux available from SESC to determine real-time day-to-day conditions in terms of Disturbed, Below Normal, Low Normal, High Normal, or Above Normal. If you do not have a modem-equipped computer, the latest geomagnetic and solar flux levels can be obtained from National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts are transmitted simultaneously on 2.5, 5, 10, 15, and 20 MHz. They contain the latest available geomagnetic Ap and K figures, as well as the 10.7 cm solar flux level and short-term forecast of expected conditions. The same information can be obtained at any time by calling 303-497-3235 (collect calls will not be accepted).

WWVH, located on the island of Kauai, Hawaii, broadcasts geophysical alerts at 45 minutes past each hour on frequencies of 2.5, 5, 10, and 15 MHz, with its signal audible throughout the Pacific Oceania area and farther into other parts of the world, depending upon radio propagation conditions. These augment the same alert broadcasts from WWV, which can be heard throughout the Western Hemisphere and other parts of the world as well.

Both the WWV and WWVH solar alert broadcasts are updated every three hours beginning at 0000 UTC, and they contain the latest information concerning geomagnetic and solar conditions, as well as radio-storm warning data. Alert data is also available at any time by calling the "on-duty forecaster" at SESC at 303-497-3171.

A comprehensive world-wide propagation analysis and forecast is given every day on the INTERNET computer E-mail network. Information for accessing this can be obtained from the following E-mail address: O1er@Rho.Uleth.CA, or C01er@Solar.Stanford.Edu.

VHF Ionospheric Openings

While the CQ WW DX Contest does not include the VHF bands, some interesting ionospheric activity is likely to occur on these bands during October.

Some fairly good meteor-scatter-type openings should be possible on the VHF bands around October 20th, when the two-day *Orionids* meteor shower is expected to begin. This should be a major shower, with a maximum hourly rate of at least 25 meteors.

Auroral activity usually increases during October, and some corresponding auroral-scatter-type and sporadic-*E* VHF openings can be expected during periods of such activity. The best days to check are those which are expected to be either Below Normal or Disturbed on the HF bands. See the Last Minute Forecast at the beginning of this column for the days in October that are forecast to be in these categories.

Computer Programs

There are several good computer programs available for supplementing band-opening predictions contained in the *CQ* DX Propagation Charts appearing on the following pages. Many of these programs have been reviewed on a regular basis by my *CQ* colleague Karl Thurber, W8FX, in his monthly *CQ* column "Antennas & Accessories."

The following is a listing of the more popular programs. All of them contain band-opening data. Most of them also contain grayline data, sunset/sunrise times, distance, great circle bearings, and other useful information. All of the listed programs are well prepared, menu-driven, relatively easy to use, and well documented.

Super DX Edge™: Computerized version in color for IBM compatibles. Also available in a large, plastic slide-rule version. Reviewed in Propagation column October 1990. Updated. For a free flyer, contact Xantek, P.O. Box 834, Madison Square Station, New York, NY 10159. (212-566-8240).

Ham Companion™: For IBM compatibles. Version 3.0 updated and revised. New color graphics for EGA and VGA. Calculates band openings for all loca-

tions; shows sunrise and sunset times, grayline moving around the world and displays great circle paths, showing azimuth, distance, and more. Predictions and forecasts can be updated with WWV sunspot numbers and solar flux levels. See W8FX's review on page 83 of May 1994 *CQ*. For more information contact Brinson Microware Corp., 114 S.E. 4th St., Mooreland, OK 73852, or call 1-800-874-0771.

MINIPROP Plus™: Version V2.0 is the latest upward revised version of a very popular HF propagation program for IBM compatibles. Predicts received signal levels and all other propagation parameters for any location. Maps display great circle path and grayline in full color. Also contains comprehensive world atlas with coordinates and lists beam headings from given QTH. Reviewed in "Antennas & Accessories" column on page 80, July 1994 *CQ*. For more details contact Sheldon C. Shallon, W6EL, 11058 Queensland St., Los Angeles, CA 90034-3029.

IONSOUND PRO™: This is an updated version of the very popular IONSOUND™ propagation program developed by Jake Handwerker, W1FM. It is a sophisticated ionospheric prediction program for IBM PCs and compatibles. It is well documented and user friendly menu driven. It produces tabular or graphic frequency opening times and data between any two locations, as well as great circle distance and bearing data. The program permits comparing data for up to twelve smoothed sunspot numbers or solar flux levels. The program has been reviewed by W8FX on page 66 of the March 1994 issue of *CQ*. Additional information can be obtained for IONSOUND.PRO and several other propagation programs from Skywave Technologies, 17 Pine Knoll Rd, Lexington, MA 02173.

Two propagation programs are now available for radio amateur use of IBM PCs and compatibles that were formerly only available for professional use. They are CAPMAN and ASAPS.

CAPMAN: Stands for Computer Assisted Prediction Manager. The program utilizes the sophisticated model of the ionosphere used in the IONCAP program. IONCAP is one of the world's standards used by professional engineers and scientists for propagation predictions and analyses. CAPMAN was developed by Don Lucas, WØOMI, one of the original developers of IONCAP, and Jim Tabor, KU5S, to overcome the shortcomings of IONCAP, for PC use by radio amateurs. While the IONCAP program for PC use was made available to the general public by the U.S. Government, it was difficult to learn, had very little documentation, and was cumbersome to use. CAPMAN, on the other hand, is well documented, user friendly menu driven, and gives very accurate results. The choices of output include maximum usable frequency (MUF), frequency of optimum transmission (FOT), signal-to-noise (S/N) ratio, circuit reliability, service probability, angles of takeoff and arrival, field strength, modes of propagation, great circle distance and bearing, and more. The 32-bit program requires an 80386 or higher microprocessor, and a math co-processor is recommended to speed up results. The program also contains a large assortment of antenna data that can be used in the calculations. Karl Thurber reviewed CAPMAN on page 83 in the May 1994 issue of *CQ*. Additional information is available from Don Lucas, 2900 Valmont Road, Suite H, Boulder, CO 80301 (303-494-4647).

