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ANTENNA SPECIAL

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ston, TX

AMATEUR'S JOURNAL

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The only transceiver that could replace our best seller

The TS-450S.

Kenwood's goal is to always offer our customers the most sophisticated achievements in technology. So, when it came time to enhance our best selling TS-440S transceiver, we didn't hesitate.

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The TS-450S offers competition class reception and 100 W transmission capabilities on all nine Amateur bands in SSB, CW, FM, and FSK modes, with 40 W on AM. The TS-690S also offers 50 W on six meters.

For amazingly clear reception, Advanced Intercept Point (AIP), greatly improves the receiver's dynamic range to an incredible 108 dB. An optional Digital Signal Processor, DSP-100, offers even further sound clarity by tailoring the incoming and outgoing audio passband signals.

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Accessories include: **PS-33** 20.5A power supply, **PS-53** 22.5A heavy duty power supply, **SP-23** external speaker, **AT-450** internal automatic antenna tuner, **AT-300** external automatic antenna tuner, **DSP-100** digital signal processor unit, **VS-2** voice synthesizer, **SO-2** TXCO, **MB-430** mobile mount, **PG-2X** DC cable, **TU-8** CTCSS encoder, **YG-455C-1** 500Hz CW filter for 455kHz IF, **YG-455CN-1** 250Hz CW narrow filter for 455kHz IF, **YK-88S-1** 2.4kHz SSB filter for 8.83MHz IF, **YK-88SN-1** 1.8kHz SSB filter for 8.83MHz IF, **YK-88C-1** 500Hz CW filter for 8.83MHz IF, **YK-88CN-1** 270Hz CW filter for 8.83MHz IF, **YK-455C-1**, 500Hz CW filter for 455kHz IF

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court
Mississauga, Ontario, Canada L4T 4C2

Kenwood meets or exceeds all specifications. Contact your dealer for a complete listing of specifications and accessories. Specifications are subject to change without notice. Complete service manuals are available for all Kenwood transceivers and most accessories. One year warranty in the U.S.A. only.

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TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

• Dual Frequency Receive Function. The TS-950SD can receive two frequencies simultaneously.

• New! Digital AF filter. Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• New high voltage final amplifier. 50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• New! Built-in microprocessor controlled automatic antenna tuner.

• Outstanding general coverage receiver performance and sensitivity. Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• Famous Kenwood interference reduction circuits. SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications, features and prices subject to change without notice or obligation.

The Ultimate Signal.

DSP

Digital Signal Processing

Without DSP With DSP

• Digital Signal Processor. DSP is a state-of-the-art technique that maximizes your transmitted RF energy.

• High performance IF filters built-in† Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• *Multi-Drive Band Pass Filter* (BPF) circuitry. Fifteen band pass filters are available in the front end to enhance performance.

• Built-in TCXO for the highest stability.†
• Built-in electronic keyer circuit.
• 100 memory channels. Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
• Digital bar meter.

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories
• DSP-10 Digital Signal Processor *
• SO-2 TCXO * • VS-2 Voice synthesizer
• YK-88C-1 500 Hz CW filter for 8.83 MHz IF *
• YG-455C-1 500 Hz CW filter for 455 kHz IF *
• YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
• YG-455CN-1 250 Hz CW filter for 455 kHz IF *
• YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
• YG-455S-1 2.4 kHz SSB filter for 455 kHz IF *
• SP-950 External speaker w/AF filter
• SM-230 Station monitor w/pan display
• SW-2100 SWR/power meter
• TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD
† Optional for the TS-950S

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Warp Drive!

TS-790A
Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as automatic uplink/downlink tracking. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ±3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.
- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio connector.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

Optional Accessories:
- **PS-31** Power supply • **SP-31** External speaker
- **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit • **TSU-5** Programmable CTCSS decoder
- **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones
- **MC-43S** Hand mic • **PG-2S** Extra DC cable

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The Radio Amateur's Journal

ON THE COVER: Keeping a tall tower topped with some fancy aluminum up in the air long enough to get some use out of it takes some heavy-duty hardware. Shown here is Richard Keller, K5WA, of Houston, Texas doing a quick check of one of the guy anchor points for one of his two towers. (Photo by Larry Mulvehill, WB2ZPI)

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ZERO BIAS EDITORIAL

One of the most common reasons people gave for not becoming radio amateurs was the Morse code. Most of the reasons centered around the code, and no matter how hard we tried to tell them how much fun CW is, somehow they didn't believe us. People kept saying that they could become interested in amateur radio and it did look like fun, but Morse code had to go. We as amateurs fought amongst ourselves for eight years over the CW issue. February 1991 saw the issue resolved and the start of a no-code amateur license.

The question of whether people would be serious about amateur radio without CW has been answered, I believe. From what people are saying at the hamfests we attend, enrollment in licensing classes is up, drop-out rates are lower, and more people are coming into amateur radio. Perhaps in the future we should put more stock in what people say.

A side phenomenon that I predicted some time ago is starting to happen. The interest in code tapes has gone up significantly. The pressure is off, and now people are starting to look at CW in a different light. Once they are involved with the hobby, CW takes on a different meaning and is not so abstract. It can be a means of enjoyment in and of itself or it can be a rung up a ladder, but now it has some relevance to what they are doing. It's simple human nature.

What else becomes simple human nature is that if these people new to amateur radio are having a good time, their friends will know about it and become involved. Judging from what I've seen and from our mail, these new amateurs are having a good time and have fit right in. With any luck this will tend to help lower our median age. Unlike some editors, I haven't reached that golden age where wisdom seems to pour forth (and pour forth) from some hidden spring. I don't know the answers to how to get large numbers of kids interested in amateur radio. I don't know why little Johnny or Jane can't read or do simple math either. In the latter case, however, I don't think more computers are the answer, as millions of people apparently learned how to read and add before there were computers.

It's very easy to proffer global solutions to specific problems, but that's the stuff by which committees are formed. Perhaps it's time to regress to one-on-one teaching. A few weeks ago I was stuck on a check-out line at a local discount store. I had a 15% discount coupon, and the young man at the register obviously couldn't figure out 15%, nor was there a 15% discount key on the fancy cash register/computer. It took about 20 minutes to get across to him the idea of 15% and then how to compute it. I'll leave it to someone else to explain 16%. These are tomorrow's adults, political leaders, heads of families, and, yes, amateurs. So forget global statistics, forget committees, and perhaps even forget role models, and just find one person to teach. Maybe it's as simple as that.

Hidden Antennas

One of my prized possessions is an antenna given to me by Jules Hoffer, W1DL. I keep it in my office, discretely placed in a flower pot so as not to "give away my position." This little beauty has a nomenclature of FSCM-81134 and according to Jules was manufactured by Electro-Voice as an antenna-microphone assembly. Apparently, these were placed in or dropped into jungle areas to eavesdrop on enemy activity.

I'll bet you were fooled too by this "top secret" antenna/plant. That's not a long black root coming from the pot. It's the coax.

With all due respect to Electro-Voice and apologies to whoever the enemy was, I don't think it fooled too many people. Perhaps it would be better if it had some leaves or Christmas ornaments, but its regular shape sort of defies a catalog of flora and fauna and just stands out. It does load up on 2 meters, though, and it certainly makes an interesting conversation piece.

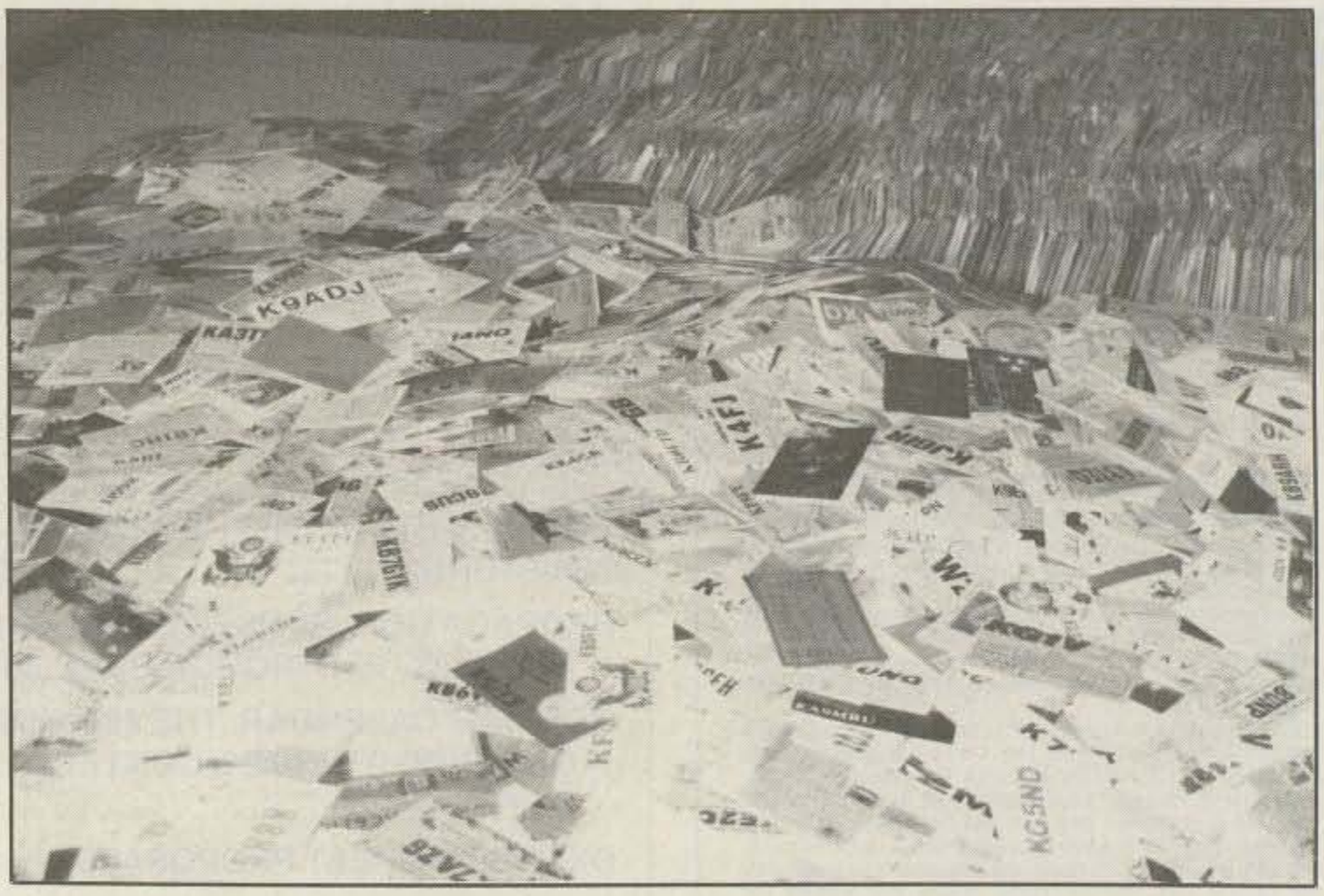
This Month

This month we have some interesting antenna projects and show what it looks like to have your amateur radio dream come true. I think most of us could live with the idea of a rotating tower. Real life got in the way of Roy Gould's amateur radio activity, and so we're about a month behind in presenting the results of our 1990 RTTY Contest. We're also reintroducing our VHF column, called "VHF Plus," edited by Joe Lynch, N6CL. Joe has an impressive biography, including having a position as Section Manager for the ARRL.

The Joys of DXpeditioning

A short while ago I received a surprising packet in the mail. It was postmarked Japan. When I opened it, I found all the QSLs from Kyoko during her Pacific tour. I had worked her from most of the places she went and really hadn't expected to see the cards for some time to come. Included with the cards was a note asking me to tell everyone that the cards would be going out and that it would indeed take some time. She included a few pictures of the cards yet to be answered. What you're looking at is the stack just from the US alone—over 30,000 cards to be answered. I don't know and she didn't say how many others there are to be answered, but I guess if there's a downside to DXpeditioning, it's coming home and finding this waiting for you.

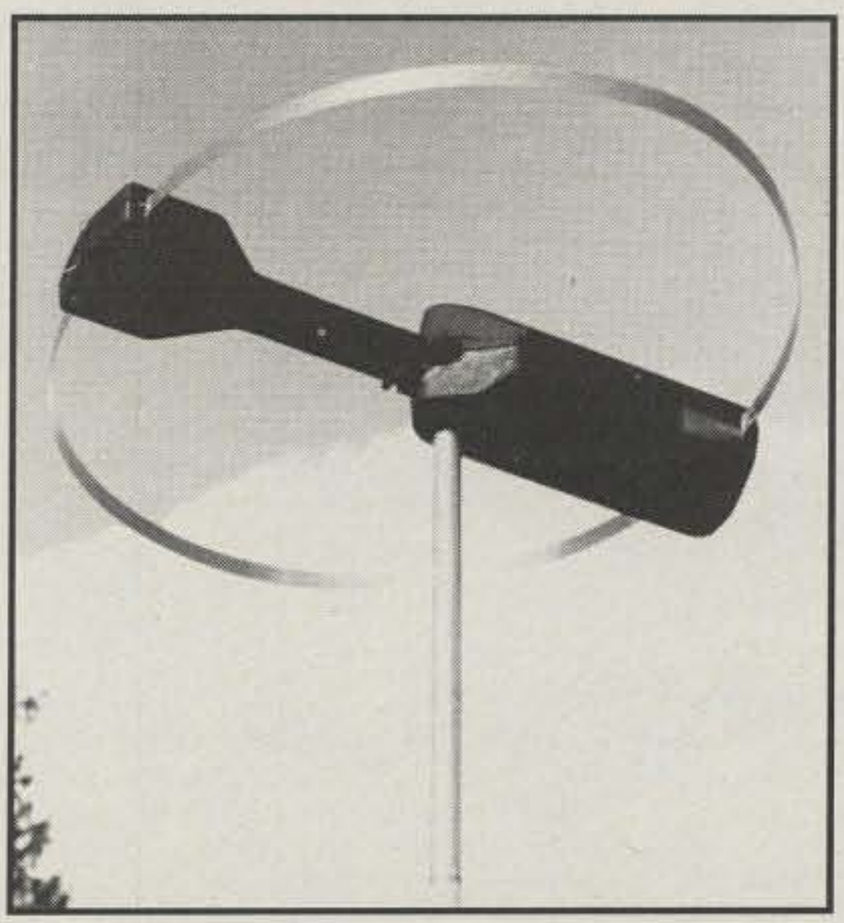
73, Alan, K2EEK



Coming home to this is enough to make you want to run away. This is what 30K-plus QSLs looks like, waiting to be answered.

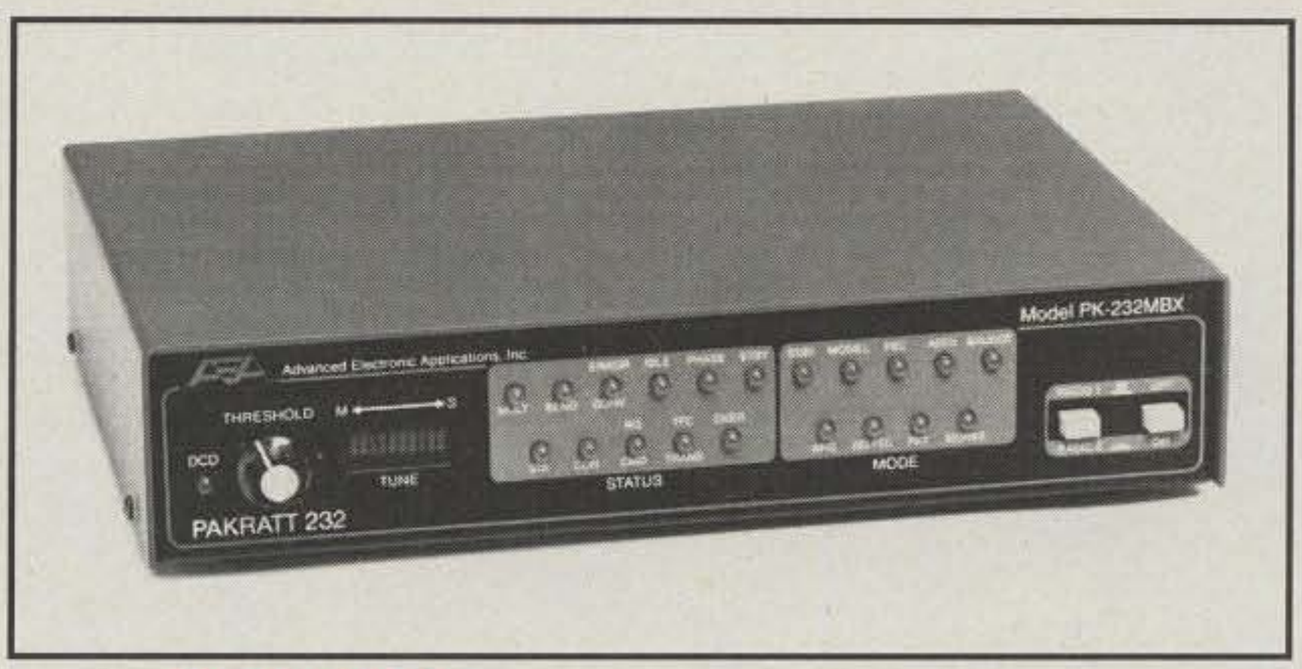
AEA is the...

Shortwave Solution



The IsoLoop 10-30 HF antenna is designed to work in limited space applications — apartments, condos, etc. Don't be deceived by its compact size (43" diameter) — it really works! Features include: Continuous coverage from 10 to 30 MHz; narrow bandwidth to suppress out-of-band signals; comes fully assembled (no mechanical joints); much more.

For complete information on these or any other AEA products, call the toll-free InfoLine at (800)432-8873.



The PK-232MBX is a must for the digital Shortwave Listener. By far the most popular multi-mode controller ever, it can receive seven different types of data signals including Morse code, Baudot, ASCII, TDM (Time Division Multiplex), WEFAX, NAVTEX and Packet. It also features: The indispensible SIAM which automatically identifies many types of digital signals; superior software support for PC compatible, Macintosh and Commodore 64 and 128 computers.

AEA-FAX is simply the best way to demodulate multi-level grey scale fax images received by your general coverage receiver. All necessary hardware and software is included in the package which also features: On-screen tuning "scope"; Autolist feature for unattended image capture and save-to-disk; "Daisy-chain" external RS-232 input allows AEA-FAX to share a COM port with a PK-232MBX or other Hayes-compatible device; up to 16 grey levels (VGA); also supports EGA, CGA and Hercules formats; prints to HP LaserJet or Epson compatible printers.

Advanced Electronic Applications, Inc.

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A4S
(10, 15, 20 Meters)
40 meter add-on available

A3S
(10, 15, 20 Meters)
40 meter add-on available

If you enjoy contesting, rag chewing or DX-peditions the Cushcraft tri-banders will make amateur radio more interesting. These antennas are used by more hams because they offer more performance and reliability with easy-to-use computer enhanced designs. They feature the highest quality materials with precision machined components and all stainless steel hardware.

A3WS, our newest model gives you uncompromised performance on 12 and 17 meters. With its light weight and clean profile it can easily be mounted with your existing tribander.

Easy-to-use kits will add 30/40 meters to the A3S and A4S and 30 meters to the A3WS.

MODEL	A3S	A4S	A3WS
Frequency, MHz	28, 21, 14	28, 21, 14	24, 18
Forward Gain, dBd	8	8.9	8.0
Front to Back Ratio, dB	25	25	25
2:1 Bandwidth, KHz	>500	>500	300
Power Rating, Watts PEP	2000	2000	2000
Boom Length, ft (m)	14 (4.3)	18 (5.5)	14 (4.3)
Longest Element, ft (m)	27.7 (8.4)	32 (9.7)	25.1 (7.7)
Turning Radius, ft (m)	15.5 (4.7)	18.4 (5.5)	14.4 (4.4)
Mast Size Range, in	1.25-2.0	1.25-2.0	1.25-2.0
Wind Load, ft² (m²)	4.4 (0.47)	5.5 (0.51)	4.1 (0.38)
Weight, lb (kg)	27 (12.9)	37 (16.8)	22.5 (10.2)
ADD-ON KITS			
Model	A743	A744	A103
Frequency, MHz	7 or 10	7 or 10	10

Heavy duty, high power trap coils.

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CIRCLE 30 ON READER SERVICE CARD

The Delta II...
Compact Power.

The Argonaut II...
QRP With Class.

These transceivers are identical except for the die cast heat sink that houses the 100 watt amplifier and accessory connectors on the Delta II. General coverage receive on AM, FM, LSB, USB, CW and the digital modes from 100 Khz to 29.999 MHz. Transmit from 1.8 to 29.999 MHz. on FM, LSB, USB, CW and the digital modes.