ASAPS: This is another worldwide standard propagation prediction and analyses program used by professionals, and recently made available for general PC use. The name stands for Advanced Stand Alone Prediction System, and the program was developed by the IPS Radio and Space Services of the Australian government. This program uses a different but equally sophisticated model of the ionosphere than does CAPMAN, but the results from both programs are similar. While CAPMAN provides a great deal more data, ASAPS is a much faster program to use, but a 80386 microprocessor and a math coprocessor are still highly recommended. CAPMAN is presently available at approximately one-third the price of ASAPS. For more information see W8FX's review on page 60 in the April 1994 issue of *CQ*, or write directly to Jacques d'Avignon, VE3VIA, 965 Lincoln Drive, Kingston, ON, Canada K7M 4Z3, or call him at 613-634-1519.

The listing of the above products does not necessarily indicate an endorsement by the editor of this column or *CQ* magazine. Additional information and prices should be obtained directly from the program producers.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the SSB and CW sections of the CQ WW DX Contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 43 contest years has shown that DX contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1994 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. Good luck in the contest!

73, George, W3ASK

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UNSURPASSED SIRIO ANTENNAS, KNOWN THROUGHOUT EUROPE AS THE FINEST COMMUNICATION ANTENNAS AVAILABLE ANYWHERE IN THE WORLD, MAKE THEIR WAY TO YOUR FAVORITE HAM STORE! SIRIO OFFERS A UNIQUE COMBINATION OF FINE OLD WORLD CRAFTSMANSHIP AND STATE-OF-THE-ART ENGINEERING. SIRIO USES ONLY THE HIGHEST QUALITY MATERIALS AVAILABLE, MAKING OTHER ANTENNAS PALE BY COMPARISON!

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- Custom VSWR & bandwidth charts - with every model, actual antenna test range results, not theoretical printouts.
- Factory pre-tuned - while fully tunable, they are shipped pre-tuned for North American bands, with custom tuning available.
- Best DC ground potential for maximum static & lightning protection

HP 2070 2M/70CM DUAL BAND

Type:	VHF 1/4 Lambda UHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144-148MHz UHF 440-450MHz
Polarization:	Vertical
VSWR:	at freq. res.<1.2:1
Max. Power:	VHF 75 Watts, UHF 50 Watts
Bandwidth:at VSWR 1.5:1	VHF/UHF 10MHz
Gain:	VHF 0 dBd - 2.15 dBi UHF 3.8 dBd - 5.95 dBi
Connection:	UHF Female with gold plates center conductor and PTFE (TEFLON) insulator
Length:	approx. 18.5 inch.
Weight:	approx. 8.8 oz.

HP 200 2m Mono Band

Type:	VHF 3/4 Lambda
Impedemce:	50 OHms
Frequency Range:	144 - 148MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwidth: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch.
Weight:	approx. 11.8 oz.

HP 200 C 2m Mono Band

Type:	VHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	144 - 148 MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwith: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch
Weght:	approx. 11.8 oz.

HP 7000 70cm Mono Band

Type:	UHF 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1. 5:1	10MHz
Gain:	3.2 dBd - 5.35 dBi
Connection:	UHF Femal with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 18.5
Weight:	approx: 8.8oz.

HP 7000 C 70cm Mono Band

Type:	UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440-450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1.5:1	10MHz
Gain:	6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 34.6 inch.
Weight:	approx. 10.9 oz.

HP 2070 H 2m/70cm Dual Band

Type:	VHF 1/2 Lambda UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144 - 148MHz UHF 440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	VHF 150 Watts, UHF 100 Watts
Bandwidth: at VSWR 1.5:1	VHF 4 MHz UHF 6 MHz
Gain:	VHF 3 dBd - 5.15 dBi UHF 6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) insulator
Length:	approx. 41.3 inch.
Weight:	approx. 11.6 oz.

These super High Performance antennas, as well as the complete SIRIO antenna line for Amateur, Commercial, Marine and Cellular are now available. Contact your favorite dealer or call EDCO for the dealer nearest you. SIRIO offers High performance antennas at unbeatable prices!

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Vienna, Va. 22180
PH 703-938-8105

Exclusive Distributors for North & So. America

ANNOUNCEMENTS

(from page 8)

mont Conference Centre, Old Windsor, Berkshire, UK. Inquiries to Neville Cheadle, G3NUG, Tel./Fax 0442 62929; from abroad +44 442 62929; "Further Felden," Longcroft Lane, Felden, Hemel Hempstead, Herts, HP3 0BN, UK. (UK License Exams.)

Oct. 8, **Nogue Valley ARC SwapMeet**, North Medford High School, Medford, Oregon. For information contact the RVARC, 1707 East Main, Medford, OR 97504. (Exams.)

Oct. 8, **Hamilton ARC FleaMarket**, Merrit Hall Ancaster Fairgrounds, Hamilton, Ontario, Canada. For information, contact Hamilton ARC, P.O. Box 91215, Effort Square Postal Outlet, Hamilton, ON L8N 4G4 Canada (905-572-3755); or Fax 905-664-4828.

Oct. 8, **The Bergen ARA Fall Hamfest**, Fairleigh Dickinson University, Teaneck, New Jersey. For further information, contact Jim Joyce, K2ZO at 201-664-6725 (no calls after 10 PM). (Exams.)

Oct. 8, **Hamfest/Computer Fair**, Grand Forks Civic Auditorium, Grand Forks, North Dakota. Contact Bob Smith, ND1H, 1203 Shakespeare Road, Grand Forks, ND 58202 (701-746-9498). (Exams.)

October 8–9, **Seventh Annual International Hamfiesta**, El Paso, TX. Send inquiries to The International Hamfiesta, P.O. Box 10496, El Paso, TX 79995; or call Clay Emert, K5TRW at 915-859-5502; or Ed Jensen, K5ED at 915-595-6739.

Oct. 8–9, **MemFest '94—Greater Memphis Amateur Radio and Computer Show**, Shelby Farms Show Place Arena, Germantown, Tennessee. For information, contact Steve Fletman, KC4ZOV at 901-363-3159 after 4 PM; or Mary Moore, AC4GF at 901-758-0661. (Exams.)

Oct. 9, **Annual Shore Area Ham and Computerfest**, Brookdale Community College, Lincroft, New Jersey. For more information, contact Al Allen, K2LG at 908-495-3246. (Handicapped parking/accessible). (Exams.)

Oct. 9, **Northwest Ohio ARC Hamfest**, Allen County Fairgrounds, Lima Ohio. Contact WD8BND, P.O. Box 211, Lima, OH 45802. (Handicapped accessible). (Exams.)

Oct. 9, **Nutmeg Hamfest & Connecticut State Convention**, Durham Fairgrounds, Durham, Connecticut. Contact Jim McCandless at 203-349-3353 (evenings); packet: N1GNV@W1NRG.CT.USA.NA; Internet: wilsonc@iia.org. (Exams.)

Oct. 9, **Maysville Hamfest**, Maysville, North Carolina. Contact Jo Ann Taylor, 919-393-2120. (Exams, contact W4ULD, 919-726-5924, or 919-247-0967).

Oct. 14–16, **Supervention '94**, Holiday Inn Convention Center, Omaha, Nebraska. For more information, contact Supervention '94 Fax 402-399-0848; phone 402-571-4178; or write to AK-SAR-BEN ARC, Inc., 1994 ARRL Midwest Division Convention, P.O. Box 24551, Omaha, NE 68124-0551.

Oct. 15, **Fourteenth Annual Tri-Cities Hamfest**, Appalachian Fairgrounds, Gray, Tennessee. Mail inquiries to P.O. Box 3682 CRS Johnson City, TN 37602.

Oct. 15, **TCRA Hamputer Fest**, Union Catholic Regional High School, Scotch Plains, New Jersey. For information and/or reservations call Dick Franklin, W2EUF at 908-654-4943; or write to 310 Indian Trail, Mountainside, NJ 07092. (Handicapped accessible; exams.)

Oct. 15, **Waycross Area Repeater Assoc. Third Annual Hamfest**, Waycross Ware County Fairgrounds, Waycross, Georgia. For information, contact Don Minchew, KD4CEX at 912-283-9553; Woodrow Kirten, N4UNC at 912-449-5357; or write or call David Sweat, KD4FGC, Wren Drive, Waycross, GA 31501 (912-283-4603). (Exams.)

Oct. 15, **The Radio Amateurs of Greater Syracuse (RAGS) 39th Hamfest**, at Academy Green American Legion Hall, Syracuse, New York. For inquiries write RAGS, Box 88, Liverpool, NY 13088, or call WA2PUU at 315-469-0590. (Wheelchair accessible; exams.)

Oct. 16, **KARC 12th Annual Hamfest**, Kalamazoo County Fairgrounds, Kalamazoo, Michigan. For more information, contact Gary Hazelton, KB8PL, 75075 M-40, Lawton, MI 49065.

Oct. 16, **Tucson Hamfest '94**, De Anza Drive-In, Tucson, Arizona. For more information, contact A.J. Pawlowski, KB7KZ, 3418 W. Green Trees Drive, Tucson, AZ 85741 (602-742-2605).

Oct. 16, **LIMARC Hamfest**, New York Institute of Technology, Old Westbury, New York. For information, contact Neil Hartman, WE2V at 516-462-5549.

Oct. 16, 1994 **FARA Hamfest & Computer Fair**, EHOVE Career Center, Milan, Ohio. Contact Steve Buss, 213 Hayes St., Willard, OH 44890 (419-935-8225).

Oct. 16, **Penn Wireless Association TRADEFEST**, Robert Yezzi Fairgrounds, Bensalem, Pennsylvania. Contact John, N3NUB at 215-355-0879 or write to PWA, P.O. Box L-734, Langhorne, PA 19047. (Exams.)

Oct. 22, **Ham Radio Auction & Flea Market**, Venango County 4-H Fairgrounds, between Polk and Franklin, Pennsylvania. Contact Doug Smith, N3BDJ 814-677-6523; or Bruno Wolozyn, K3MHB 814-677-8694; or write to Fort Venango Mike & Key Club, RD #1, P.O. Box 591, Cranberry, PA 16319.

Oct. 22–23, **Hamfest Chattanooga**, Chattanooga Convention Center, Chattanooga, Tennessee. For information, contact Charles Curle, 8719 Snowhill Rd., Ooltewah, TN 37363-9628 (615-344-8447 days; or 615-344-8447 nights).

Oct. 23, **RH Hill ARC Hamfest**, Sellersville National Guard Armory, Sellersville, Pennsylvania. Hamfest Hotline: Linda Erdman 215-679-5764; or P.O. Box 29, Colmar, PA 18915. (Exams.)