The top priority in this engineering effort was receiver performance. The result is impressive. Excellent sensitivity and dynamic range. Selectivity is dramatically enhanced by our unique Jones Filter (patent pending) which is an eight pole crystal ladder I-F filter. The band-width is continuously variable from 2.4 Khz to 500 Hz. This , in combination with our digitally controlled pass-band tuning and switched capacitor audio notch filter, provides QRM fighting weapons that are most uncommon in rigs in this price range.

The CW system is our best yet. QSK (of course) and a keyed wave-form that will embarrass some competitive transceivers that are substantially more expensive. Whether you prefer a calibrated tone or zero beat for matching another station's frequency is academic. Both methods are provided. The programed offset is 700 Hz. By using receive offset (RXO), you can set up for whatever operating audio frequency you prefer. Just to top it all off, a preset audio filter is switched in when the CW mode is selected.

Excellant SSB performance with built-in speech processor. Other standard features include a noise blanker, SWR bridge, 20 dB attenuator and multi-speed AGC and QSK. Dual VFO's plus memory scratchpad, independent receiver offset tuning with offset display and a momentary REVerse button to check the transmit frequency. Forty-eight memories, 15 with duplex capability. The "set and forget" controls for VOX gain, delay and anti VOX, plus CW sidetone level, are all front panel programed using our unique soft-touch system. There are no rear panel controls. All of this plus a two wire serial interface for remote control.

The liquid crystal display holds contrast even in direct sunlight. The electro-luminescent back lighting can be turned on/off. The display includes the multi-meter and shows mode, VFO status, clock or receive offset and frequency to 10 Hz.

Like all Ten-Tec designs, the Argonaut II and Delta II are designed to be field serviceable to the board level. The upper chassis deck is hinged for easy access to all three board mounting surfaces.

If you are a serious QRP operator, the Argonaut II was designed for you. If you are interested in an affordable 100 watt rig that loves to travel but has all the of the "big rig" functions and features, the Delta II is for you.

ACCESSORIES

Model 936. A 20 A, 13.7 Vdc, power supply for the Delta II. Primary power is 115/230 Vac, 50/60 Hz.

Model 290. Step attenuator. Reduces Argonaut II output power from 5 watts to 10 mw in six calibrated steps.

Model 291. 300 watt antenna coupler. For single wire or coax fed antennas. Uses SWR bridge in the transceiver.

Model 606. Electronic keyer. Energy efficient for battery operation.

Model 293. Mobile mount. For under-dash or floor installation.

Model 303. Fan kit for use on the Delta II. Recommended for extended full power operation in "key down" modes.

Model 935. A 43 watt, 13.7 Vdc, switching power supply for the Argonaut II. Primary power 90-270 vac @ 47-63 Hz.

Model 700C. Hand Mic
Model 705 Desk Mic.
Both models are electret microphones and may be used with any Ten-Tec transceiver with a 4 pin mic connector.

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Customer Service: 615-428-0364

FLYWEIGHT BODY with HEAVYWEIGHT FEATURES

Alinco's New DJ-F1/F4T Realized Super Compact Body and Plenty of Features including:

*40 Memory Channels store Frequency, Shift direction, Split operation Setting, Tone encoder/Tone decoder setting (with optional Tone squelch unit), DSQ setting, Tone frequency and Offset frequency independently.

*Digital Signal Display and Memory Function

The DJ-F1T/F4T has special memory channels for transmitting, receiving, and store "Two Digit" DTMF Tones, for communication messages. This feature allows for the DJ-F1T/F4T to receive a "Two Digit" message and display it at any later time, at the convenience of the operator.

*Wide Band Receiving range

F1T:140-170MHz(AM Mode 118-136MHz after modification)
F4T:430-460MHz

*Battery Pack Lock
*Pager and Code Squelch
*Triple Stage Selective Power Output
*5W Output Power with Optional Battery Pack EBP-18N
*8 Scan Modes
*Programmable VFO Range Function
*Battery Save Function
*Six Channel Steps - 5, 10, 12.5, 15, 20, and 25KHz
*Priority Function (Dual Watch)
*Automatic Power Off (Programmable Timed)
*Automatic Dialer Function
*Illuminated DTMF Keypad
*Many Optional Accessories such as:

EMS-8:Remote Control Speaker/Mic.
EME-11:Earphone/Mic. with PTT/VOX
EME-10:Headset with PTT/VOX
EJ-2U:Tone squelch Unit
EDC-33:Quick Charger (Compatible with standard battery pack)

and many more. . . . .

DJ-F1T

DJ-S4T

DJ-S1T/S4T is Simple Type and Low-Priced But Offers Features such as:

*5W Output Power with Optional Battery Pack EBP-18N
*Triple Stage Slective Power Output
*Dry Cell Battery Case Lock
*Programmable VFO Range Function
*Frequency Lock, PTT Lock Function
*One Touch Squelch De-Activation Function
*8 Scan Modes
*Wide Band Receiving Range

Available Features with Optional DTMF Unit (DJ-10U) and DTMF Keypad (ESK-1) Include:

*Pager and Code Squelch
*Digital Signal Display and Memory Function
*Automatic dialer Function
*Many Optional Accessories Available

•Specifications

Frequency Range:
DJ-F1T/S1T
TX:144-148MHz
RX:140-170MHz (AM Mode 118-136MHz after Modification)
DJ-F4T/S4T
TX:440-450MHz
RX:430-460MHz

Output Power:
* with Battery Pack EBP-16N (Standard for F1T/F4T)
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ANNOUNCEMENTS

• **"Youth in Amateur Radio"** - This amateur radio special event will be operated from three locations from 0001Z August 3 to 2359Z August 4. AA0CR, the 1991 *Westlink Report* Young Ham of the Year, will operate from St. Louis, MO; KB2IGG, 1990 Young Ham of the Year, will operate from New York City; and KK6BB will operate from Fullerton, CA. For a QSL from any station send QSL and contact number with legal-size SASE to AA0CR, P.O. Box 5832, St. Louis, MO 63134. For a certificate for contacting all three stations, send 3 QSLs and 3 contact numbers with 9 × 12 SASE. Suggested frequencies: General/Novice portions of 40, 20, 17, 15, and 10 meters (phone/CW).

• **The following special events will take place during August:**

KA1BB, from expedition to Flat Hammock Island, Fishers Island Sound, NY; Tri-City ARC; 1300–2100Z Aug. 4; lower 20 kHz of General phone and CW 10, 15, 20, 40 meters, and center of 10 meter Novice band. QSL with letter-size SASE via Tri-City ARC, Box 686, Groton, CT 06340.

WC2ADK, from 4-H Fair, Bridgewater, NJ; Somerset County Office of Emergency Management; Aug. 14–16 from 1400–0100Z each day; HF on lower 25 kHz of General 80–10 meters, packet, ATV, visitors on 145.32 simplex. Send QSL and SASE to Somerset County OEM/4H, P.O. Box 3000, Somerville, NJ 08876.

WA2VJL, from Dog Days of Summer, Rio Grande Valley, south Texas; San Benito ARC; 1800–0300Z Aug. 9–11; on 28.425, 21.315, 21.125 (CQ DOG). For folded certificate send business-size SASE (for flat 9½ × 11) to San Benito ARC, P.O. Box 1382, San Benito, TX 78586.

W2OB, from National Lighthouse Day, Barnegat Lighthouse, Barnegat Light, NJ; Old Barney ARC; 1200–2300Z Aug. 10–11; CW 7040, 14040, 21040, 28040; SSB 7275, 14290, 21390, 28390; FM 146.835 repeater, 146.52 simplex. QSL via Joe Fleishinger, NU2F, 75 Joshua Drive, Manahawkin, NJ 08050.

WB2OQY, from Gabby Hayes Days, Wellsville, NY area; Allegany Highlands ARC; Aug. 10 8 AM to 6 PM local time; contacts on 20, 15, 10, 2 meters. For certificate send QSL confirming time and frequency of contact to RD 1 Box 46A, Hinsdale, NY 14743.

WA3HJC, commemoration of 6th year of operation of Oil Creek & Titusville Railroad, Titusville, PA; Oil Creek Valley Radio Society; 1300–2100Z Aug. 3, and 1300–1700 & 1900Z Aug. 4; CW—Novice portion of 15 and 40 meters; SSB—Novice portion of 10 and General portion of 15, 20, and 40 meters. For photo QSL (canceled from the only operating railway post office car in the country), send QSL and #10 SASE to Mike Dziubkowski, N3GCY, P.O. Box 22, Titusville, PA 16354.

WA3DFU, from 115th year of Middletown Grange, Wrightstown, PA; Warminster ARC; 1400–0200Z Aug. 15–17; packet through WA3TSW, plus 147.09 + repeater and HF 25 kHz up on the General portions, CW on request. For QSL certificate send 9 × 12 SASE to WARC/WA3DFU, P.O. Box 113, Warminster, PA 18974.

N4KZR, from 300th anniversary of founding of Yorktown, VA; Southern Peninsula ARK; 1400–2200Z Aug. 16–18; phone General portions of 80, 40, 20, 15 meters and Novice 10 meter phone subband. For certificate send QSL with SASE to M.C. Ellis, 300 Artillery Road, Yorktown, VA 23692.

W7AIA, from 32nd annual antique aircraft fly-in, Evergreen Flying Field, east of Vancouver, WA; Clark County ARC; 1800–2359Z Aug. 17 and 1800–2300Z Aug. 18; lower portion of General portion of 40, 20, 15 meters and conditions permitting, on or near 28.455, in Novice/Tech portion of 10 meters. For certificate showing 1917 Jenny, send SASE only to CCARC, W7AIA, P.O. Box 1424, Vancouver, WA 98668.

KE8DL, from Coast Guard Festival, Grand Haven, MI; North Ottawa ARC; 1600–0000Z Aug. 1–4; on 7.225–7.250, 14.250–14.300, 28.400–28.450. For certificate send QSL and SASE to KE8DL, 1815 Hillcrest, Grand Haven, MI 49417.

W9DK, from WW II submarine *The Cobia*, Maritime Week, Manitowoc, WI; Mancorad RC; 1400–0000Z Aug. 17 and 18; on 7.250, 14.250, 21.350, 28.450. For certificate send QSL and SASE to Mancorad RC, P.O. Box 204, Manitowoc, WI 54221-0204.

W0MME, from 42nd annual Midwest Old Threshers Reunion, Mount Pleasant, IA; Mount Pleasant, Iowa ARC; Aug. 28 to Sept. 2; General portion of 80–10 meters phone and CW, especially 3970 kHz and local repeaters 147.39, 444.95 MHz. For QSL send SASE to Dave Schneider, WD0ENR, 507 Vine, Mount Pleasant, IA 52641-2846.

0-land, 125th anniversary of Cresco, IA and to honor some of its notables; Cresco, Iowa ARC members; 1400Z Aug. 23 through 0500Z Aug. 25 (24 hours a day); General phone portion of all bands plus Novice phone portion of 10 meters and 15 kHz inside CW Novice band. For certificate send QSL and SASE to station contacted by address listed in 1991 Callbook.

(continued on page 113)

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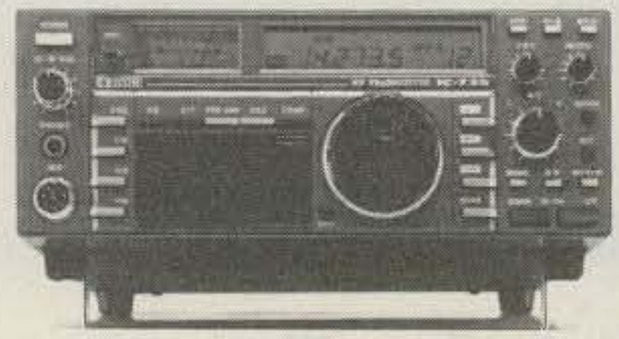

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Before we all turn as green with envy as Kermit the Frog, let's relax and enjoy the fantasy that WB2ULI/5 provides us with his accomplishment. His fantasy came true, and perhaps one day it might also work out for us.

Building the Ultimate Rotating Tower

BY PETER SEARS*, WB2ULI/5

The author, WB2ULI/5, shown like the mighty hunter with his trophy. This is something I think we'd all like to have some day.

After a move from New Jersey to Texas, there were many changes, challenges, and opportunities. A new job, a new home, new friends, and building a new antenna farm were part of the excitement. Prior to our move, my wife and I did a lot of careful house hunting. We found the ideal house. It has two acres right on the golf course and no antenna restrictions. As soon as possible, my 70 foot crank-up tower with monobanders for 10 and 15 was put up. At least I was on two bands.

Another part of our lot was selected for the "big" tower which would handle 20 through 160 meters. However, I had no experience putting up guyed towers, and I wanted to learn more about them before I set a plan into place. A friend at work told me about a local contest club that was having at its next meeting a guest speaker who was going to talk about mechanical aspects of towers and guy systems. I decided to go to this meeting of the North Texas Contest Club to hear the talk and meet some of the locals.

The speaker that night was Dick Weber, K5IU. His presentation was very informative, but I had a hundred questions. After the meeting I introduced myself and began with question one, hoping to get more information about tower erection and tower selection. It is hard to believe what happened during the next 45 minutes.

It turns out that Dick is a mechanical engineer (BSME, MSME, P.E.). Not only that, but he is also the owner of Rotating Tower Systems, Inc. I knew someone was building hardware to rotate a 45 and 55 tower, but until we started talking, I did not know it was him. He asked if I had considered putting up a rotating tower. My reply was no, because I was planning on putting up a Rohn 25G tower. He then asked if I would like to put up a Rohn 25G rotating tower. Standing in the parking lot with Dick, my tower plans quickly crystalized. Dick had just finished design and development of a guy-wire bearing and rotating base assembly for use with Rohn 25G. He was about to build the first production units which were to be used on another tower at his station. Well, those plans changed. The first units were now going to my station to build a 120 foot rotating tower, with Dick's help.

With a rotating tower my list of options grew, but a final configuration was quickly decided. The plan was to rotate the top 60 feet of the tower. This put the rotating base assembly at 60 feet with guy-wire bearings at 90 and 110 feet. An additional section of tower was to be mounted above the top guy-wire bearing, which would make a great mast to mount antennas. (I later found that a section of tower is a lot easier to climb than a mast.) For 40 meters, a 2-element Cushcraft 40 meter beam was to be mounted at 118 feet. On 20 meters one of the advantages of a rotating tower was exploited. Two 4-ele-

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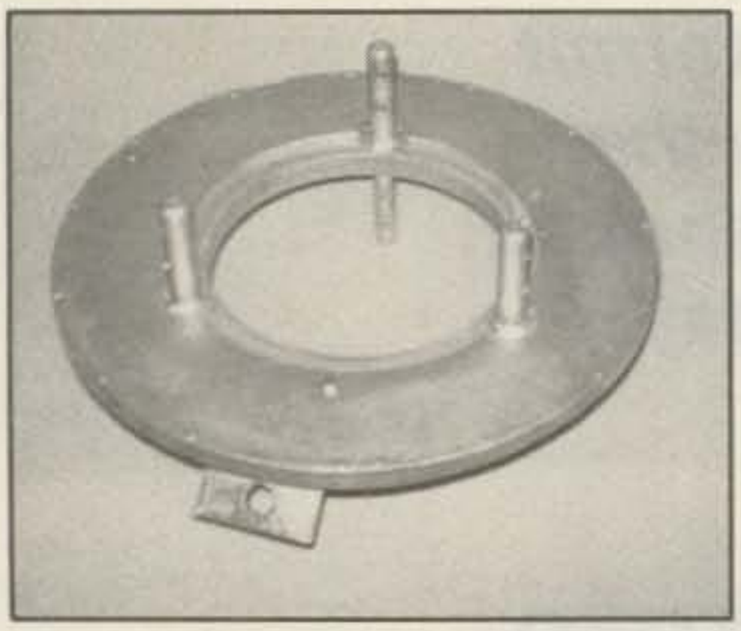
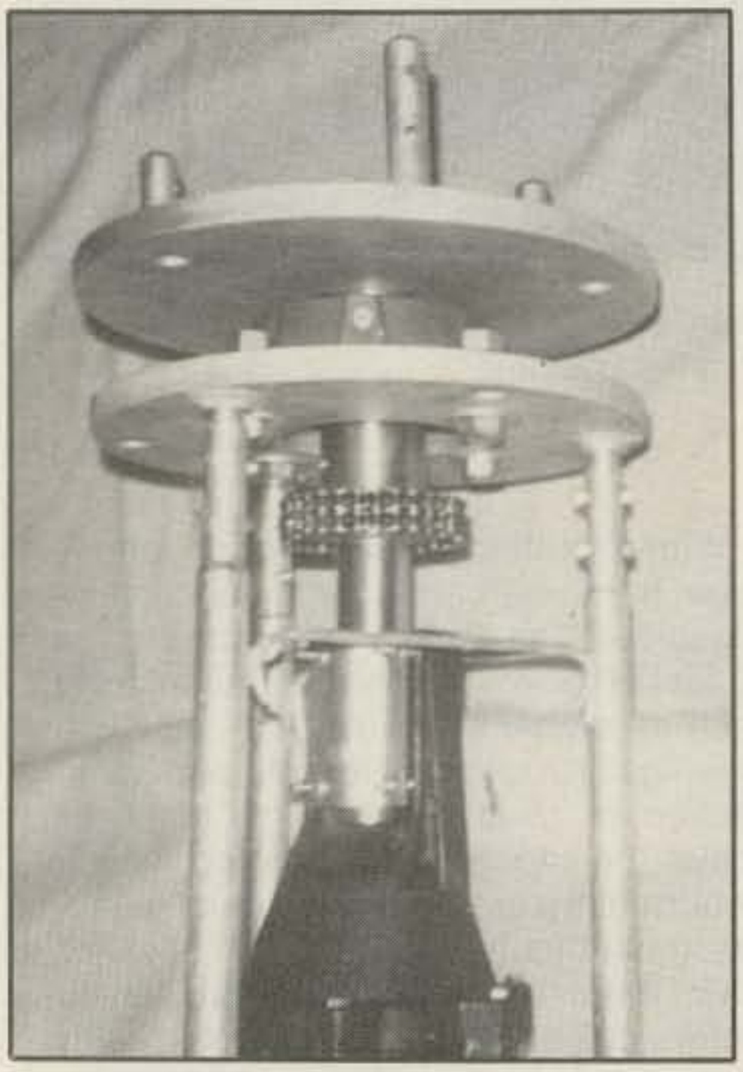


This is the guy-wire bearing assembly ready for installation.

ment Hy-Gain 20 meter beams were to be installed, one at 62 feet and the other at 111 feet. This plan took care of 40 and 20, leaving 80 and 160.

One of the features of the rotating base assembly allowed me to consider a very nice option for 160. The rotating base assembly had a grounding system as part of the design. The drive-shaft assembly, which attaches directly to the upper part of the base unit, goes clear through the support bearing and into the rotor. Once the shaft is below the lower support plate, there is an attachment point for grounding straps. The straps go from the drive shaft to the tower leg bolts. This scheme provides a direct DC and RF path through the base assembly without having any current flow through the tower support bearing.

What did I plan to do? The plan for 160 was to shunt load the tower. The shunt-feed wire would be attached to the tower at the 55 foot level, 5 feet below the rotating base unit. The beams would provide loading which would make the tower look longer electrically than its 120 foot length. All this loading would be okay on 160, but would hurt if shunt loading was attempted on 80 meters.



Here is the rotating base unit being checked out prior to installation.

On Dick's rotating tower he has several wire antennas end-supported by the stationary part of the guy-wire bearings. This gave me the idea of hanging an 80 meter ground plane from the top guy-wire bearing. The plan was to hook the top end of the vertical portion of the ground plane to the 110 foot guy-wire bearing with the feed point pulled away from the tower to clear the lower beam. This would put the feed point about 10 feet below the rotating base assembly. From the feed point there would be four radials run to nearby trees.

Over the next several weeks I discovered the joys of preparing for putting up a tower. I dug a hole for the base of the tower. Before the concrete was poured, I bolted a 10 foot section of tower to the concrete section and guyed it with temporary guys. This allowed me to level the two joined sections, so I did not have to do it while the concrete was being poured. Screw anchors were installed for the guy wires. The two lower levels of guying (28 and 58 feet) would go to one set of screw anchors. Farther out from the tower another set of anchors was installed to handle the guys coming from the guy-wire bearings at 90 and 110 feet.

Part of the planning of this system had me calculating guy-wire geometries. With a 20 meter beam mounted at 62 feet, there needed to be clearance between the farthest tip of the beam and the guy wires secured to the 90 foot guy-wire bearing. Even after all the calculating, checking and rechecking, it was a relief when the lower 20 meter beam was mounted and cleared the guy wires.

One concern I had was how to properly break up the guy wires with insulators, especially in the area where the guys pass the lower beam. The general scheme selected was to break up the guys into short nonresonant lengths near the tower and go to longer and longer nonresonant lengths the farther the guy got from the tower. This was done except at the level of the lower beam. Here an insulator was put at the same level of the beam with short nonresonant lengths above and below this level. The idea was to break up the guy wire into small lengths in the strongest part of the antenna's field.

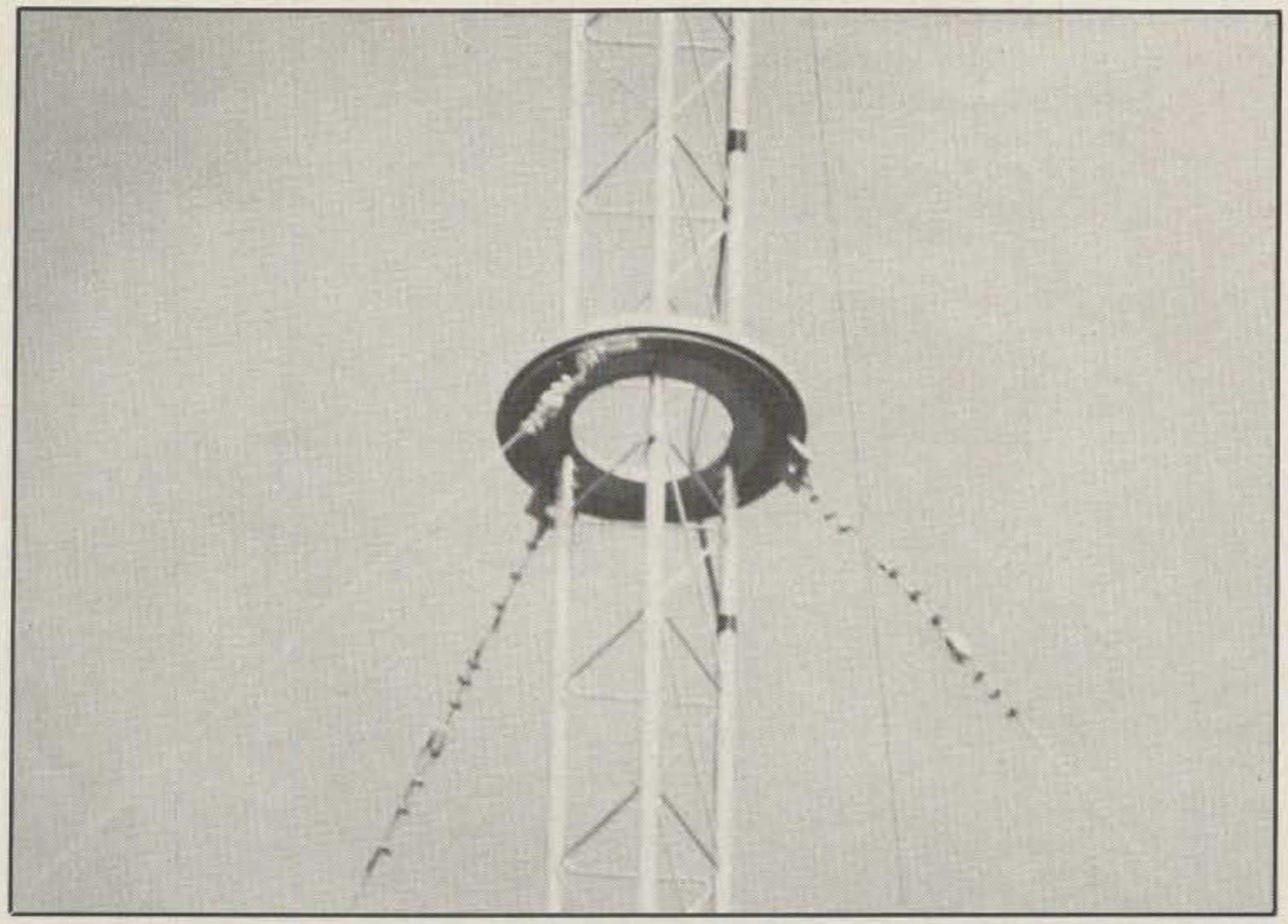
After doing the paper design of the guy wires, I discovered the joy of making up guy wires. This was made a lot easier with an abrasive cut-off wheel mounted in a hand grinder that Dick lent me. Cutting the guy wire into proper lengths became a very easy job. Installing the insulators and guy clamps was very time consuming, but not too bad a job. Since this was my first guyed tower, I enjoyed doing these things and learned a lot in the process. I had a lot of help, though. Dick provided a lot of advice and special tools.

This is what it looks like when the rotating base unit is installed. The switch box can be seen to the right.

While I made up feed lines and completed making the guy wires, Dick had the rotating joint and two guy-wire bearings fabricated. While all this was going on, he also built a tram system to put the beams on the tower. Finally, the tower sections arrived and things were about ready. Dick took one of the tower sections home for a slight modification. He cut out the diagonal cross braces in the topmost part of the section so a Tail Twister rotator could be mounted. He then assembled the entire rotating base unit. After check out, the rotor was left mounted in the tower so it could be pulled up with the tower.

Since I had never put up a guyed tower before, I had no experience and had only an idea of the equipment needed and what to do. I was reassured that we could handle it.

The day after Thanksgiving was the start date. Plans were made. In addition to Dick and me, Andy Bonnot, KF5QR, volunteered to help us. The morning of the planned day Andy and Dick arrived. Dick's truck was full of tools, climbing



A guy-wire bearing installed at the 90 foot level.

belts, a gin pole, ropes, more ropes, pulleys, gadgets I did not recognize, and of all things, a *theodolite* (a surveyor's instrument for measuring horizontal and vertical angles).

The first day went well until the winds picked up. Putting up the sixth section was a bit taxing, but we managed to get it installed and the guys fastened. We had the 28 and 58 foot guys installed, but the tower needed to be straightened. This is where we used the theodolite. It was alternately set up at two locations 90 degrees apart, and we adjusted the guys until the tower was straight within a quarter inch over its entire length. The rest of the day we couldn't work on the tower, but at least a good start had been made. The wind was not welcomed, as it was only 2 PM when we quit. We made plans to meet again the next day with the goal of installing the rotating base unit and continuing to erect tower sections.

The rotating base unit is a very strong and well-built piece of hardware with all parts hot-dipped galvanized. There are four pieces to the unit. There is a lower round plate, an upper round plate, a very large bearing used to support the rotating part of the tower, and a nickle-lated drive shaft assembly. In the first step, the lower round plate was secured to the top of the 60 foot section, which already had the rotator installed in it. The plate has three stubs which slip into the tower legs and fasten with the standard leg bolts. Next the drive-shaft assembly was dropped through a clearance hole in the lower plate and slipped into the rotor clamp. Then the bearing was put on and its bolts tightened. After this was done, the top round plate was set on top of the bearing, and five large bolts were installed through the top plate into the upper end of the drive shaft.

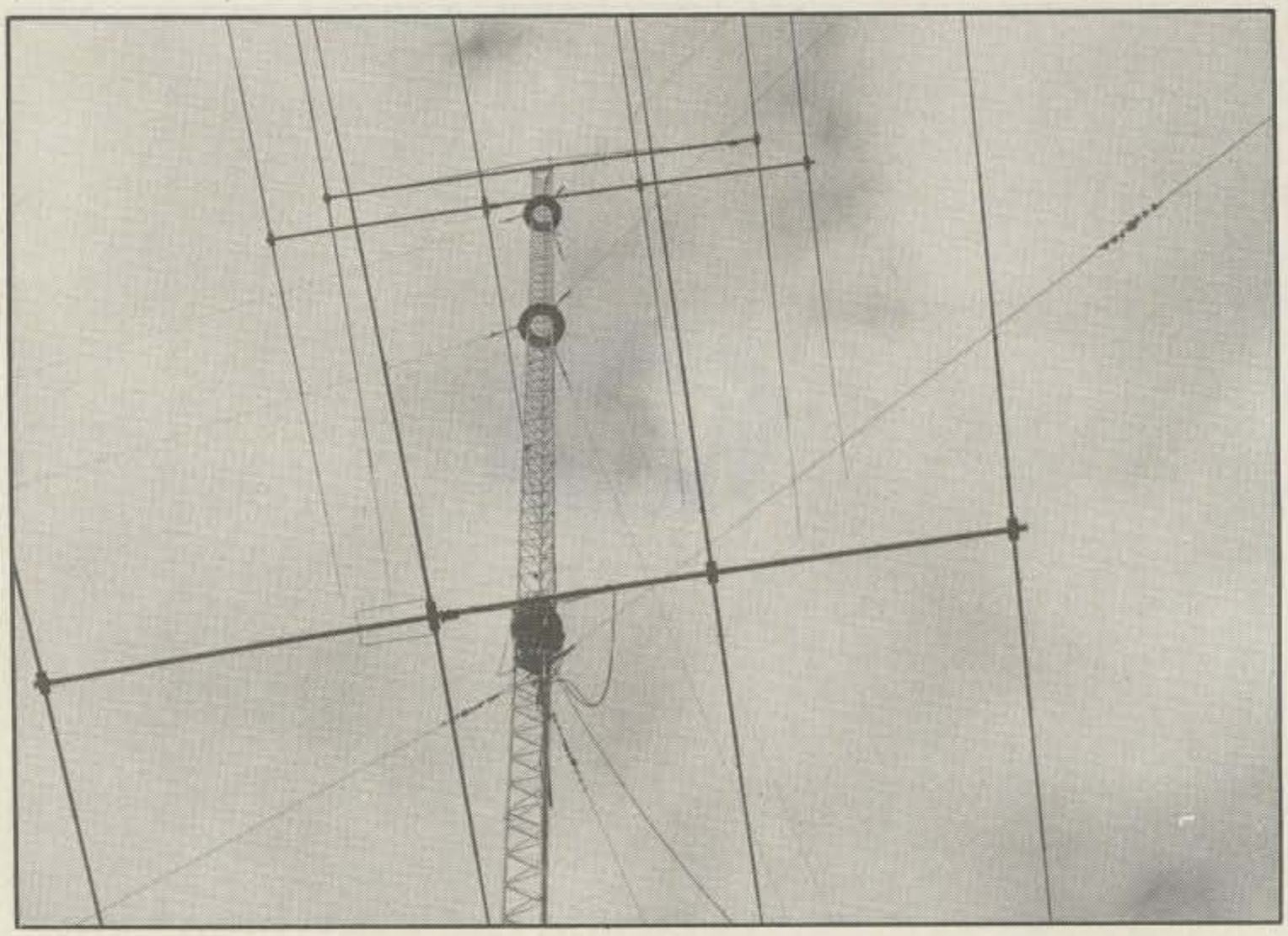
The last thing was putting in three temporary large threaded rods. These rods were installed to lock-up the base unit. This was needed to prevent rotation of the base unit and to allow additional tower sections to be installed until the first set of guys above the base unit were on. After the first level of guying above the base unit is installed, the rods are only needed to prevent tower rotation.

The next day the wind blew again, but much worse. We did complete the base installation, but it was impossible to consider putting up tower sections. Andy and Dick left after lunch. I had a talk with the wind. With two days cut short due to wind, I was afraid we would strike out on day three. However, the winds heeded my blasphemy. The last 60 feet of tower went up easily even though this included installing two guy-wire bearings.

The guy-wire bearing slips in between

Dick Weber, K5IU, using the theodolite to level the tower during assembly.

Last-minute tensioning of the guy wires by the author.



Looking up at the 120 foot tower shows the completed project.

two tower sections. It has stubs which slip into the lower tower section and into the tower section above. Like the rotating base unit, it secures with standard leg bolts. The guy-wire bearing is a work of art. It has two 1 inch thick steel plates machined to make the inner and outer races of a large-diameter ball bearing. The internal races are designed to take horizontal and vertical loads. Over 180 precision balls are loaded into the race. There is a bolted-on cover which does two things: It holds the bearing halves together and shields the assembly from the weather. The way the cover shields the bearing, it would take more than half an inch of ice to temporarily lock up the bearing. Ice and snow cannot get inside the bearing, but ice, if thick enough, could bridge the gap between the cover and guy attachment points.

This bearing is really built for years of service. All the welding is top notch, and the careful machining results in a bearing which is very easy to turn. As with the base unit, the parts are hot-dipped galvanized.

Installing the guy-wire bearings was no trouble at all. They were pulled up the tower with the gin pole and slipped into place.

The big moment had arrived. The tower was up with all guy wires fully tensioned. Quickly the threaded rods restraining the base unit were removed. Using only a finger, the top 60 feet of tower was easily rotated. At this moment all the work and preparation paid off. After everything checked out, the rods were put back in and we began preparing for installation of the three beams.

The only problems encountered during installation of the beams were weather related. Either it was too windy or it was raining. However, over the next several weeks the beams were installed without any problems or much effort thanks to the tram we used. The tram has two pulleys which ride on the tram rope while the boom of the beam is secured to a cross arm below the pulleys.

The lower 20 meter beam was installed first. Dick's truck was parked about 160 feet from the tower and became the anchor for the tram rope. The tram, with beam, was then pulled up the tram rope with a tow line tied to the tram structure. The tower end of the tram rope was tied to the tower about 2 feet above the mounting spot for the beam. When the beam reached the tower after its ride up the tram rope, the U-bolts holding the boom to the tram were taken off and the beam transferred to the tower.

It was a sight to see the top beams being installed. It was such a sight we forgot to take pictures. A few of the neighbors were amazed to see a huge aluminum antenna suspended 90 feet in the air passing over the corner of my house on its way to the 110 foot level of the tower.

With the beams installed, the vast majority of the work was over. The next step was to secure the rotor to the drive-shaft assembly and rotate the array. The tower was aligned, and the rotor clamped to the drive shaft. What a wonderful sight! All that pretty aluminum turning smoothly and effortlessly. I could just imagine all the DX waiting for my thundering signal.

After a few minutes of admiring the installation, it was time to begin installation of the feed lines and matching sections, or there would be no thundering signal.

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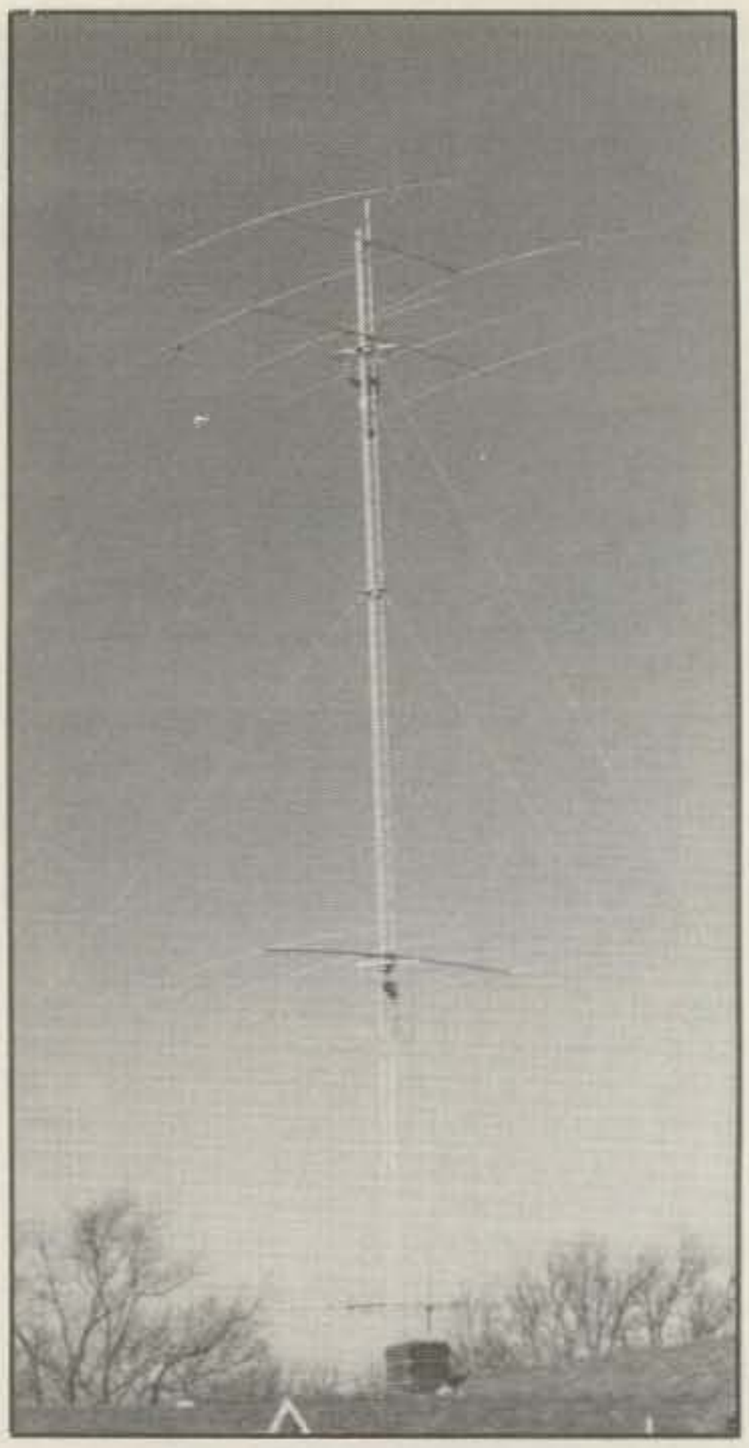
The 40 meter feed line was strung up the tower and connected to the pigtail hooked to the driven element. The 20 meter antennas were phased together permanently with a matching harness. I did not think being able to switch between the upper antenna, lower antenna, or both antennas was worth the trouble of building a switching unit.

The matching harness consisted of quarter-wave 75 ohm coaxial cables feeding each beam. The two 75 ohm cables were joined with a tee and then off to the shack via a 50 ohm cable. Since the quarter-wave sections would not reach between the beams, equal lengths of 50 ohm cable were used to make up the distance between the ends of the 75 ohm matching sections and the baluns on the 20 meter beams. Both the 40 and 20 meter cables were brought down the tower legs and run about 3 feet out on the boom of the lower 20 meter beam. This was done so a device loop was created by drooping the cables from the boom to the stationary tower below the rotating base unit.

Just below the rotating base unit I had mounted a switch box to choose between the 40 and 20 meter beams, the planned 160 meter shunt feed system, and the planned 80 meter ground plane. The 160 meter and 80 meter antennas were going to have to wait a few days until I tried out the beams.

How do the beams work? Well, after a quick SWR check on 40, I began looking for a DX station. I quickly found a large pile-up which turned out to be 3Y5X. The VFOs were set for split, the keyer programmed, and the beam aimed. I then called with the pack. Wow! He came back first call.

After my blood pressure returned to normal, I worked a lot of other DX stations which confirmed the 40 meter beam was doing an excellent job. Results on 20 were very pleasing. Comparing signal reports with some VUs and 4S7s showed my signal to be two S units higher than a friend's about 30 miles away. He was using a large tribander at 60 feet running the same power. Further testing with my friend showed my stack to be about two S units higher on the long haul and during band openings and closings. During peak hours my stack was about one S unit higher.



To get an idea of the size, the bottom edge of the picture shows the roof of the author's home. This antenna installation is sure impressive and obviously a work of love.

Am I happy with my rotating tower? Yes, indeed. The system has been through several severe Texas-size storms without any problems, and the tower rotates flawlessly and effortlessly. The use of the rotating base unit and guy-wire bearings has let me build a highly versatile and effective antenna system. It has allowed me to have two stacked monobanders on 20 and a monobander on 40 all with common rotation.

Other ways to approach this level of performance would be to have separate towers to rotate upper and lower 20 meter beams. Or, you could have a lower 20 meter beam fixed mounted or on a side mount, giving limited rotation.

I believe I have the "Ultimate Rotating Tower" because I have achieved a no-compromise system for 20 and 40 with added versatility to hang wire arrays and to shunt load the entire structure. I have been able to do this economically by using a single Rohn 25G tower and rotor. I have one tower's worth of guy anchors, one feed line, one rotor cable, one control cable, and have taken up one tower's worth of real estate. Is this the "Ultimate Rotating Tower"? CQ

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IC-781

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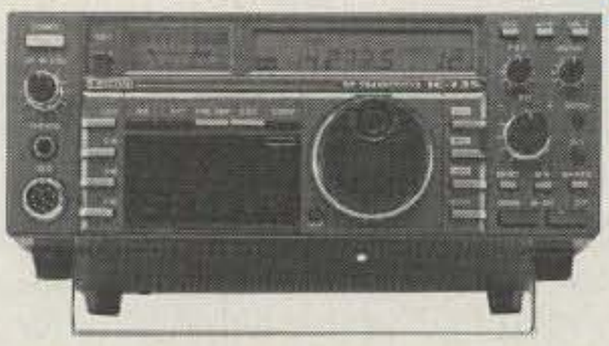

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Here's a neat idea that's also a quick building project. If you're into building and trying out antennas, this one's for you.