Oct. 23, **Foothills ARC, Inc. Hamfest**, Greensburg Hose Company #1 (just off Route 66 North of Greensburg), Greensburg, Pennsylvania. For information, call Larry Gaebel, WA3TLT at 412-834-7137.

Oct. 23, **USECA Swap**, Macomb Community College, South Campus, Warren, Michigan. For table info., call Virginia, N8NLS at 313-268-0691; or Kevin, N8QVX at 313-772-8082; for VE test registration, call Bill, N8CVC at 313-468-8345; for club info., call Dave, KF8CT at 313-268-6730. (Exams.)

Oct. 23, **The Kettle Moraine ARC, Inc. 16th Annual Ham Radio and Computer Swapfest**, Waukesha County Exposition Center, Waukesha, Wisconsin. For reservations contact KMRA Swapfest, P.O. Box 411, Waukesha, WI 53187-0411.

Oct. 29, **Hamfest Minnesota & Computer Expo**, in the main arena at the St. Paul Civic Center, St. Paul, Minnesota. For more information write to P.O. Box 5598, Hopkins, MN 55343; or call Hamfest Minnesota Information Line at 612-535-0637. (Exams.)

Oct. 29, **The Annual Ham Radio Auction**, Senior Citizens Center, Waterford Municipal Complex, Waterford, Connecticut. For information call KA1BB at 203-739-8016; or write Bob Dargel, KA1BB, 8 Willow Lane, East Lyme, CT 06333-1526. (Wheelchair accessible.)

Oct. 29, **Franklinfest '94**, Franklin, Kentucky. For info and reservations contact Ed Schwab, KA4REF, P.O. Box 9656, Bowling Green, KY 42102; phone 502-843-4389. (Exams.)

Oct. 29, **Gateway to Ham Radio Club Hamfest**, West County Tech. School, St. Louis, Missouri. Contact Dave, NØOFF or Joe, NØSJR, at 314-230-9402; or write to Gateway To Ham Radio Club, 10 Ann Avenue, Valley Park, MO 63088.

Oct. 29, **The Port St. Lucie Florida ARA "PSL-FEST94"**, at Prima Vista Blvd. and Irving St., Port St. Lucie, Florida. Contact Bob Blackwell, W3HVS at 407-335-1341 or Wes Sammis, W2YRW at 407-878-4739.

Oct. 30, **1994 RMRL Hamfest**, Jefferson County Fairgrounds, Golden, Colorado. For information, call Joe Dickinson, WTØC at 303-771-9577. (Exams.)

Oct. 30, **The Marion ARC 20th Annual HamFiesta**, Marion County Fairgrounds Coliseum, Marion, Ohio. For more information, contact Karen Eckard, N8JDH, 6583 South Street, Meeker, Ohio 43302 (614-499-3565); or Betty Krist, N8UDT, 132 N. Seffner Avenue, Marion, OH 43302 (614-387-3533 after 5PM).

Oct. 30, **Boone & Clinton Co. Hamfest**, Boone County 4-H Fairgrounds, Lebanon, Indiana. For more information, contact Sam Paul, WA9YZE, P.O. Box 186, Lebanon, IN 46052 (317-659-1720). (Exams.)

Oct. 30, **5th Annual Mason-Dixon Computer & Hamfest**, Carroll County Ag Center, Westminster, Maryland. Contact Gary Viands, KE3FN at 717-259-7342.

OUR READERS SAY

Four-Band Quad Correction

Editor, *CQ:*

I would like to point out a correction to my article "A Compact, Four-Band Quad Array" (July issue, p. 22). Table I on page 24 lists the 15 meter director length as 26.251 feet. It should be 46.251 feet. I would also like to thank you for publishing the article. It was a great thrill to see it in the magazine, and the feedback I've gotten has been amazing! It's been great fun.

Steve Root, KØSR
South St. Paul, MN

Classic Rigs Are Great!

Editor, *CQ:*

Just a short note to tell you how much I enjoy your publication. Also want to let you know that the first section I read is Dave Ingram's column on Classic Rigs. Dave's articles are always great. Please continue to have his articles, and see if they can be increased.

Keep up the fine work.

Patrick E. Gardner, K8ZXW
Lincoln Park, MI

A Reader Since 1945

Editor, *CQ:*

Alan, as fellow hams we belong to the same fraternity. I've read your stuff and *CQ* magazine since it first came out in 1945. Somewhere in my junk I have some back issues. One has a cover photo of a field day gathering, and right there on that cover is Elizabeth Zandonini, W3CDQ, long since now a Silent Key. She was a true CW operator, having started back in 1912. She had a modest station in the attic of her home in Washington, DC, from which she worked the world on all bands—CW only. What a gal!

But, I digress. *CQ* magazine has for many years supplied the information and the modicum of technology that I am able to absorb to keep me fascinated with this ham radio hobby. As a matter of fact, I've been involved since about 1939. This brings me to Dave Ingram, K4TWJ's columns that appears in *CQ*. His stories have prompted me to engage in a little USPS QSOing, and I've always appreciated his responses to my needs for additional information and guidance. He does a good job, and I really feel that there are a lot of old timers out there, as well as newcomers, who lean toward homebrewing some of the stuff we used to live by back in the '40s and '50s. His recent columns of February and March under the homebrew headline were exciting and even prompted me to suggest to him a unique approach to achieving regeneration in those old tube circuits. I've been seeking background info on Wardell Smith, W2BRQ's (now also a Silent Key) article in your November 1964 issue, page 80, dealing with the taming of regeneration in RF and detector circuits. Dave had a good reply to that one. I hate winding coils, especially tapped ones.