How To Build A Remotely Controlled Bridge For Impedance Matching

BY RICHARD A. GENAILLE*, W4UW

It has always bothered me that I have never been able conveniently to determine the feedpoint impedance of an antenna that is hanging in mid-air out of normal reach. I own four commercially manufactured devices called either SWR and power meters, antenna impedance meters, or noise bridges. I also have a couple of "home-brew" SWR meters. Invariably, in the instruction manuals provided I am told that the best point at which to determine the antenna's impedance is at the feedpoint of the antenna, or "where the transmission line connects to the antenna." If the antenna in installed and the feedpoint is up in the air above the top of my ladder or not near a suitable support, then my chances of testing at the feedpoint of the antenna are nil—unless, of course, I can fly!

The instructions tell me that I may not be able to make a valid measurement at the "shack" end of the feedline because the resistance and reactance that my test instrument sees change with the length of the feedline. However, it can be done! All that I have to do is use a "magic feedline length" called a half wavelength or any multiple of a half wavelength. Not so fast, bucko! "Caveat Emptor." Let the buyer beware! I can't use the standard formula of 492/f MHz by itself. I need to shorten it by the velocity factor of the feedline's dielectric. If you do much antenna work, you may wind up with 250 feet or more of specially made, multi, half-wavelength test feedlines, depending upon the number of bands you might work and based on the distance from the antenna's feedpoint to a convenient testing location.

I was planning to erect a four-band multiple-dipole antenna system and wanted to know what the feedpoint impedance was for all four bands. When I thought of having four different frequency dipoles tied together and fed at the center by one feedline, I remembered the shortcomings of my various test instruments. I also had visions of chopping up some coax feedline to get those half-wave lines that I knew I would need for determining the impedances at the feedpoint for four different bands! The original article that described the multiple-dipole antenna merely said that "the antenna system showed an impedance of close to 70 ohms on all bands, and the SWR on a 75 ohm line was low and nearly constant." That statement didn't satisfy my curiosity. The answer was simple. Why not build a bridge that could temporarily be attached to the antenna feedpoint and remotely operated from *terra firma*!

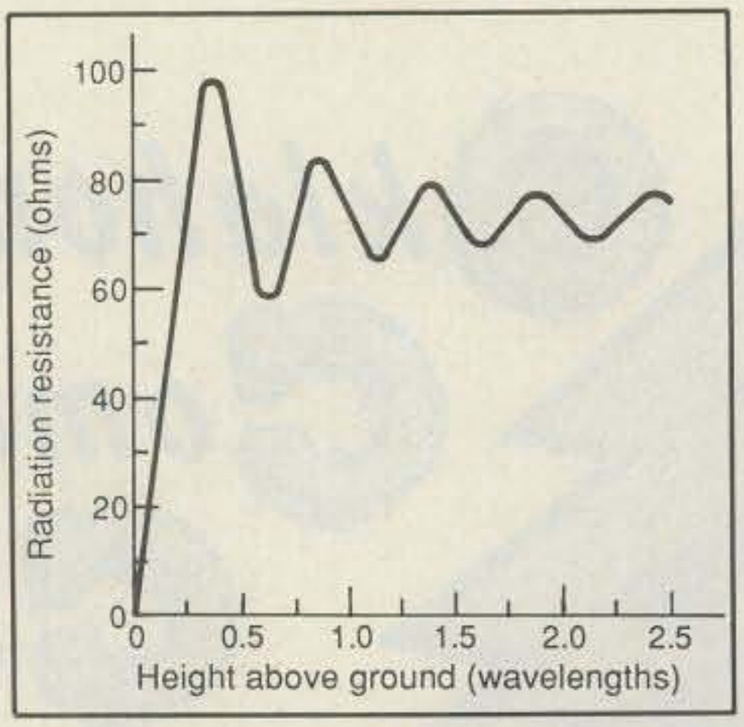
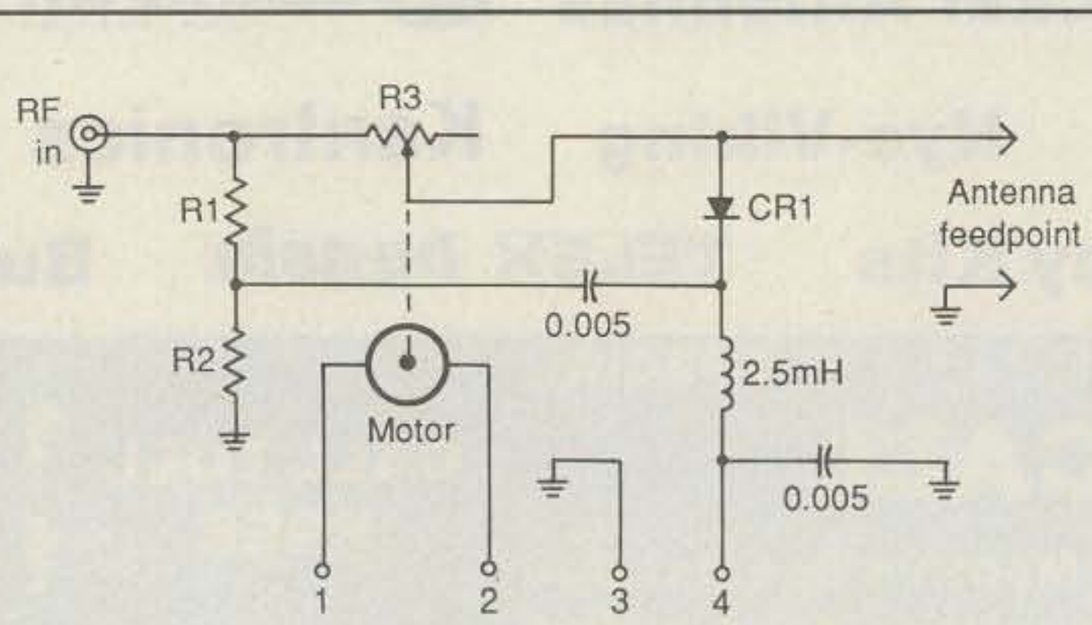


Fig. 1– Radiation resistance of horizontal half-wave dipole at various heights above ground.

Studying the chart of fig. 1 caused me some concern. The height of my new multiple dipole would be about 43 feet above ground level, not over perfectly conducting ground upon which the chart is predicated. Not only that, but there would be a house underneath it with a lot of wiring and plumbing hidden inside. Where is the



CR1—General-purpose diode, 1N34A or equivalent
R1, R2—51 ohm, Philips or Sylvania ECG (flameproof), matched 1 watt
R3—500 ohm variable, noninductive, Allen Bradley Type J or Ohmite Type AB
MOT—DC motor, Ingraham, 3 VDC, 2/3 RPM

Fig. 2– Remotely controlled impedance matching bridge.

*719 Quarterstaff Rd., Winston-Salem, NC 27104

chart that tells me what the radiation resistance is under these circumstances? There "ain't" none!

The 43 foot height could represent a wide range in radiation resistance for the four bands of interest. It might be 60 ohms on one band and 90 on another. I could take a coward's way out and just connect my 50 ohm feedline, and if my transmitter didn't like what it saw I could use an antenna tuner or "The Coax Line Stretcher"[1]! The challenge was to be able to check at the feedpoint, and then I would know for sure what the impedances were for each band. That way I could build a simple balun or matching transformer that might handle the average of the values found, and I would have a closer match of the feedpoint to the feedline and forget about needing a tuner.

The remote-controlled impedance bridge is nothing more than a standard bridge used for checking SWR, except that we are not interested in reading the incident voltage—*only* what is reflected. The technical object is to use a variable noninductive resistor, remotely controlled, to get the bridge voltmeter to read zero with whatever the antenna feedpoint load might be.

A simple dipole will show resistance at its feedpoint at resonance. Therefore, adjusting the appropriate bridge arm for a zero reading will tell us what the feedpoint impedance is. Fig. 2 is the schematic of the unique bridge.

The physical object is to make the unit as lightweight as possible to reduce sagging of the center of the antenna at the feedpoint. A small motor is mechanically coupled to the shaft of the variable resistor (potentiometer). The reversing switch for the motor and the metering circuit are installed near the operating position or wherever the source of signal and DC voltage for the bridge motor is located. The motor is a small surplus motor apparently used in computer systems. I purchased several of these at the Dayton Hamvention a few years ago and wish that I had obtained a dozen or so. The fellow who was selling them had a cardboard carton full of them for a few bucks each! I have seen similar small, reversible DC motors at other hamfests, so they should not be too difficult to find.

Construction of the unit is shown in photo 1. The variable resistor, R3, is critical in that *it should be noninductive*. The types specified are also available in fair quantities at hamfests. To make identification easier a typical unit is shown in photo 2, with and without the cover. Some potentiometers have a small connecting wire tied to the movable contact. If the stop is removed to permit continuous 360-degree rotation, thereby eliminating the need for automatic reversing arrangements, the connecting wire will break if the motor rotates the shaft of the potentiometer continuously. How the potentiometer is constructed can be determined by removal of the cover.

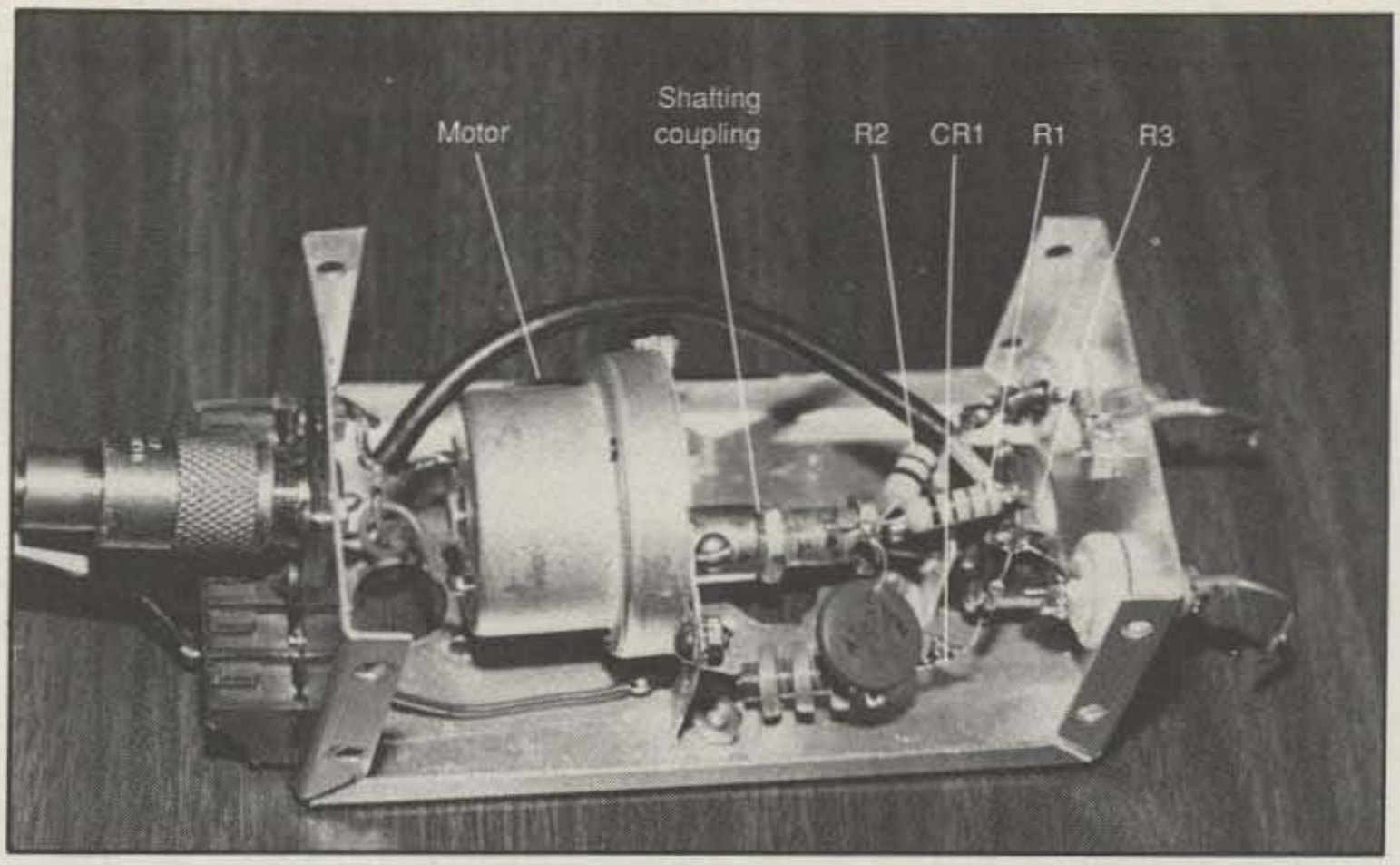


Photo 1– Parts placement for remotely controlled bridge.

Regarding the unit shown in photo 2, the cover contains an indentation which restricts the rotation to about 270 degrees. Removing the cover permits continuous rotation and reduces overall weight by a small amount. I removed the cover and painstakingly punched out the indentation, which was a lot of trouble. Unless you are going to drag the bridge around in the dirt or make measurements in the rain, the cover should not be required. Other potentiometers may have different stop arrangements.

RF signal, meter, and motor connections are made using RG58U coax and a 4-wire antenna rotator cable. The total length of my cables is about 75 feet. However, this could be more or less depending on how high your antenna will be located and how far away your source of RF and DC is. I use a small regulated DC power supply to power the motor and adjust the voltage to provide the exact amount required by the motor, allowing for drop in voltage due to the length of the cable to the unit.

The arrangement of the reversing switch for the motor and the metering circuit are shown in fig. 3. The meter shown will provide full-scale deflection with no termination on the bridge under the conditions specified. However, R4 can be used to adjust the meter reading when power is first applied to the bridge.

Try to keep the weight down as much as possible, whether it is by selecting the smallest motor to do the job, using smaller sized coax, etc. My unit doesn't weigh much more than an encapsulated balun, so there is not any more sag than usual at the center of the antenna.

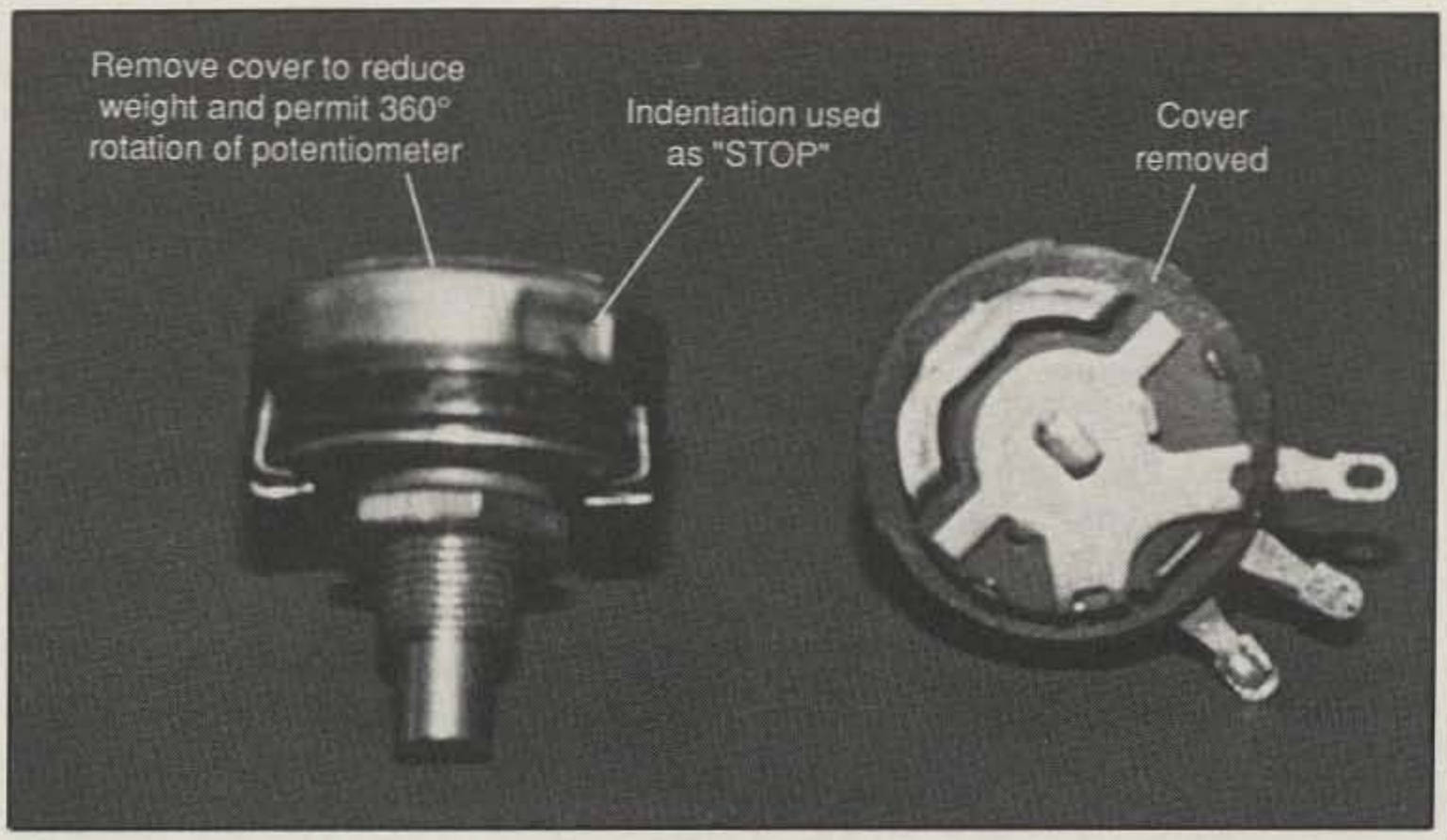
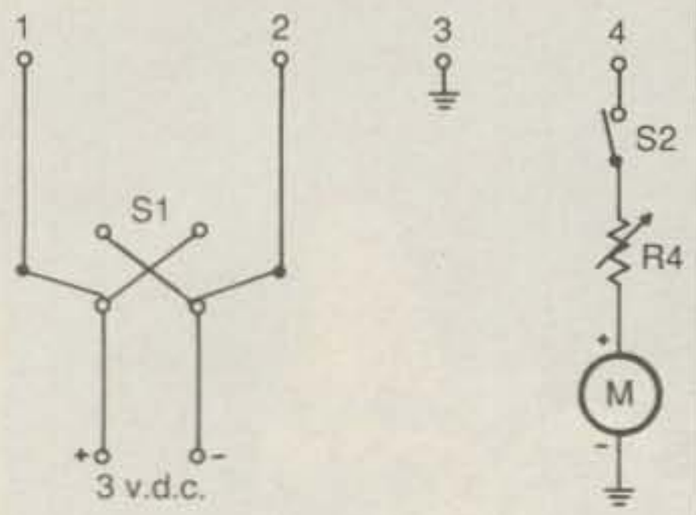


Photo 2– Noninductive potentiometer made by Allen Bradley or Ohmite.



SW1—Switch, toggle, DPDT, center off
SW2—Switch, toggle, SPST
M—0-100 DC microammeter
R4—5000 ohm variable

Fig. 3– Local metering and motor power source.

Using The Bridge

To use the bridge first make the necessary cable connections to RF power, DC power, and to the metering circuit. While on the test bench, check the operation of the motor-driven potentiometer by applying voltage and operating the reversing switch. Apply RF signal from a signal generator or transceiver, making certain that the warning shown in the caption of fig. 4 is observed. Normal signal generator output should not be any problem.

Assuming that you have a bridge meter reading, adjust R4 for close to a full-scale reading. Connect a 50 ohm noninductive resistor across the terminals of the bridge identified as "antenna feedpoint." Operate the motor reversing switch, causing the motor to continue running until the bridge meter indication drops to zero. At this point bridge potentiometer R3 should have come to rest at the 50 ohm point, and the bridge is balanced as indicated by the zero meter reading.

To check the resistance of bridge resistor R3, disconnect the RF connection to the bridge, switch off the meter, and remove the 50 ohm test resistor. Using a reasonably accurate ohmmeter, read across R3 from the **RF IN** jack to the wiper terminal of R3. The reading should be the same as the 50 ohm test resistor. Try the same procedure, only this time use a 25 ohm or 100 ohm test resistor. After you are done zeroing the meter reading, resistor R3 should read the same as the resistor used for testing. Now you get the picture! The reason for disconnecting the RF cable and meter connections when checking R3 is to prevent any parallel resistance paths from giving an erroneous reading when you are checking the adjusted value of R3.

It should now be clear how you would check the antenna feedpoint. As mentioned previously, you can only check for the resistive feedpoint of a resonant antenna. Assuming that you have constructed a half-wave dipole and you want to see what the impedance is at the feedpoint, just connect the bridge to the feedpoint securely and raise the antenna to its operating height. Run the same test that you ran with the test resistor on the workbench. If you get a null on your meter but not zero, then your antenna is cut for a higher or lower frequency than what you are feeding to the bridge. Change the RF input frequency slightly higher or lower until the meter gives a zero reading with adjustment of the remote bridge. Unless you have constructed your dipole incorrectly or there is a fair-sized metallic object in close proximity to one end of your antenna, you should be able to get a zero reading on the meter. It may be at a slightly different frequency than what the antenna was measured and cut for, but now you will know if the antenna is too short or too long for the frequency desired. You then have to make adjustments in the length of antenna.

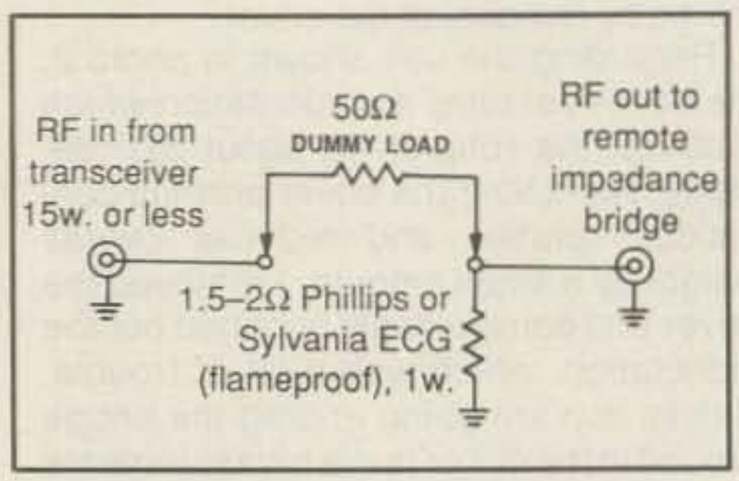


Fig. 4– Power divider for use with low-level resistance type bridge when RF source is 100 watt transceiver. ***Warning:*** *This circuit assumes transceiver has RF power control and/or tune switch which will limit power output to no more than 15 watts. Greater power input to divider could destroy CR1 and damage meter.*

The bridge has told you two things: where the antenna is resonating and what the feedpoint impedance is. If you are close but not right on frequency, making the necessary physical corrections will not change the feedpoint impedance significantly. Lower the antenna, disconnect the bridge from the antenna, measure R3 as mentioned in the previous paragraph, and *voila!* You now know pretty much what the feedpoint impedance is. Needless to say, your antenna installation should be via the usual ropes and pulleys to facilitate raising and lowering the antenna for testing, pruning, etc.

The remotely controlled bridge enabled me to check the feedpoint of my newly constructed multiple dipole on each of four bands. From that information I was able to adjust the length of each dipole to exactly where I wanted it within the various bands and to construct a fractional balun for 50/75 or 1.5 that provides almost a perfect match from my 50 ohm feedline to the multiple dipoles. Fractional baluns and other transmission-line transformers are simple to construct and are the subject of other publications.[2]

Here's hoping that the remotely controlled impedance bridge will make life a little easier for you in your antenna endeavors. It may even give someone the idea for a remotely controlled bridge that will provide not only resistance readings, but reactance readings as well. Wouldn't one of those be great for checking the feedpoint of a loop to see what it looks like at various frequencies? I mean like real world and not a computer analysis! And, without a bunch of "magic feedlines."

Footnotes

1. Genaille, Richard A., "The Coax Line Stretcher," *CQ*, April 1989.

2. Sevick, Jerry, "Transmission Line Transformers," ARRL, 1990.

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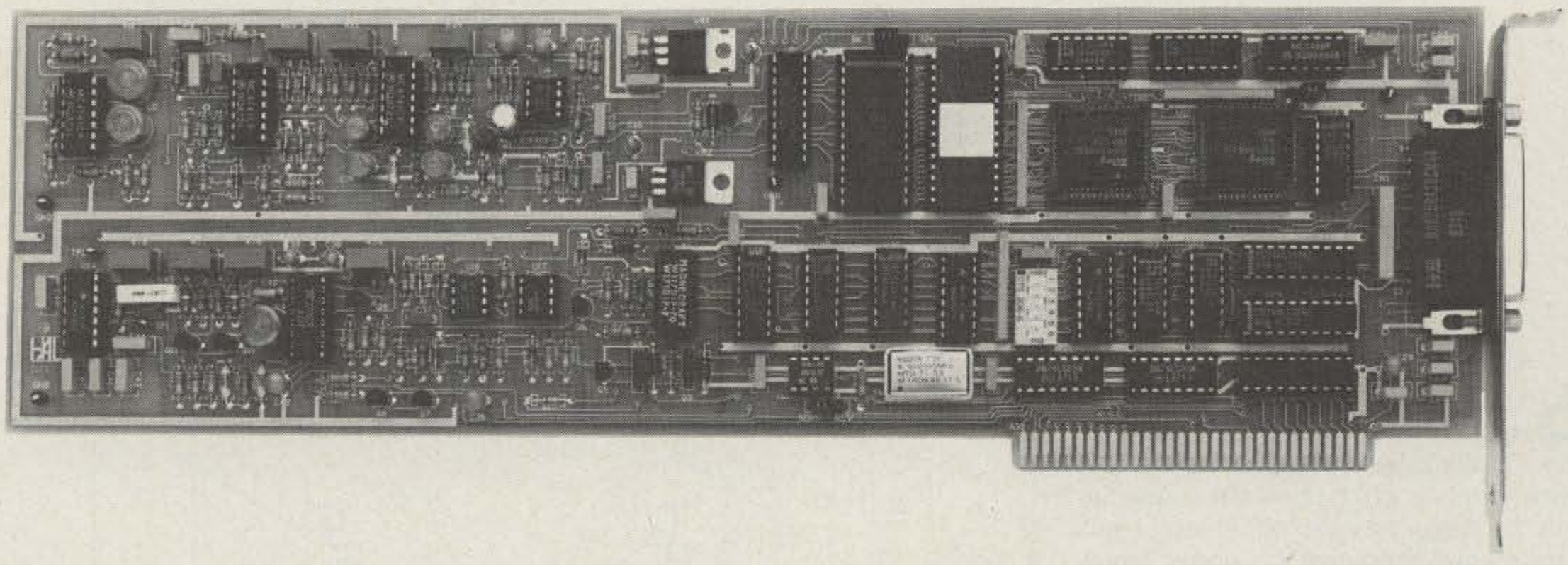

The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

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CQ REVIEWS:

The Ten-Tec Model 253 Automatic Antenna Tuner

BY LEW McCOY*, W1ICP

Over the years I have written many articles dealing with antenna tuners and Transmatches, so I guess I am as familiar with the subject as can be. In fact, I was instrumental in coining the word "Transmatch" back in the 1950s. Throughout that time period there had been several attempts in the amateur industry to come up with a Transmatch that was completely automatic in that it would take an unknown antenna system load and match it to 50 ohms—the desired design impedance of nearly all modern equipment. Note I say amateur industry, because there have been some commercial and military units. Even so, these devices have been limited in their ranges. The reason for that was there was usually no need for a really wide-ranging matching system in the commercial field. Antennas were of a specific type, and the feed impedance was in a limited range.

However, in amateur radio, particularly with random-length dipoles and open-wire-type feeds, the load excursions can be tremendous, and automatically tuned antenna tuners usually cannot match such loads simply because we must cover so many bands and frequencies. There have been some types designed in the past to automatically match *any* load, but none have really been completely effective unless a particular antenna is used.

The Tec-Tec Model 253, however, is a very pleasant departure from the past. It *will* match literally any load with an SWR of less than 10 to 1. I have tested this unit extensively, and believe me, I tried some really *exotic* loads, such as an 8 foot (10 meter) whip on 80 meters. Here we are looking at a radiation resistance that is a fraction of an ohm, but Ten-Tec handled it. For kicks I had some high-value wire-wound resistors which would produce a 10 to 1 load. You will have to admit that is fairly high. No problem. The 253 circuits whirred, and suddenly there was a matched condition of less than 1.3 to 1. A match of 1.3 to 1 or better is the matching condition for which the unit shoots.

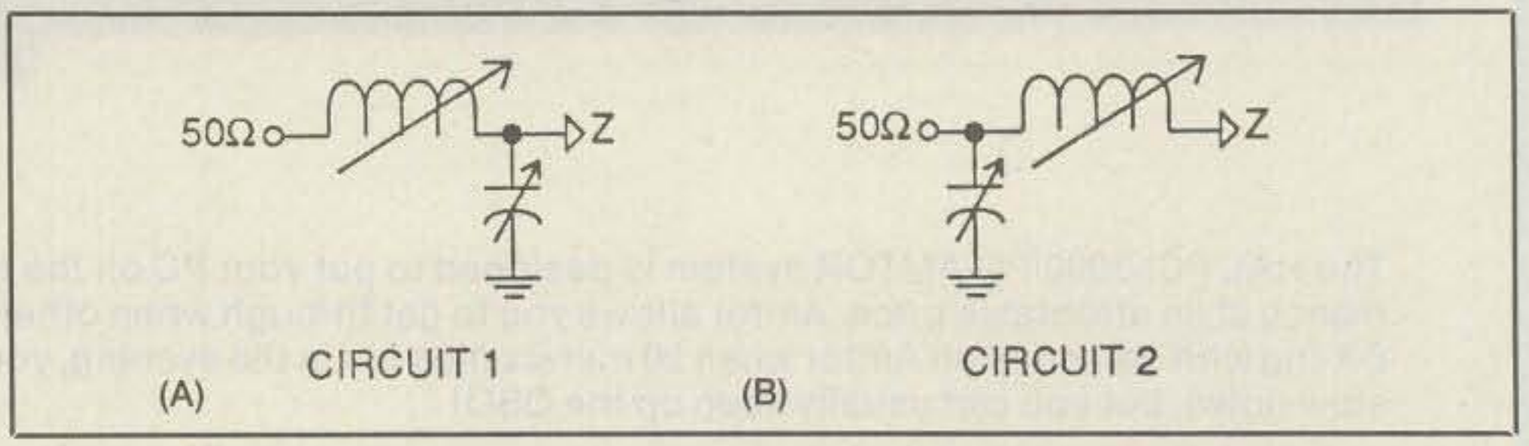


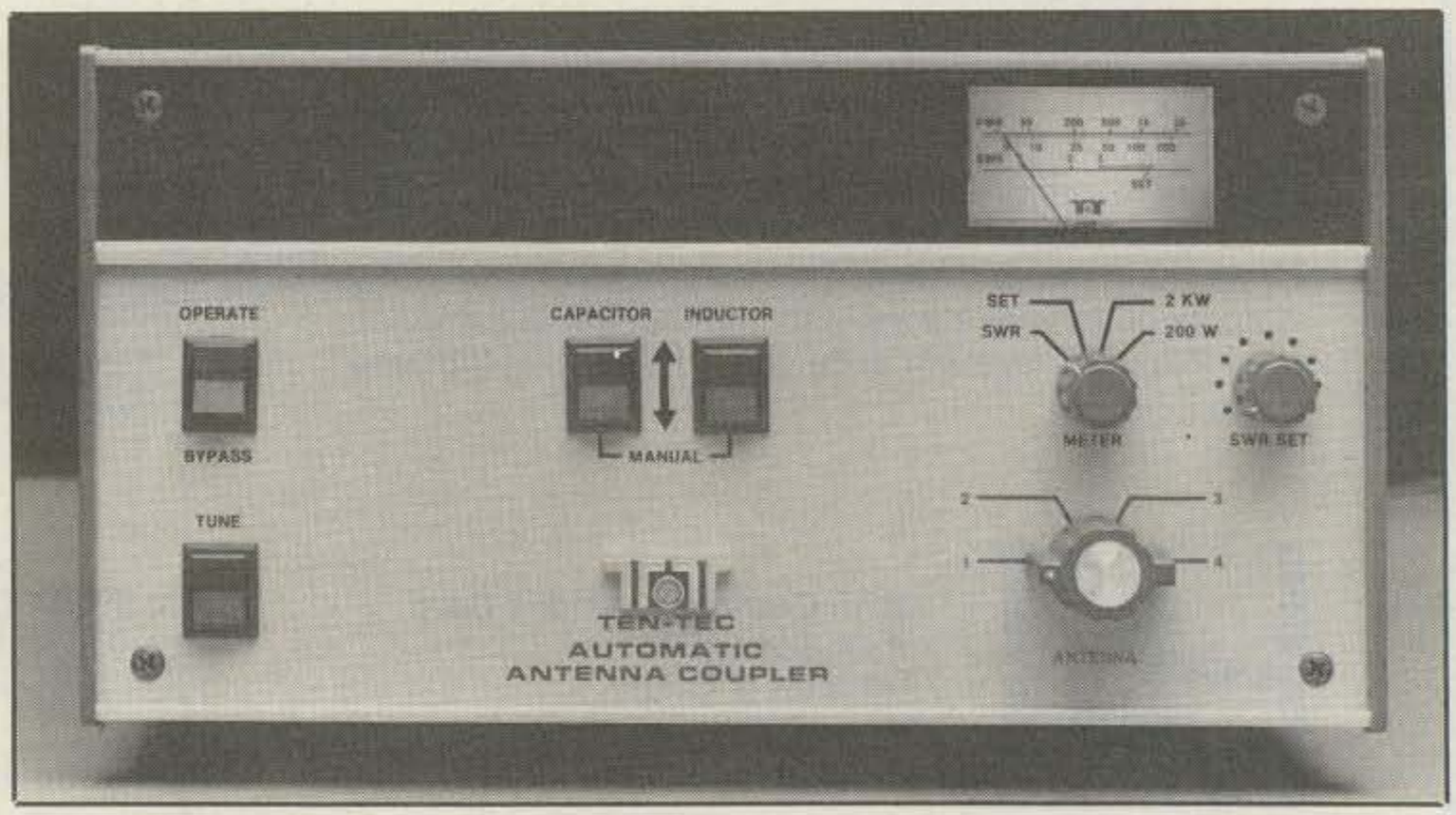
Fig. 1– At (A) we have configuration 1 and at (B) configuration 2.

Probably the best way to describe what happens is to quote from the very excellent instruction manual—the section on the theory of operation. I might add that I agree almost 100 percent with the theory, and if anyone questions my use of the Ultimate circuit of the T, it is simply because such are *manually* tuned devices (plus they will match more than a 10 to 1 mismatch). Following are the book's words. I have footnoted those areas of discussion where there should be more explanation.

Theory of Operation

The problems of matching a 50 ohm transmitter to an unknown antenna impedance can be solved by different circuit configurations. For the Model 253 Automatic Antenna Coupler, a reversible low-pass L-network (see fig. 1 at [A] and [B]) was chosen over a PI or TEE configuration for the following reasons.

1. After tuning, the bandwidth of the



This is the Model 253 completely automatic antenna tuner rated at 2 KW.

**Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061*

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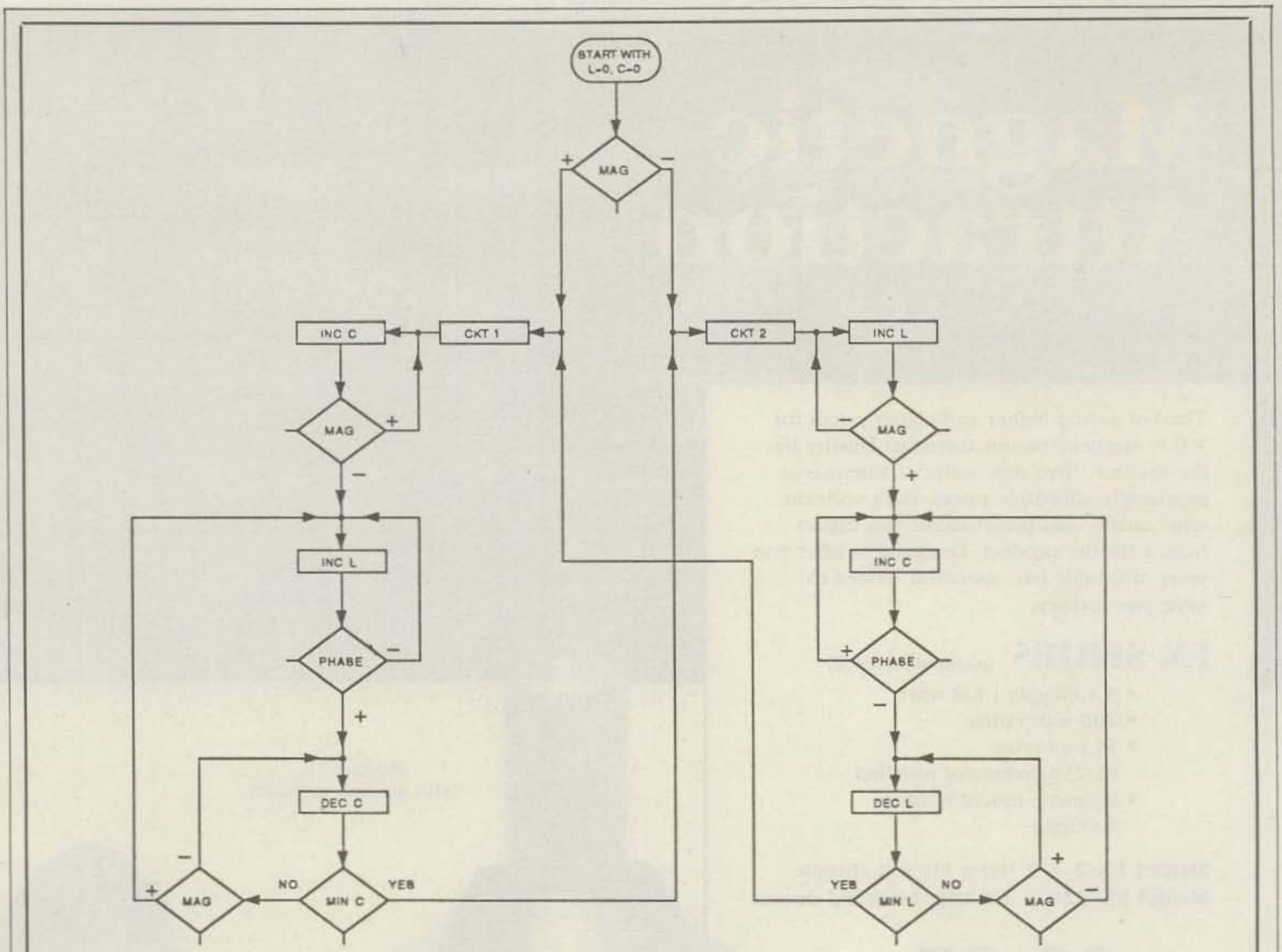


Fig. 2– This is the automatic tuner flow chart as explained in the text.

match is wider than can be obtained with a single section PI or TEE network and, for a given inductor Q,[1] the loss is lower. This means that after tuning on a given frequency, larger excursions from that frequency can be tolerated without having to retune. Also, lower inductor loss translates to higher coupler efficiency.

2. The L-network offers the lowest component count possible for a general impedance network.[2] This is especially important in an automatic tuner, since the component values must be variable. Each additional network component requires another motor or relay bank to adjust the value.