Anyway, each time *CQ* arrives I look first at the table of contents to see if Dave Ingram has anything, and if not I look to Lew McCoy's name. It certainly would be great if more of Dave's material could appear in *CQ* on a regular basis.

Henry E. Johnson, K4IPY
McLean, VA

N6PL Leaves A Legacy

Editor, *CQ:*

I was very saddened when my June copy of *CQ* arrived a few days ago and I read in Zero Bias about the death of Capt. Paul Lee, N6PL. My first contact with Paul was an adversarial one some 20 years ago. As practicing broadcast engineering consultants, we were representing opposing clients attempting to obtain an FM broadcast channel in southern California.

Cases like the one in which we were involved can be very contentious, resulting in a great deal of time and money being expended before any resolution. The clients' attorneys are constantly urging the engineers to build technical cases, while they build legal ones, supporting their clients' positions. It therefore came as a surprise when Capt. Lee suggested at the start of our first face-to-face meeting that perhaps it was technically possible to accommodate both clients. As they were located in cities separated by considerable distance, I concurred that it might be possible.

With consent of our clients, Paul and I then began a series of technical discussions concerning the use of directional antennas, a practice common now but not then. Exchanging calculations and ideas over a number of weeks resulted in both a solution and a friendship. There was rarely a discussion in which at some point the problem at hand was not dismissed, for at least a few minutes, in order to discuss amateur radio and what aspect of the hobby each was currently indulging in.

Paul was a gentleman, a good engineer, and a fine human being. What better legacy can a man leave? Thanks for remembering him.

Hugh R. Paul, W6POK/TA2ZI
Ankara, Turkey

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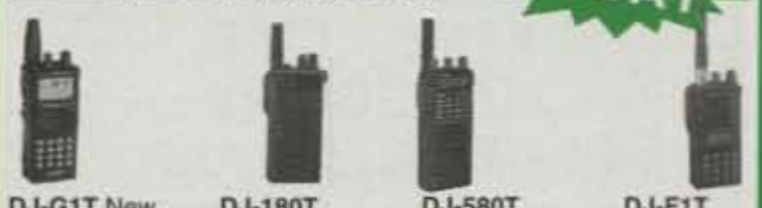

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WANTED: YK-88SN 1.8 kHz SSB Narrow Filter for Kenwood TS440S. VE7BFX, #51-10771 Auburn Drive, Richmond, B.C., V7A 4X7, Canada (604-272-1825).

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HEATH HW-7 with HW7-A supply. Manuals included, $125.00. Earl, W9CK, 2535 West 40th Street, Fremont, MI 49412 (616-924-3038).

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WANTED: Defective Fluke 8022A or 8022B digital multimeter. Hand-held type. Call 606-236-6510. George Griebe, WQ4Z, 650 Chestnut, Parksville, KY 40464-9624.

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843-9255.

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MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES

MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

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MODEL VS-35M

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MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

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(continued on page 163)

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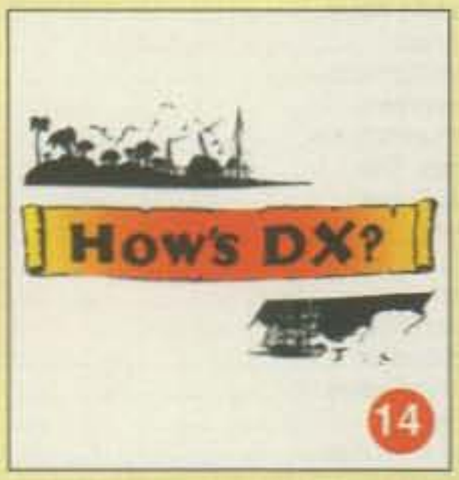

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525 E. 70th Avenue, 1W
Denver, CO 80229
(303) 288-7373

COD

FT-11R/41R
2m/70cm Handhelds

- **Frequency Coverage:**
  Wide Receiver Coverage:
  FT-11: 110-180 MHz RX,
  144-148 MHz TX
  FT-41: 430-450 MHz RX/TX
- Selectable Alpha Numeric Display
- New Compact Battery Design
  4.8V produces 1.5 Watts
  9.6V produces Full 5 Watts*
- 150 Memory Channels
  (75 when Alpha Numeric)
- AM "Aircraft" Receive
  (110-136 MHz)
- Small Compact Size w/ Easy Operation (measures only:
  4"H x 2¼"W x 1"D)
- Rx/Tx Battery Savers
- High-efficiency MOS FET Power Module
- Large Back-Lit Keypad and Display
- Up/Down Volume/Squelch Controls
- Built-in DTMF Paging/Coded Squelch
- Automatic Power Off (APO)
- **Accessories:**
  FNB-31 4.8V, 600 mAh Battery
  FNB-33 4.8V, 1200 mAh Battery
  FNB-38 9.6V, 600 mAh Battery
  FBA-14 6 AA Size Battery Case
  FTS-26 CTCSS Decode Unit
  NC-50 Dual Slot 1-Hour Desk Charger
  CA-10 Charge Adapter (required w/ NC-50)