3. There are no "internal" nodes or loops in an L-network. This means that the voltages and currents inside the coupler are never higher than the input and output voltages and currents.[3]

4. For an L-network, there is only *one* set of component values which provides an impedance match for any given load. Therefore, when a match is found, it is automatically the "best match" (lowest loss and widest bandwidth).[4] PI and TEE networks can produce a match at several different settings, each with a different circuit Q.[5]

5. The low-pass configuration of the L-network provides two additional poles of harmonic filtering. This can help[6] reduce TVI caused by harmonic and high-frequency spurious outputs of transmitters. Many antenna tuners use a *high-pass* circuit configuration. Although a properly operating high-pass tuner will not *cause* TVI, it will not help either.[7]

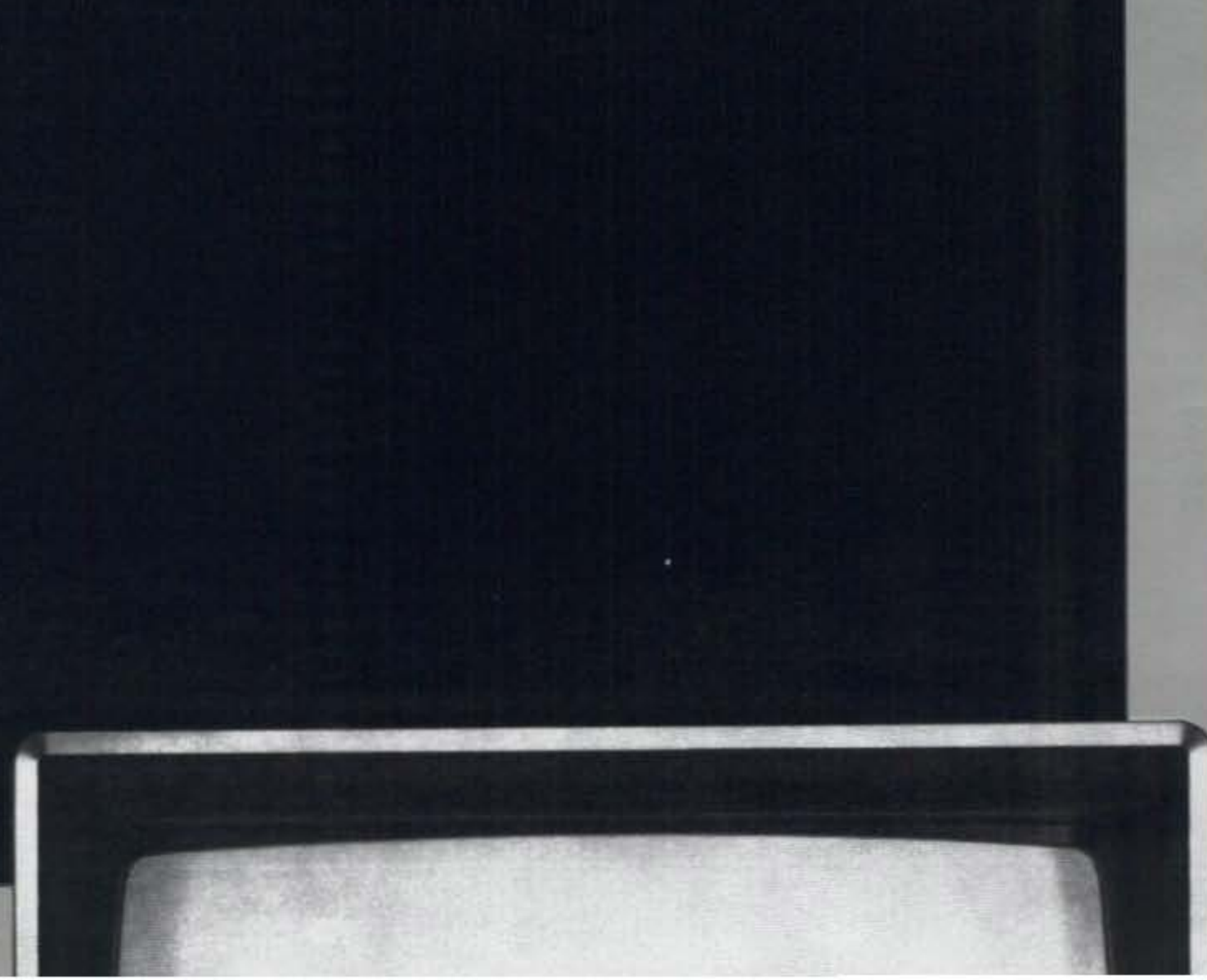
6. With only two variable circuit elements (and a reversing switch) the automatic tuning procedure or "algorithm" is much simplified. (This is the end of my extraction from the manual.)

So what we have in the Model 253 is a variable motor-driven inductor and switched capacitor bank. The object is to take an unknown antenna load, and this can be a very small radiation resistance or a very large radiation resistance, plus an unknown amount of reactance and convert these or this unknown load to 50 ohms. The entire algorithm for determining the correct values of L and C to find such a match is much beyond the scope of this review. However, fig. 2 is a flow chart that provides a simplified version of what happens. The timing and control functions are not pointed out, but the flow chart shows the basic routine or path followed.

Keep in mind that there are two circuit configurations with our PI—fig. 1 at (A) or (B). We start trying to match with fig. 1(A). The inductor rotates, with the algorithm searching for a match, meanwhile switching capacitors out of the circuit. If the capacitor value reaches zero, the algorithm tells the unit to switch to configuration (B) and then proceeds until it reaches a match of 1.3 to 1 or less. When that point is reached, the microprocessor stores the setting information in its memory so that it can instantly be called up when changing bands. In other words, set it once and forget it.

I've sort of done this review backwards in telling you how it worked rather than what it will do, so let's cover that. The 253 is an antenna coupler that will take an unknown load of less than 10 to 1 and con-

Television is on the brink of something phenomenal...



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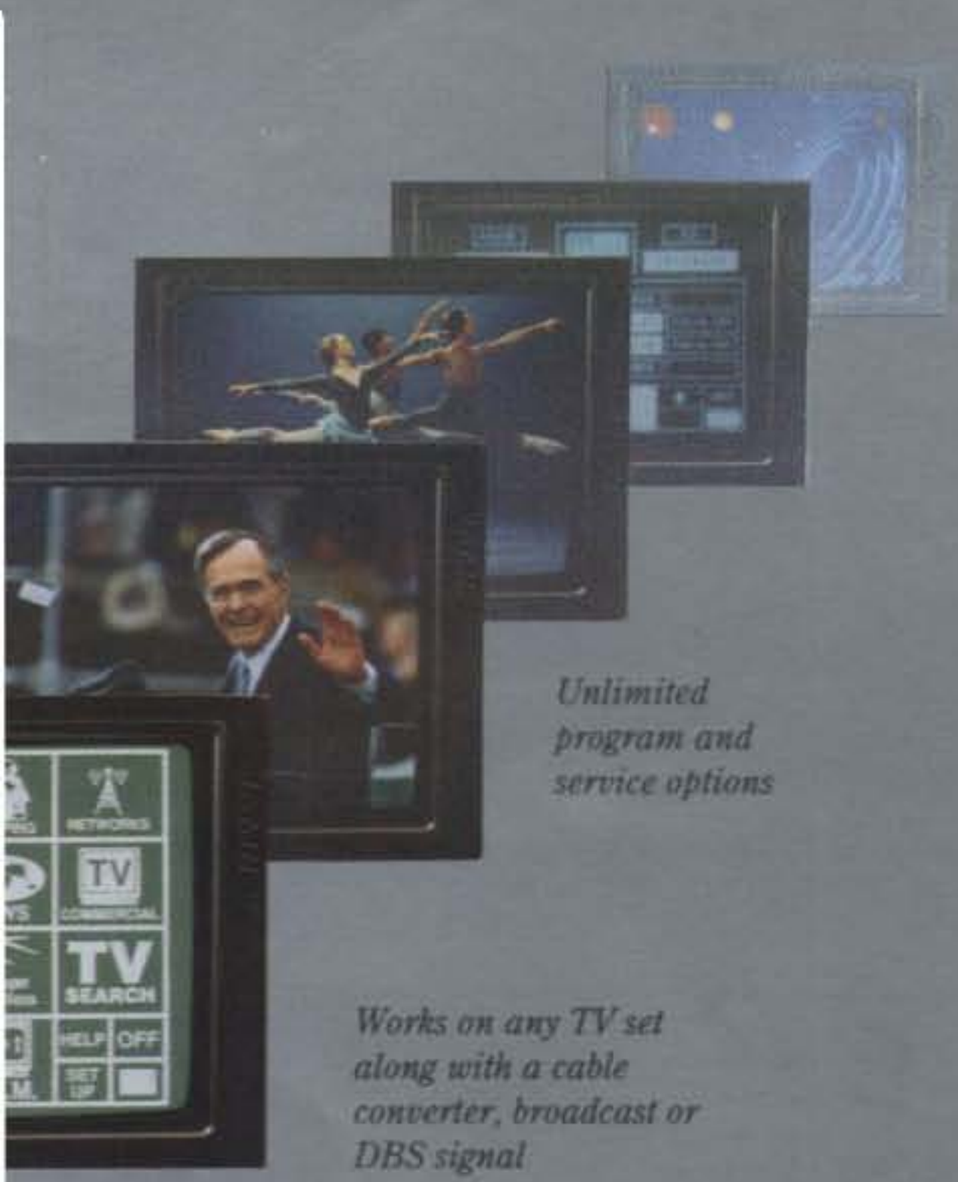

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vert it to less than 1.3 to match. (Although my own experience showed it did match many loads greater than 10 to 1. I appreciate the fact that the designers are being conservative.) The antennas can be either coax fed or have balanced feed lines. There are four coax-fed antenna inputs (or three) if a balanced line is brought in.

The tuning unit is rated at 2 KW maximum, and I thoroughly tested at the legal limit of 1500 watts. Frequency range is from 1.8 to 30 MHz (continuous, so it covers MARS frequencies). DC power requirements are 12 to 14 volts at 2 amperes (not furnished). The automatic tuning time is approximately 5 seconds typical. From a cold start, say from 10 meters to a match on 160, could take 30 seconds.

In the memory tuning, the tuner automatically returns to settings last being used for each antenna switch position. Separate settings can be stored for each band if a remote band connector is used. Retuning (auto or manual) updates memory.

There are four antenna positions as mentioned earlier and seven band positions, giving a total of 28 memory positions. In other words, once you let the tuner adjust itself for 80 meters, for example, and then switch to another band and let it adjust, these settings are entered into memory. When you switch back to 80, the tuner turns on and in just a few seconds shuts itself off—completely matched. At the very least, it is an ingenious device.

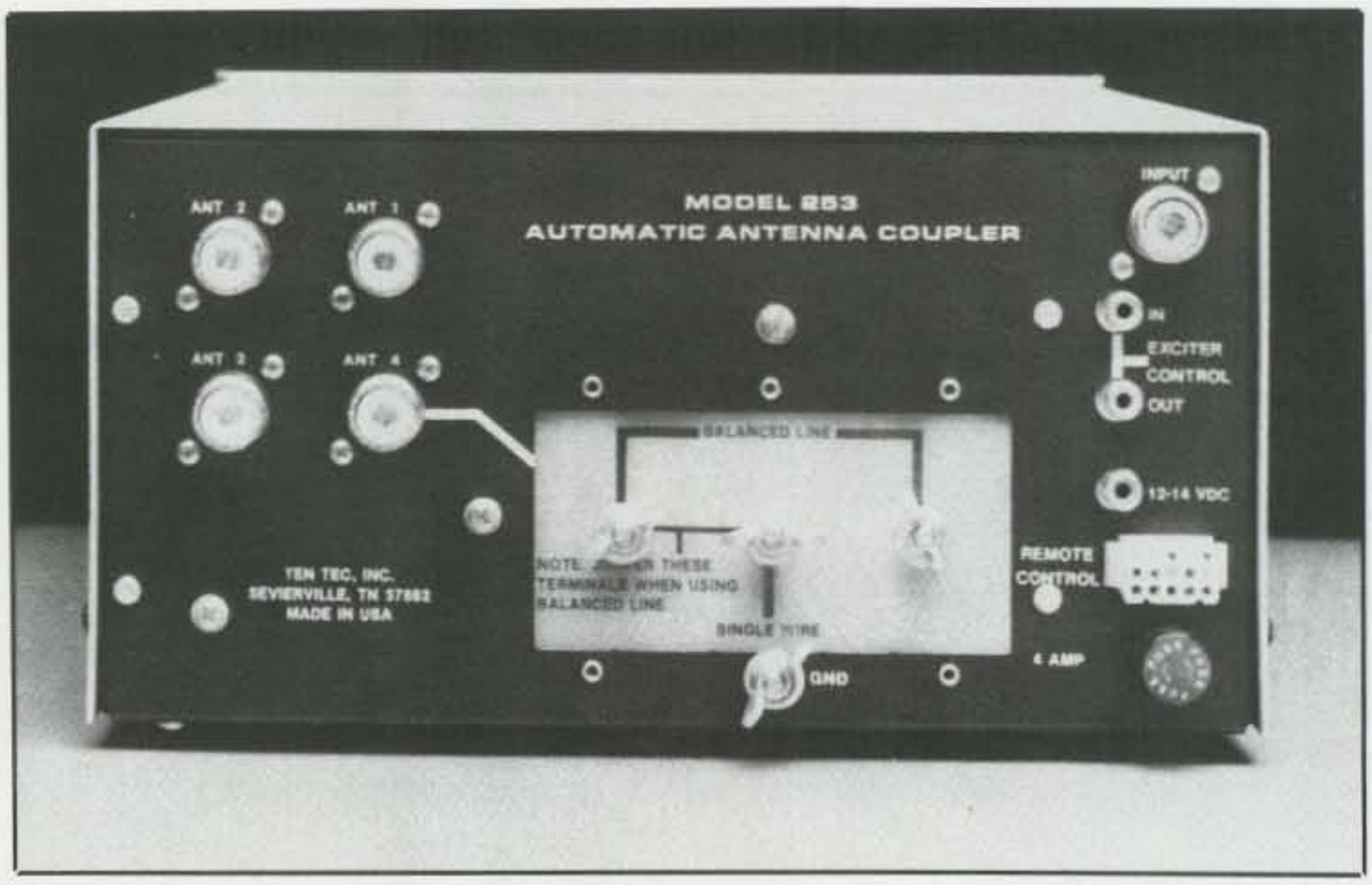
For the technically minded, here are the matching figures: At least 10 to 1 SWR matching, any phase angle, 1.8 to 30 MHz. Thirteen-hundred (1300) ohms maximum parallel equivalent resistance at 1500 watts output (2 KV peak at better than 26 to 1 SWR). Five-thousand ohms maximum parallel equivalent resistance across balanced line at 1500 watts output.

There is over-voltage protection built in. An **ARCING** indicator illuminates when the RF voltage exceeds 2 KV. The tuner is reset to bypass mode if **ARCING** or **OVER** indication remains on for more than 1 second. A hot switching system protection is provided by an internal relay interlock system.

Internal power bridge and circuitry are built in, of course. The front-panel meter has four switch positions—**SWR, SET, 200 WATT,** and **2000 WATT.** The unit is 5½ inches high, 14 inches deep, and 10½ inches wide.

It should be apparent from the foregoing that I was extremely impressed by the automatic tuner. Ten-Tec has apparently taken all conditions into consideration and more than met them. While I didn't mention it before, if you have band information output provided by your transceiver, this output can be fed to the tuner so that when you change bands, the tuner is automatically set up with the transceiver. The neophyte should not confuse this tuner with some of the other "built in" transceiver antenna tuners. This unit will match almost *any* load, while the others can be very limited or require specific antennas.

The current list price of the Model 253 is $1150.00. The unit is manufactured by Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37862.



Back view of the tuner. At the upper left are the four antenna outputs. The lower center panel is for a balanced feed connection. Remote control is at the right.

Footnotes

The following are author's notes and comments on the material quoted from the unit's instruction manual.

1. The only problem you should be aware of is that in a *manually* tuned setup there is always the possibility of getting extremely high Qs with corresponding high RF voltages, but that is not a problem in this circuit.

2. I heartily agree. The fewer the variable components, the simpler and more trouble-free the circuit is.

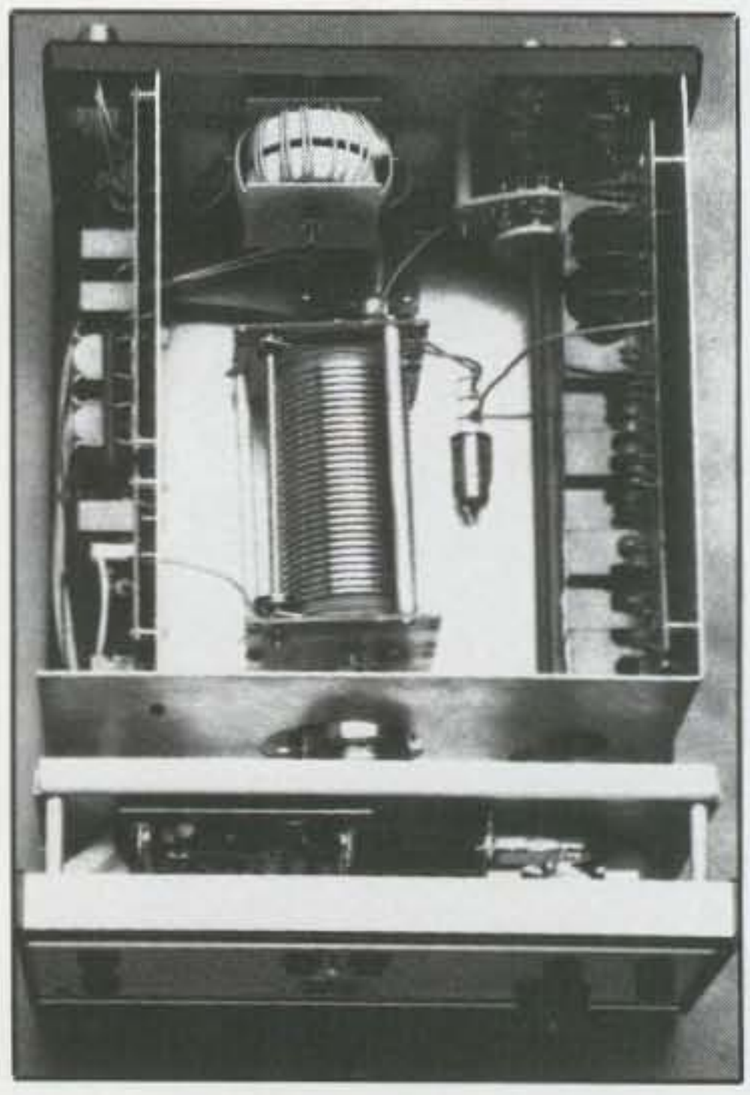
3. At the risk of sounding stupid, I am not sure I agree 100% with this statement. *But,* in my tests I ran 1500 watts output and experienced no problems even though some of my RF voltages were very high.

4. Again, I disagree. What is "best match"?

5. Again, the different settings may or may not be an advantage.

6. I would prefer the writer said "may help" so as not to mislead the beginning-type amateur who has TVI. Do not depend on an antenna tuner to help in cleaning up TVI or RFI.

7. I cannot help but interject that an antenna tuner, from my own countless tests over the years, offers no real help for TVI. *It is possible,* for *any* type of tuner to have stray resonance in the VHF and UHF range that could accent a harmonic. But the only answer for TVI harmonic reduction is simply good shielding and a low-pass filter. CQ

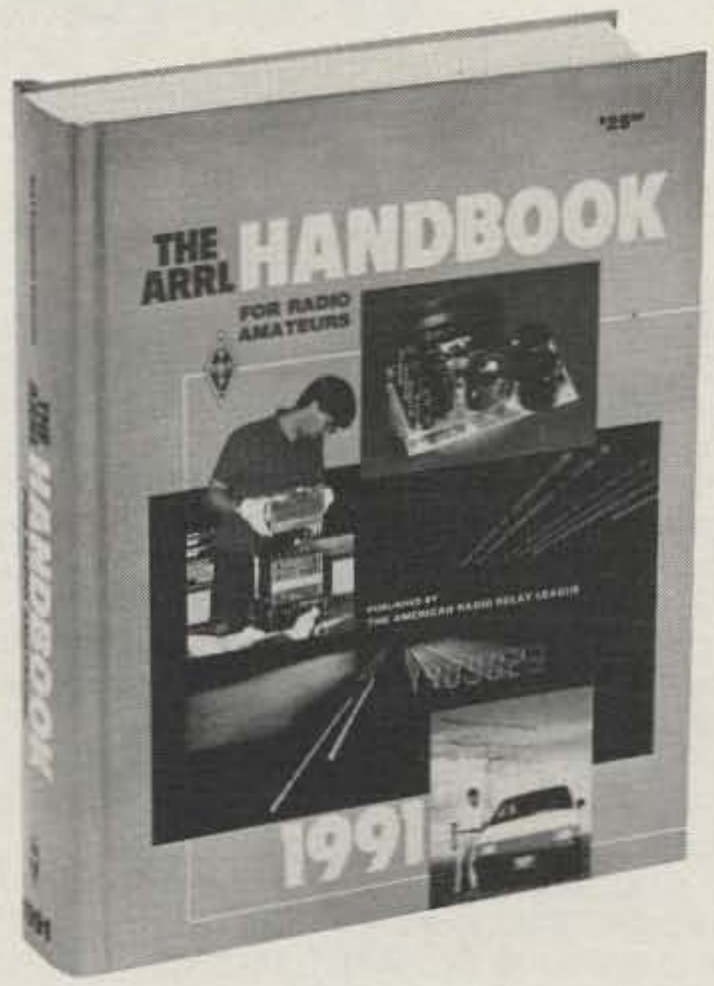


This shows the upper interior of the tuner. The roller inductor is at the center, and the balun for balanced lines is directly behind the roller.