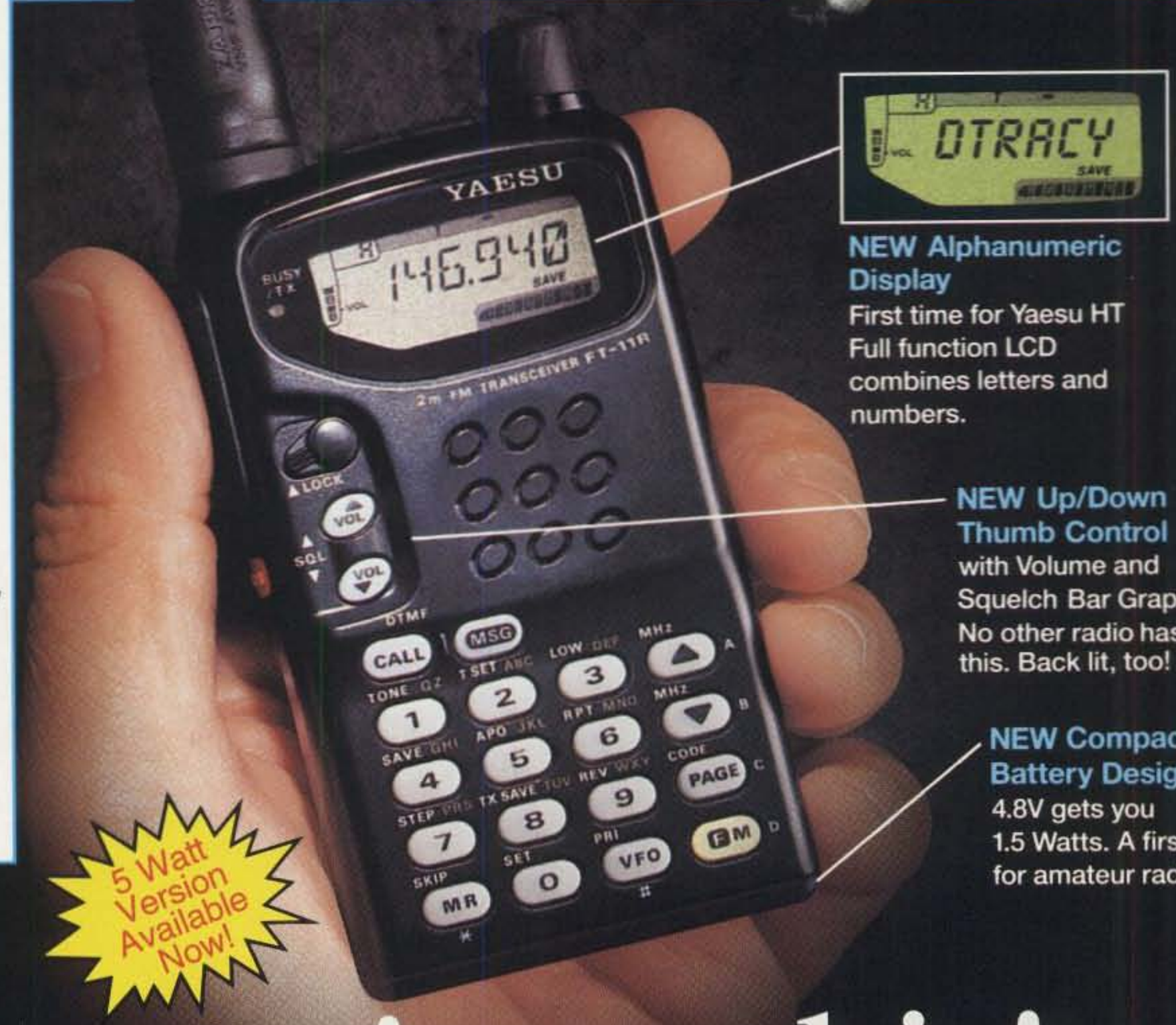
*FT-11 Only.
FT-41, 3.5 Watts

"Look, alphanumeric display and a 4.8V battery. Terrific!"

"Small and thin – with a full sized keypad! How'd they do that?"

"Yaesu did it again!"

NEW!



NEW Alphanumeric Display
First time for Yaesu HT Full function LCD combines letters and numbers.

NEW Up/Down Thumb Control
with Volume and Squelch Bar Graph. No other radio has this. Back lit, too!

NEW Compact Battery Design
4.8V gets you 1.5 Watts. A first for amateur radio.

5 Watt Version Available Now!

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 4"H x 2¼"W x 1"D

"Small" is relative, isn't it? It could mean size – which in this case it does. And, it could mean "reduced", which it doesn't! Nothing missing from the hot new FT-11R HT from Yaesu except bulk! You're going to wonder just how all the features of this full-function radio fit in. Until you remember Yaesu pioneered 2-way radio micro technology.

To see what this really means to you, check out all the new features. Like the alphanumeric display. This Yaesu HT first, lets you tag your favorite frequency by name, call sign or number. Or, the new "voltage stingy" battery. It's an industry first for amateur radio. Smaller and compact, the 4.8V battery gives you 1.5 watts on TX. And, if that's not enough, there's an optional drop in, dash mount battery charger.

You see it's not a small time performer. Just small sized. The FT-11R. Another small example of Yaesu superiority. See your dealer today!

YAESU
Performance without compromise.℠

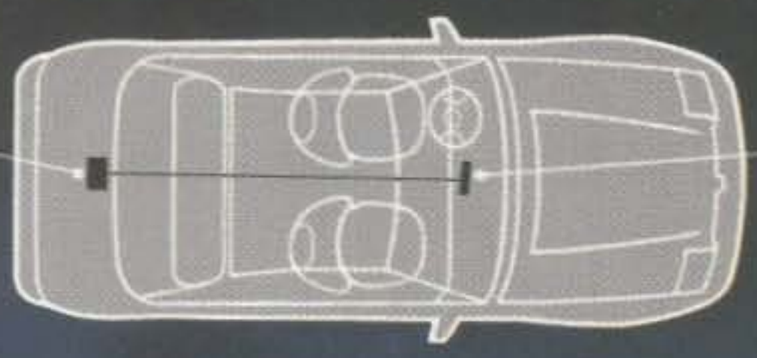
Compact HF Transceiver **FT-900AT**

that's going places.

For ease of use, Yaesu's exclusive Omni-Glow display enhances viewing in any light condition.

Trust Yaesu to know what you want. True HF you can take with you or leave at home!

100 Watt RF deck can mount in trunk, or under seat.



Detachable front panel mounts up front.

And, since the high speed antenna tuner is built-in, it means less clutter in your shack.

For sheer high-performance, anywhere, the incomparable FT-900AT ranks with the FT-1000 to further establish Yaesu as the choice of the world's top DX'ers.

Available now at your Yaesu dealer.

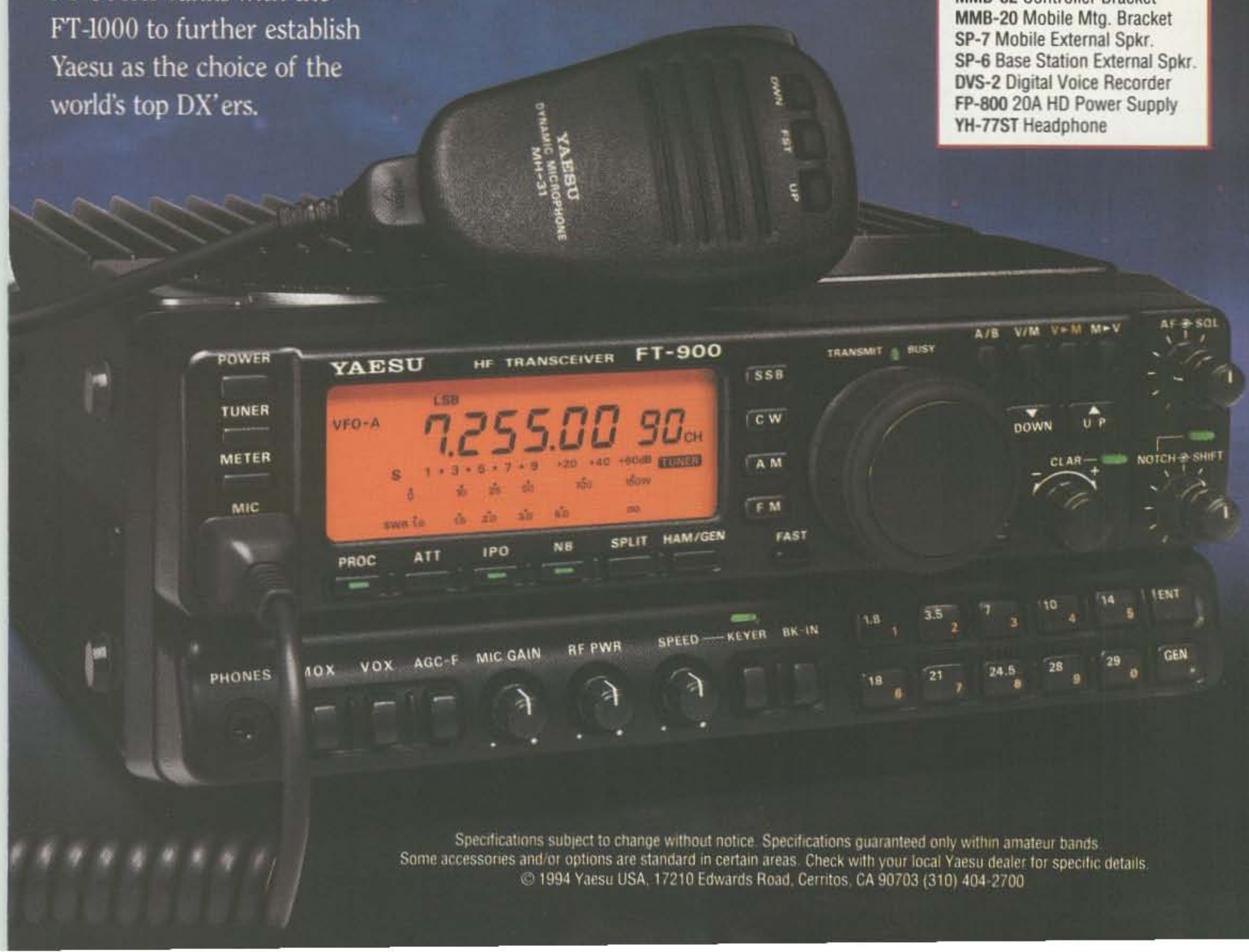
YAESU

Choice of the World's top DX'ers

Specifications

- Remote Front Panel Design
- Built-In Auto Antenna Tuner
- Direct Keypad Entry when used as a Base Station
- Large, Bright Omni-Glow™ LCD Display
- 100W on SSB, CW, FM modes; 25W on AM
- IF Shift and 30db Notch Filter
- Digital S/RF, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
- Direct Digital Synthesis (DDS)
- 100 Memory Channels
- Frequency Range
  RX: 100 kHz-30 MHz
  TX: 160-10 meters
- CW Full Break-in Keying w/ Adjustable Speed
- Fast/Slow AGC Circuit
- Intercept Point Optimization
- Duct Flow Cooling System
- Twin Band Stacking VFOs
- Built-in Noise Blanker
- Built-in Adjustable Speech Processor

ACCESSORIES:
YSK-900 Remote Mount Kit
MMB-62 Controller Bracket
MMB-20 Mobile Mtg. Bracket
SP-7 Mobile External Spkr.
SP-6 Base Station External Spkr.
DVS-2 Digital Voice Recorder
FP-800 20A HD Power Supply
YH-77ST Headphone



Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

EW HF

Introducing an HF

"With the small snap-off remote front panel design, it's an HF mobile."