CQ REVIEWS:

The 1991 ARRL Handbook—68th Ed.

BY LEW McCOY*, W1ICP



That's correct, the 68th edition of *The ARRL Handbook*. The very first *ARRL Handbook* appeared in 1926. At one time I understood that *The ARRL Handbook* was one of the most published books in the United States. The bible was of course first, then believe it or not *The Boy Scout Handbook*, and next *The ARRL Radio Amateur's Handbook*. (Its numbers are in the millions.) Understandably, any book would have to be an outstanding publication to merit such sales. In order to be so popular, a very high standard of excellence must be maintained. The 68th edition is certainly no exception.

It is difficult to review such a book simply because of its size and the extent of its contents. However, I will try. The 1991 version contains 39 chapters. I didn't attempt to count the pages, but the book weighs in at several pounds! The staff needed to produce this handbook is two editors, five assistant editors, nine production people, and fifteen listed contributors. I say "listed" because I see many items of mine in the book, plus others from an earlier era. In any case, the best of amateur radio can be found described in the book.

The first five chapters deal with an explanation of amateur radio itself, our goals and purposes, and then the basic electrical fundamentals including design, techniques, an understanding of the language used in our hobby, plus complete coverage of solid-state and vacuum design. These chapters are done in an easy-to-understand style, something at which *The Handbook* has always aimed, while at the same time providing the reader or student with all the information for a good, solid base in electronics.

The next twelve chapters cover radio principles, including power supplies (theory and design), then a chapter on basic audio and video, and next digital basics. The following chapters cover modulation and demodulation, radio frequency oscillators and synthesizers, radio transmitting, receiving, and transceiver principles. In all these chapters complete theory is given plus circuitry showing actual circuits, even though in later chapters many construction projects covering these fields are described. Continuing our chapter listings we have repeaters, all types of RF power amplifiers, and so on. Chapter 16 discusses transmission-line theory and operation, and then antenna fundamentals are covered in Chapter 17. Chapter 18 gives details on voice communications, while Chapter 19 goes into digital work.

The Handbook next treats some of the more exotic modes now in use—image communications such as slow scan and fast scan, plus frequency-modulated amateur television (FMTV), facsimile, weather-satellite reception, and special modulation techniques. Any questions a newcomer to these modes may have are certainly answered, or more detailed references are provided.

Chapter 22 is devoted to radio frequencies and propagation of radio signals. (This chapter alone is worth the price of the book.) Next space communications is treated in depth. I have always preached that amateur radio has many, many facets. In the earliest days we had only phone or CW, then later RTTY. Now there are so many aspects of the hobby it is impossible to keep up—unless you have this handbook. For example, the space communications chapter alone consists of 42 pages of information with profuse illustrations.

In Chapter 24 the book begins the construction-techniques information, which includes tables on drill sizes, metal gauges, circuit-board etching, and so on. The next chapter covers one of our most important fields, as far as I am concerned —test equipment and measurements (45 pages). This is followed by troubleshooting and repair. After this come power-supply projects which include just about any supply you would need, from low voltage to high voltage.

The chapters following are practical circuits and construction projects for audio and voice equipment, digital, HF radio (50 pages), VHF radio projects, and then UHF, with a total of over 140 pages on these two popular areas.

Chapter 33 treats antenna projects, naturally a favorite with many amateurs. There are many projects to delight the heart of the experimenter. If I have any criticism of the book, I assumed that there would be some treatment of computer-derived antenna patterns and the subject of gain (I may have missed it). I find a growing controversy in this subject as to the accuracy of some computer-obtained patterns and gain. Maybe the editors will add this interesting information in the next edition. However, as the reader can assume, I would rate this handbook very, very highly.

Chapter 34 treats station accessories. Chapter 35, an extremely useful chapter, is on component data. Chapter 36 tells you how to assemble a station, 37 covers operating aids, 38 is monitoring and direction finding, and the last, Chapter 39, is on interference, TVI, BCI, and so on. This is followed by etching patterns—18 pages for different popular projects found in the book. Next is a popular abbreviation list, and then the index.

I could use a lot of superlative adjectives in describing this 68th edition of *The Handbook,* but my editor would probably tone me down. What I can say is that anyone in amateur radio would be a fool not to have this handbook on his bookshelf. During my many years at the ARRL I worked on *Handbook* projects and on the book itself. The current book is so far ahead of those days that it doesn't bear comment. *The ARRL Handbook*, hardcover, is $24.95 (plus $3.75 postage and handling) and is available from the CQ Book Shop, Main Street, Greenville, NH 03048, or call 800-457-7373 for orders only. CQ

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

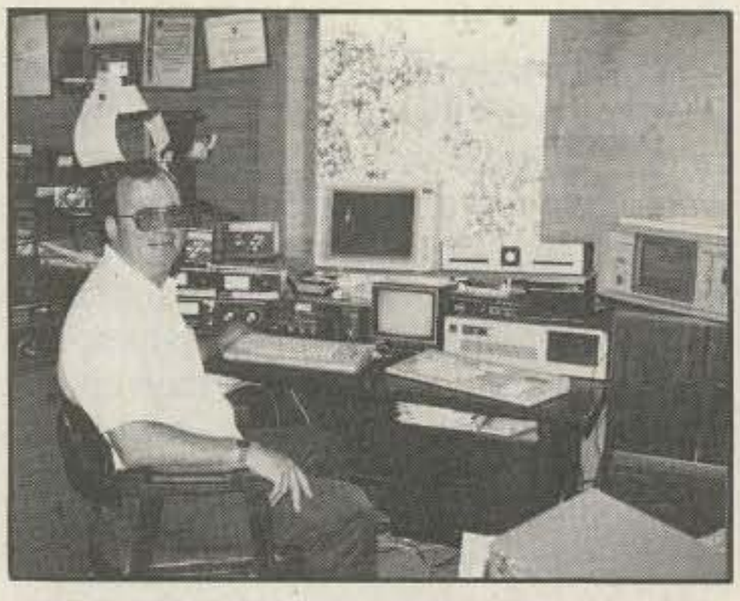
Results of the 1990 CQ World-Wide RTTY Contest

BY ROY GOULD*, KT1N

Logs were received from 80 countries, and a total of 437 logs were checked. The contest just continues to grow each year, and of course, conditions sure helped in 1990. Many first time on RTTY or first contest ever comments were noticed. In addition, China appeared for the first time, as well as the Ivory Coast, Gabon, Turkoman, and Sierra Leone.

Mistakes and incomplete information and forms continue to be a problem. Much time is spent correcting a good deal of the entries. Please try to use the correct form and provide all the required information as outlined in the rules.

This year we added some new entry classes. Both the Single Operator Assisted and the Multi-Op Multi-Transmitter classes drew very few entries. However, I think they will grow in the future.



Jay, WS7I, operated as HC5J from Ecuador to take first place World Single Operator.

John, TG9VT, first place North America, third place World.

Single Operator Class

Jay, WS7I, traveled to the contest station of Ecuador, the home of Ted, HC5K, in Cuenca to capture First Place World Single Operator with over 1.3 million points, edging out our globe-trotting friend Walter, DJ6QT. Walter, who traveled this time all the way to France and operated as TQ6JD, came up about 100 QSOs less and came in second with 1,157,308 points and first Europe. Of course I don't know how many people in their logs asked where TQ6 was! Our good friend John TG9VT came in third with another great effort just a few points behind Walter to take North America.

In South America OA4ZV took the honors, and Joel, KG4DX, had 591,839 points to lock up Oceania. Kuni with his trip to Ogasawara took Asia's plaque. A surprise was Patrick, FP5DX, who was on RTTY for the first time and nearly caught everyone with his effort, which brought him fourth place in the world. Then came Jean louis from Gabon, who placed fifth in the world and first Africa.

Single Operator Assisted

There were only six entries in this class, with Hal, WA7EGA, taking the honors with just under 670K points with 932 QSOs. All the other entries except for one were also from the States. Perhaps this class will see more activity. We'll have to see.

Single Band

Ten meters was a popular band this year, with some great scores for single band entries. Twenty meters was still the top scoring band, with LZ5Z's 242,400 points for First Place World on 20. CE6EZ took 15 meters with 201,312, and Blin operating 4U1ITU captured 10 meters with 236,842 points.

There were only a few entries on 40 and 80, with UB4HQ making 101 QSOs on 40 to take that band and WA8TXT working 73 stations on 80.

Multi-Operator Class

Well, the gang from UZ9CWA was convinced that they were not going to get into the same trouble they had in 1989 when they tried to give the deserving Zone 17 but had all sorts of problems. This year they made it to Turkoman and came on as RH7E, making 1321 QSOs to run away with the Multi-Op Single plaque. Victor, UH8EA, loaned his station location for this effort, and it paid off with a great effort. Ten meters was open almost 24 hours a day for them. Coming in second was the group operating as DLØGK, and then the club station UZ3AYR.

In the Multi-Multi class W3LPL came in on top with 1,728,520 points, with the VE7ZZZ gang close behind with just over 1.5 million points. The LPL group made 56 QSOs more than the RH7E Multi-Single group, but the ex-

JJ3YBB, first place Japan, fifth place World, Multi-Operator, Single Transmitter.

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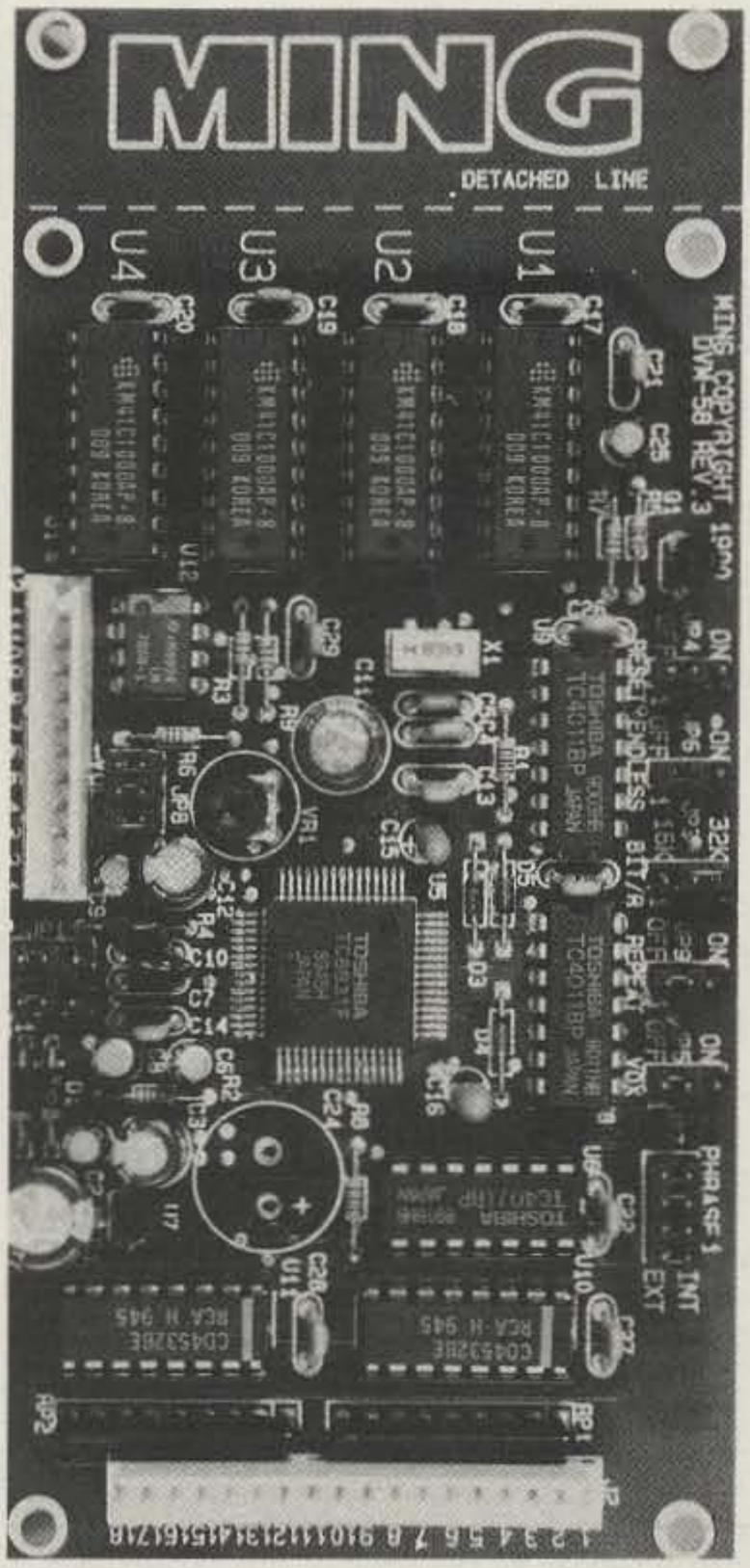

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WORLD MULTI-OPERATOR MULTI-TRANSMITTER: CQ Magazine. Won by **The Operators at W3LPL.**

TOP SCORE, CONTINENTS, SINGLE OPERATOR ALL BAND

NORTH AMERICA: HAL Communications Corp. Won by **John Troost, TG9VT.**

SOUTH AMERICA: Association DX-EX Ecuador. Won by **Wilhelm Ziesak, OA4ZV.**

EUROPE: HAL Communications Corp. Won by **Walter Skudlarek, TQ6JD.**

OCEANIA: The RTTY Journal. Won by **Joel Chalmers, KG6DX.**

ASIA: The N5JJ Memorial. Won by **Kunihiko Fujii, JH1QDB/JD1.**

AFRICA: Roy KT1N, Roland N1FTD, and George KB2VO. Won by **Jean-Louis Domange, TR8JLD.**

TOP SCORE, WORLD 14 MHZ, SINGLE OPERATOR: Kunihiko Fujii, JH1QDB. Won by **Tzvetalin Tzvetkoff, LZ5Z.**

TOP SCORE, WORLD 21 MHZ, SINGLE OPERATOR: Denis, WD4KXB and Mike, KA4RRU. Won by **Ralf Hucke, CE6EZ.**

tra QSO points by the RH7E boys had them as the top score overall.

Summary

Once again, thanks for all your comments and suggestions. We have picked up a few more sponsors for plaques, but there are still many available. Contact me if you are interested. Thanks, and a tip of the DX hat to George, KB2VO, and Roland, N1FTD, for all their help. See you September 28 and 29th. Good DX!

73, Roy, KT1N

RTTY Chatter North America

RTTY has replaced CW as my favorite mode . . . *AA4M*. Great condx and a new amp combined for six new countries . . . *AA5AU*. Biggest thrill was coming within 1% of K0LUZ at N4WW's contest station . . . *AB4ES*. Already looking forward to next year . . . *AL7BB*. My first RTTY Contest ever. Packet QRM everywhere . . . *FP5DX*. I have too many keyboards. At 3 AM it gets confusing . . . *K0LUZ/4*. I worked 5W1KT at a drive-up window at a Dunkin Donuts . . . *K1CGJ/M*. First RTTY Contest. Had a ball. Will be back next year. Maybe K1EA will adapt CT to RTTY Contesting . . . *K1DG*. Enjoyed the contest, everyone was courteous . . . *K4KIY*.

First RTTY Contest ever. First VU ever any mode . . . *KA4RRU*. Murphy stayed away this year; nothing blew up . . . *KA5YSY*. We should be exchanging something more meaningful, like a QSO number . . . *KB3DF*. I intended to only operate packet, but after 2 Q's in 1 hour, I learned RTTY . . . *KC8FS*. The friendship and politeness exhibited in RTTY contesting is the last bastion of gentleman DXing . . . *KD2YG*. Worked six new ones . . . *KD4MM*. This is my first contest. Had a lot of fun tuning the bands . . . *KE7KU*. Excellent conditions, should have been more activity on 10 . . . *KF6HI*.

Twenty meters was just a dull roar here . . . *KL7PG*. Tnx to CQ WW RTTY, RTTY will never be the same . . . *KN6J*. Nothing like a RTTY DX pile-up . . . *KY7M*. Entering both All Band and 14, so that we can lose twice . . . *N0FMR*. Good contest! Wait till next year . . . *N1FTD*. Had known Ted, W2FG, was not in the contest, I would have tried harder . . . *N2FF*. Change the exchange to the same as CQ WW SSB and CW. Then K1EA software can be used . . . *N3UN*. This is a great contest. Combining States and Canadian areas with DX countries and zones creates an enjoyable contest for everyone, not just the super-stations . . . *N6GG*.

First contact, SM5FUG said I was first station operating 850 Hz shift in years. WHOOPS! . . . *N7GVV*. All in all a totally awesome adventure . . . *N8AGU*. Off times must be less than 3 hours, too long . . . *NC7K*. Not bad for a city lot! I am going back to single band. This is too much paperwork . . . *NJ0M*. Working TR and TY was an added bonus . . . *NQ6C*. There is no such thing as a clear frequency in a RTTY contest . . . *NT3B*. Biggest thrill was working G00BSQ at the Queen's residence in England . . . *VE3JAN*. I had a pile-up calling CQ with 40 watts into a vertical . . . *VE6KRR*.

If only K1EA could get CT working in this contest . . . *W1GZ. (Ed.: Let's ask him. I'll buy one.)* In a wall-to-wall contest, my 10 watts did pretty good . . . *W2FCR*. I was using a borrowed rig with NO filters. OUCH! . . . *W2JGR*. Had a stiff neck at the end of the test. Too many keyboards . . . *W2VP*. Biggest thrill was having BV4VB answering my CQ . . . *W3FV*. A training exercise for most of us . . . *Ops at W3LPL. (Ed.: Nice training exercise.)* Thanks to all the DX stations that participate . . . *W6IWO*. Made my first RTTY contact two days before the contest . . . *WA1IML*.

Never really been interested in DX, but this sparks some excitement . . . *WA4DYD*. Two more Zones for my RTTY WAZ, three to go . . . *WA4MCZ*. Biggest thrill was getting 9L1US on third try in monster pile-up. Sometimes little pistols win . . . *WA6SDM*. Was on RTTY for 10 days prior to the contest . . . *WB2EAR*. I had to fix the radio and put up an antenna. It felt like Field Day . . . *WD7I*. TNC locked up at start. Had to stop and rebuild it . . . *WF5E*. First contest ever. Next year I will get serious! . . . *WI1Y*. Biggest thrill was working 1S0 and 9L on RTTY . . . *WI2T*.

NUTS! My 40 and 80 antenna didn't work . . . *XM7CQD*. Only tried to look for new ones, but worked 80 countries and 32 zones. But please use as check log. Next year I will play for sure! . . . *WWJ2D. (Ed.: Nice check log 80 countries!)*

Kuni, JH1QDB/JD1, took first place Single Op Asia.

RTTY Chatter DX

A very popular contest. I will be back for sure . . . *4U1ITU*. First contest ever. Been on RTTY two months. Amazed a 5W1 had to struggle so hard . . . *5W1KT*. I got some strange looks from some non-ham visitors to the shack over the weekend . . . *9L1US*. Not very many stations on 20 heard from here? . . . *9M2AX*. You may not get a large score in this contest, but you sure will have fun . . . *CE6EZ*. 28 MHz was excellent . . . *EA3GCV*. Great contest, great condx, great balls of fire! . . . *G0ARF*. Should have been on 14 right through, but 28 was so good! My first time, some great QSOs . . . *GI4TSK*.

Enjoyed the contest. Looking forward to next year . . . *GW3NYY*. I was handicapped by illness, but still glad to give HB0 out . . . *HB0/HB9NL*. Nice to meet old friends . . . *HB9DCQ*. Great contest. See you next year.