"It's a great base, too. Direct keypad entry, built-in antenna tuner, CW keyer with adjustable speed, 100 Watts, Omni-Glow display... Wow!"

"Yaesu did it again!"

Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.

Uncompromising HF quality that will change your lifestyle. It's the first transceiver with true HF technology to go mobile in any vehicle or stay at home as a compact base station.

With its revolutionary, small, snap-off remote panel, the controls of the FT-900AT can install almost anyplace in your car, truck or camper. Since the 100 Watt RF deck can be installed under a seat or in your car trunk, it's away from critical automotive electronic wizardry. And, for ultimate convenience, the built-in antenna tuner simplifies in-car operation.

As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other features you'll like include CW keyer with front panel speed adjustment, speech processor, twin stacking VFOs, and IF Shift and Notch. No competitor offers this! Bonuses, such as signal strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability.

The FT-900AT controls mount almost anywhere in your car, truck or camper.

HURRY!
Offer extended for a limited time!
You Can Still Save $100.00
When you buy an IC-737A!
See your dealer for details.

HIGH PERFORMANCE

BEST FEATURES

ICOM's

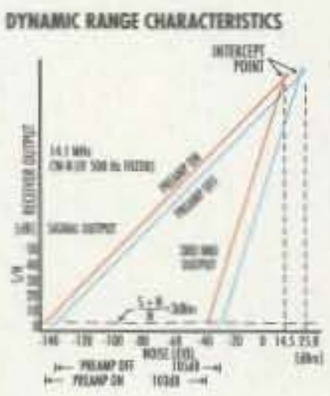
IC-737A

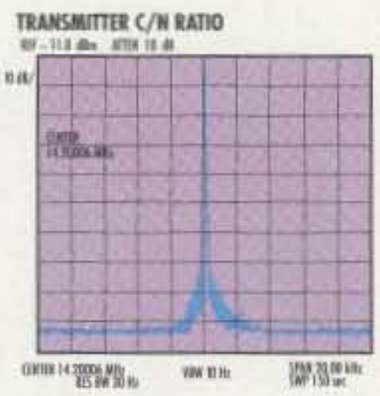
A Winning Combination of Performance and Features Previously Offered Only on Rigs Costing Thousands More!

HIGH PERFORMANCE

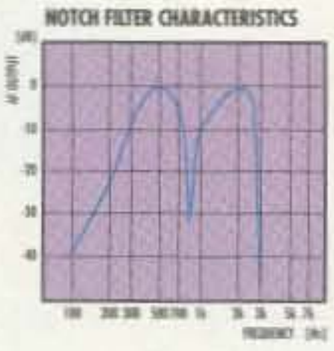
New D.D.S. (Direct Digital Synthesizer) System – Miniaturized and improved technology provides phenomenal performance increases (higher PLL lockup speeds and improved C/N ratio, phase noise and blocking characteristics).

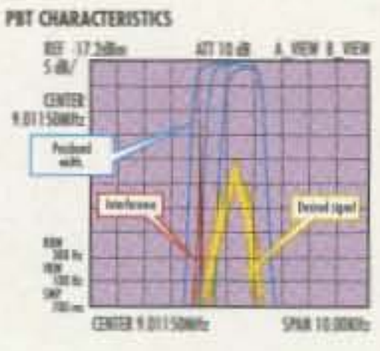
Pass Band Tuning – Electronically narrows the IF passband to eliminate interference signals (more effective than IF shift offered on competitive models).





Notch Function – Tune out an interfering signal frequency to eliminate unwanted CW or AM carrier tones, while preserving the desired signal's audio response. The combination of PassBand Tuning and Notch Function is very effective on crowded bands.





100% Duty Cycle – Large cooling fan and heatsink provide a stable 100 W in SSB, CW and FM modes (40 W in AM).

See your participating ICOM dealer today and view a video demonstration of this product!

VHS

More High Performance – With full break-in (QSK), built-in electronic keyer, speech compressor, noise blanker, fast/slow AGC, preamp, attenuator, many tuning functions (including direct keypad entry) and dual CW filters (optional).

BEST FEATURES

Auto Antenna Tuner – Fast, quiet and smart, *"Spot checks showed that it could match loads with indicated SWRs as high as 10:1"* (February 1993 QST review). Auto-preset memories for each band, **including 160 M.**

Quick Split Function – Transmit and receive frequencies are **displayed simultaneously**. Both can be tuned independently. Call DX stations operating split frequency faster than any of your competition operating a single frequency display model.

Auto Antenna Selector – Two antenna connectors let you select the best antenna for band and conditions from the front panel. Stores to both band memory and memory channels.

Double Band Stacking Register (DBSR) – Memorizes two frequencies and modes **in each band**. Can be used like extra VFOs in one band. Use one register for CW and the other for SSB if you like.

10 Memo Pad Memories – Push "Memo Pad–Write" to quickly store a frequency & mode, for example, if you find a piled-up DX station. Recall just as quick with "Memo Pad–Read."

Large LCD Display – Easy to read in all lighting conditions. Won't "wash out" in direct sunlight.

MORE GREAT FEATURES

- Voice Activated Transmit (VOX)
- 101 Memory Channels
- Multiple Scanning Modes
- General Coverage Receiver
- PC Compatible (w/optional CI-V)
- Many compatible options available
- Dial Lock
- All Mode Squelch
- Carry Strap
- Opt. Mounting Bracket

CIRCLE 163 ON READER SERVICE CARD

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