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TG9VT	1,142,946
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TR8JLD	644,333
HA6PX	634,068
KG6DX	591,839
W3FV	552,636
SM5FUG	549,150
JH1QDB/JD1	544,101

3.5 MHz

WA8TXT	3,108
LZ2XA	2,958
VE6UX	2,460

7.0 MHz

UB4HQ	9,990
NT3B	7,303
KD3KW	4,704

14 MHz

LZ5Z	242,400
4M5RY	238,650
YT2GW	219,240
ZF1RY	209,625
HC5J	124,968

21 MHz

CE6EZ	201,312
HB9DCQ	189,758
EA9JV	171,360
SM6ASD	141,778
VE3XO	133,938

28 MHz

4U1ITU	236,842
HC5J	207,411
PP5JD	204,953
JR1IJV	123,066
OY9JD	111,626

SINGLE OP ASSISTED

WA7EGA	669,693	N3UN	182,382
W2UP	656,496	SM0DJZ	153,012
AA4M	269,015		

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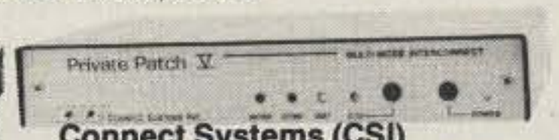

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Where were W & VE on 80 and 40? Biggest thrill was HC5K's hospitality . . . *HC5J*. Another great contest. Was KG5EG previous two years. Really enjoyed being the "DX" . . . *HL9RY*. I enjoyed the short time I was in. Next time longer . . . *I2WEG*. My first Dxpedition. Great fun . . . *JH1QDB/JD1*. It was exciting for first time for me . . . *JI1CQA*. 28 MHz was fantastic. Thank you for very nice contest . . . *JR1IJV*.

Contest was pretty, see you in 91 . . . *OK1DJO*. Great to work such fine DX so easy . . . *ON6NL*. My first time in this contest. See you in 91 as an all band entry . . . *OY9JD*. 73's to all from the UZ9CWA gang . . . *Ops of RH7E*. My first RTTY contest. Many new ones overall . . . *SMØDJZ*. Great condx and high activity . . . *SM5FUG*. Lots of fun, thanks to all participants . . . *SM6ASD*. Nice to meet friends from all over the world . . . *SP2UUU*. My thanks to WØSA for equipment to get me on RTTY. Great contest . . . *SP5JTR*. Worked 75 different DXCC Countries . . . *TQ6JD*.

Real great fun. Next year I will be more comparative on the lower bands . . . *TR8JLD*. Eleven new countries and six new states. Great contest . . . *TU2UI*. The last contest from Y2. Great condx . . . *Y24MN/A*. I was so tired I could not stay up Saturday night for the US stations. See you next year . . . *YT2GW*. Tnx to all who operated and organized . . . *ZL2AKI*.

N2FF ready to grab a new one.

Station Operators, Multi

4KØADS: UWØLGL, UV3DCX, UWØLZ, UAØ-103-454. **BY4AA:** BZ4COP, BZ4DAB, BZ4DDL, & DJ7BU. **BY4WNG:** BZ4RCC, BZ4RDX, BZ4ROM, BZ1FB, BZ4RBA, & others. **DLØGK:** DL9YAJ, DL2DCB, DF7XE, DF8QB, DL2DBS, DL8YBW, DJ6VE, DJ6VP, DH8YAQ, DL2WP. **FF1COM:** F6NL, F6IQA, & FE1LEW. **FF6KRJ:** F5CW, F6IJR, & FC1JEN. **GXØCNC/A:** GØCCD, G4OJJ, G1ENP, Dave Banks, & refreshments by Mandy. **HB9DCW:** HB9DCV, HB9DIZ, HB9JAQ. **IY4AJ:** IK4BWC & IK4HLP. **JA7YAA:** JP1PVO, JQ1PQT, JQ1JCV, JJ3CNL, JHØORW.

JJ3YBB: JA3AHL, JA3CZY, JA3FHL, JA3PJL, JH3FQF, JH3UHG, JE3TXA, & T. Koyama. **K7SS:** & AA7FT. **KY1F:** & KA1RJJ. **N6IHQ:** & N6NKO. **OK1KQJ:** OK1DXS & OK1ICM. **OK1KSL:** OK1AQ, OK1AHG, OK1FAK. **RH7E:** UA9CR, UA9CFV, UA9CGA, UV9CAF, UZ9CU. **SK5WB:** SM5INC, SM5NUZ, SM5NWJ, SM5PPS. **SP3PLD:** SP3IBM & SP3SBB. **SP4KEV:** SP4KEV & SP4IRS. **UQØA:** YL2KL, YL2GM, YL3GN, & UQ2GID. **UZ3AYR:** UA3DJY, UV3ABN, UA3DRG, RA3170123, UB5072272, RA3170107, K. Rodin.

UZ3DWH: UA3FA, RA3DUT, UA3DVB. **UZ3PWJ:** UA3PNN & UA3PNO. **UZ9CZM:** RH9CPQ & RH9CFB. **UZ9LWE:** RA9LR & UA9LGD. **VE3UR:** VE3ZAB, VE3NIT, VE3IW. **W1GZ:** KA1IFE, W1BYH, W1HFN, KA1BVM. **W3/VK1GN:** VK1GN, WD4KUI, K4KCC, Nathen, & Micah. **W1AQL:** WD4DWN, N9HZQ, N4VMD, KC4JAY, & KØDI. **YU4EZC:** YU4MA, 4N4DXZ, Cedo, Vucko, & Ivan. **JL1ZCG:** JO1BMV, JO1RUR, JK1JEO, JHØNZN, JRØJFM. **VE7ZZZ:** VE7ARS, VE7AV, VE7BUL, VE7CBJ, VE7DBS, VE7EAP, VE7EQU, VE7HBQ, VE7HRC, VE7RBL, VE7SK, VE7SSS, & VE7DRS. **W3LPL:** W3EKT, WB8MAZ, KF3P, WB3FIZ, K7GPD, W3LPL.

Number groups after call letters denote following: Classification (SOB = Single Op All Band, SOA = Single Op All Band Assisted, MOS = Multi-Op Single Transmitter, MOM = Multi-Op Multi-Transmitter), Final Score, Number of QSOs, Points, Zones, Countries, and State/Canadian Provinces. Winners are listed in boldface.

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

CALL	CL	SCORE	QSOs	POINTS	ZONES	COUNTRIES	W/VE
WA7EGA	**SOA**	**669,693**	**932**	**1767**	**70**	**151**	**158**
W2UP	**SOA**	**656,496**	**697**	**1692**	**84**	**191**	**113**
W3FV	**SOB**	**552,636**	**535**	**1428**	**88**	**196**	**103**
KØLUZ/4	**SOB**	**525,960**	**639**	**1461**	**78**	**165**	**117**
AB4ES	SOB	471,466	608	1306	78	163	120
WF1B	**SOB**	**446,400**	**565**	**1240**	**76**	**164**	**120**
NJØM	**SOB**	**390,504**	**545**	**1228**	**74**	**150**	**94**
N6GG	**SOB**	**363,069**	**431**	**1071**	**79**	**148**	**112**
K6WZ	SOB	316,510	478	1021	70	142	98
W4HBK	SOB	314,847	433	1053	72	151	76
AA5AU	**SOB**	**306,516**	**444**	**861**	**80**	**147**	**129**
N2FF	**SOB**	**293,037**	**419**	**1007**	**70**	**154**	**67**
AA4M	**SOA**	**269,015**	**449**	**865**	**74**	**132**	**105**
NO2T	SOB	264,264	463	924	66	135	85
WF5T	SOB	241,860	402	834	69	124	97
NC7K	**SOB**	**218,295**	**394**	**735**	**71**	**110**	**116**
W9KDX	**SOB**	**202,681**	**344**	**841**	**63**	**121**	**57**
NT3B	**SOB**	**183,855**	**359**	**721**	**72**	**101**	**82**
N3UN	**SOA**	**182,382**	**294**	**678**	**71**	**125**	**73**
NTØV	SOB	180,936	398	718	59	91	102
W9RXJ/Ø	SOB	176,288	305	787	64	128	32
WB2EAR	SOB	143,004	336	701	45	87	72
KD2YG	SOB	140,880	259	587	60	118	62
WI1Y	SOB	138,276	299	668	47	93	67
W4TOY	SOB	132,930	276	630	51	108	52
NØFMR	SOB	128,180	283	580	51	96	74
N1FTD	SOB	127,022	265	602	52	106	53
WB8YJF	**SOB**	**119,626**	**224**	**559**	**62**	**115**	**37**
WF5E	**14**	**117,561**	**402**	**789**	**30**	**67**	**52**
N4LIH	SOB	117,116	237	437	41	133	94
K1DG	SOB	116,813	233	587	47	114	38
W6JOX	SOB	110,149	223	481	62	90	77
KK4DK	SOB	98,091	226	519	49	87	53
KA9PJZ	SOB	97,850	191	515	59	112	19
KA4RRU	SOB	97,584	230	456	45	88	81
AB8K	**28**	**96,250**	**312**	**770**	**29**	**67**	**29**
KA5YSY	**21**	**94,605**	**392**	**795**	**17**	**58**	**44**
K5KLA	**SOB**	**90,321**	**172**	**483**	**62**	**115**	**10**
KC2FD	**14**	**90,220**	**344**	**694**	**26**	**59**	**45**
WB6ZHN	SOB	89,024	204	428	57	84	67
WA6UFY	SOB	88,973	230	461	47	67	79
WD4KXB	SOB	86,520	180	420	57	98	51
KI4MI	SOB	83,104	199	424	47	90	59
W2KHQ	SOB	82,161	185	459	46	89	44
K1CGJ/M	SOB	79,608	190	428	49	84	53
W8PBX	SOB	77,568	198	404	46	75	71
W2JGR	SOB	77,355	193	405	50	88	53
KEØKB	**28**	**71,628**	**248**	**564**	**31**	**71**	**25**
KN6J	**28**	**71,424**	**276**	**576**	**27**	**58**	**39**
WA6SDM	SOB	71,040	191	384	51	98	36
K7PB	SOB	65,625	143	375	57	96	22
WA8FLF	SOB	64,260	170	357	49	75	56
NE1I	SOB	61,178	140	362	52	90	27
N4ROL	SOB	58,136	158	344	44	81	44
K6WZ	28	56,680	208	520	27	61	21
WZ6Z	SOB	54,165	134	345	52	57	48
W8LNK	SOB	54,020	152	365	41	78	29
NQ6C	**21**	**53,790**	**261**	**489**	**24**	**45**	**41**
WJ7S	**14**	**52,038**	**215**	**441**	**27**	**50**	**41**
WA4MCZ	SOB	50,530	129	326	46	85	24
W9RXJ/Ø	**21**	**48,272**	**177**	**431**	**29**	**61**	**22**
W4KQS	SOB	47,740	145	341	34	72	34
KE4BM	SOB	46,576	147	284	43	63	58
W8AKS/6	SOB	44,548	130	301	48	63	37
W3AOH	SOB	44,023	119	331	45	76	12
N2FF	**21**	**42,728**	**183**	**436**	**20**	**53**	**25**
KY7M	SOB	40,752	137	283	44	57	43
N7GVV	SOB	39,930	141	330	32	60	29
W2FCR	21	35,964	135	333	26	58	24
W9KE	SOB	35,816	122	296	31	64	26
KD4MM	SOB	33,516	113	266	41	56	29
W3HXI	**21**	**33,088**	**158**	**352**	**22**	**49**	**23**
WA1IML	SOB	32,520	129	271	32	49	39
KB3DF	**14**	**31,080**	**142**	**296**	**21**	**49**	**35**
N8AGU	SOB	30,371	108	251	41	54	26
W9KDX	**28**	**28,440**	**138**	**360**	**22**	**46**	**11**
AA5BT	SOB	28,248	104	214	39	52	41
NC7K	**28**	**27,324**	**146**	**297**	**23**	**38**	**31**
AA6QY	SOB	25,990	102	226	38	44	33
KA3JFI	**28**	**25,596**	**131**	**316**	**25**	**40**	**16**
NTØV	28	24,600	128	300	24	43	15
KC8FS	SOB	24,240	104	202	30	49	41
N1FTD	**21**	**24,030**	**129**	**267**	**20**	**40**	**30**
NN5T	SOB	23,560	94	190	36	46	42
KA8WAS	**14**	**22,707**	**142**	**261**	**18**	**40**	**29**
AA5AU	**28**	**22,707**	**112**	**261**	**21**	**46**	**20**
KØBJ	SOB	22,578	80	213	38	57	11

WI1Y	21	21,840	125	273	20	35	25
WB2VTD	14	20,982	113	269	18	43	17
K0VW	SOB	20,832	102	186	31	38	43
K2RYI	SOB	20,273	84	209	27	53	17
W0LHS	SOB	19,656	102	189	23	36	45
KE0Y	SOB	19,012	75	196	37	50	10
W4DEC	SOB	17,836	79	182	33	41	24
N0HYG	SOB	17,628	101	156	29	33	51
KF6HI	28	17,172	112	212	19	32	30
NF2K	SOB	16,910	68	190	32	52	5
WC4E	SOB	15,925	100	175	22	34	35
WF5T	28	15,910	94	215	21	36	17
WD7I	28	13,333	104	199	16	26	25
KM4IG	SOB	13,000	79	125	27	29	48
N9CCI	**21**	**12,696**	**94**	**184**	**21**	**33**	**15**
N0FMR	**14**	**12,070**	**88**	**170**	**14**	**29**	**28**
K4KIY	**21**	**11,457**	**87**	**171**	**17**	**26**	**24**
KA4RRU	**28**	**11,151**	**70**	**177**	**15**	**33**	**15**
KS4S	28	11,092	76	188	18	32	9
K1CGJ/M	**28**	**10,773**	**66**	**171**	**17**	**35**	**11**
WG8H	SOB	10,191	59	129	24	34	21
NW0F	SOB	9,954	66	126	24	32	23
WA4DYD	SOB	9,348	56	114	27	30	25
HK3GZB /W4	**14**	**9,333**	**108**	**183**	**10**	**30**	**11**
W6IWO	21	8,673	83	147	16	20	23
KD3KW	28	8,437	59	143	17	32	10
KC4GR	**SOA**	**7,544**	**47**	**92**	**29**	**28**	**25**
NT3B	**7**	**7,303**	**88**	**109**	**28**	**10**	**29**
KI4MI	28	6,370	46	130	13	33	3
WW8Q	**28**	**6,006**	**67**	**143**	**12**	**21**	**9**
WI2T	14	5,886	55	109	12	21	21
N8KHS	SOB	5,642	51	91	17	17	28
KE4BM	28	5,593	49	119	13	26	8
KD3KW	7	4,704	61	96	8	14	27
KR1Z	**14**	**3,444**	**34**	**84**	**12**	**20**	**9**
WA8TXT	**3.5**	**3,108**	**73**	**84**	**3**	**3**	**31**
KE7KU	SOB	2,950	34	59	15	16	19
WB4ETY	SOB	2,790	24	62	19	23	3
N2DCH	SOB	2,730	31	65	14	19	9
KD2YG	**7**	**2,698**	**50**	**71**	**6**	**7**	**25**
NW0F	21	2242	34	59	12	14	12
N8KHS	**21**	**1,488**	**29**	**48**	**8**	**7**	**16**

ALASKA

NL7RA	**SOB**	**359,805**	**609**	**1411**	**59**	**87**	**109**
AL7BB	SOB	219,730	430	1022	53	74	88
KL7PG	SOB	68,452	259	628	27	42	40
NL7RA	**21**	**62,800**	**265**	**628**	**22**	**39**	**39**
KL7PG	21	54,600	249	600	20	33	38

CANADA

XM7CQD	**SOB**	**390,000**	**668**	**1500**	**50**	**95**	**115**
VE6ZX	**SOB**	**356,160**	**548**	**1272**	**51**	**104**	**125**
VE3XO	**21**	**133,938**	**396**	**1063**	**24**	**66**	**36**
VE1AUE	**SOB**	**88,407**	**256**	**627**	**29**	**55**	**57**
VE2JR	**SOB**	**84,836**	**188**	**508**	**42**	**91**	**34**
VE6KRR	SOB	82,099	260	551	34	38	77
VE3OCX	**SOB**	**73,986**	**159**	**418**	**54**	**93**	**30**
VE4AIY	**SOB**	**62,464**	**232**	**488**	**29**	**39**	**60**
VE3FJB	SOB	52,164	163	414	43	83	0
VE1AUE	**21**	**47,138**	**208**	**518**	**18**	**39**	**34**
VE2OWL	SOB	45,540	139	330	34	54	50
VE3JAN	**14**	**38,024**	**157**	**388**	**19**	**41**	**38**
VE7IRA	SOB	27,170	107	247	33	34	43
VE6CNN	**28**	**18,675**	**102**	**249**	**18**	**33**	**24**
VE6UX	**3.5**	**2,460**	**46**	**82**	**3**	**2**	**25**
VE2FFE	**14**	**1,682**	**24**	**58**	**8**	**12**	**9**
VE6SH	**21**	**1,161**	**21**	**43**	**6**	**11**	**10**
VO1AW	**SOB**	**1,075**	**18**	**43**	**8**	**9**	**8**

CAYMAN ISLANDS

ZF1RY	**14**	**209,625**	**673**	**1625**	**21**	**59**	**49**

COSTA RICA

TI2YO	**21**	**122,200**	**397**	**940**	**26**	**65**	**39**

GUATEMALA

TG9VT	**SOB**	**1,142,946**	**1090**	**2702**	**91**	**182**	**150**

ST. PIERRE, MIQ

FP5DX	**SOB**	**985,704**	**1030**	**2452**	**80**	**164**	**158**

AFRICA

CANARY ISLANDS

EA8AKQ	**SOB**	**188,300**	**314**	**1076**	**32**	**60**	**83**
EA8RA	SOB	160,820	313	935	34	69	69
EA8AKQ	**28**	**45,825**	**138**	**611**	**14**	**30**	**31**
EA8AKQ	**21**	**23,250**	**126**	**375**	**9**	**17**	**36**
EA8AKQ	**14**	**3,024**	**48**	**84**	**8**	**12**	**16**
EA8AKQ	**7**	**12**	**2**	**6**	**1**	**1**	**0**

CEUTA & MELILLA

EA9JV	**21**	**171,360**	**412**	**1224**	**27**	**69**	**44**

DJIBOUTI

J28TY	**SOB**	**94,868**	**214**	**641**	**29**	**35**	**84**

GABON

TR8JLD	**SOB**	**644,333**	**774**	**2293**	**57**	**117**	**107**

IVORY COAST

TU2UI	**SOB**	**104,272**	**230**	**686**	**34**	**67**	**51**

KENYA

5Z4BI	**SOB**	**39,116**	**174**	**508**	**25**	**52**	**0**

MALI

TZ6VV	**SOB**	**145,962**	**309**	**918**	**38**	**63**	**58**

SIERRA LEONE

9L1US	**SOB**	**288,351**	**483**	**1449**	**34**	**57**	**108**
9L1US	**28**	**93,627**	**303**	**909**	**17**	**42**	**44**

SOUTH AFRICA

ZS6BCR	**21**	**31,440**	**133**	**393**	**22**	**40**	**18**

ASIA

ASIATIC RUSSIA

UW9CY	**SOB**	**335,225**	**461**	**1265**	**61**	**140**	**64**
UA0KCI	SOB	106,950	260	690	42	87	26
UA9YAD	SOB	8,085	53	147	22	33	0

CHINA

BZ4SAA	**SOB**	**52,569**	**226**	**531**	**36**	**63**	**0**

EAST MALAYSIA

9M6HF	**SOB**	**63,729**	**223**	**657**	**33**	**36**	**28**

GEORGIA

RF1F /UA3TT	**28**	**19,533**	**139**	**383**	**13**	**27**	**11**

INDIA

VU2SJV	**SOB**	**114,264**	**200**	**552**	**54**	**116**	**37**
VU2NBT	**28**	**66,300**	**276**	**780**	**21**	**45**	**19**
VU2SJV	28	28,106	108	299	19	54	21

JAPAN

JR1IJV	**28**	**123,066**	**328**	**954**	**28**	**59**	**42**
JA1WYQ	**SOB**	**56,914**	**150**	**398**	**47**	**62**	**34**
JA3EOP	**21**	**42,240**	**152**	**440**	**24**	**45**	**27**
JA2NNF	**14**	**33,027**	**118**	**327**	**27**	**49**	**25**
JE2UFF	14	28,593	128	353	23	38	20
JA4RED	SOB	23,280	80	240	33	52	12
JH8JBX	14	9,246	50	138	25	34	8
JI1CQA	SOB	7,524	46	132	20	25	12
JA1IHS	28	7,242	48	142	14	20	17
JA7KM	28	5,452	41	116	16	27	4
JA6WW	14	4,464	33	93	18	24	6
JA0DWY	SOB	3,984	35	83	19	26	3
JA3BCT	SOB	3,773	33	77	22	27	0
JA7NJN/1	28	3,700	35	100	11	18	8
JH8QBY	14	2,475	28	75	11	19	3
JR2CFD	**7**	**1,829**	**25**	**59**	**12**	**19**	**0**
JA8EAT	7	1,560	24	60	8	8	10
JI6JSD	21	672	14	32	9	11	1

KOREA

HL9RY	**SOB**	**531,973**	**686**	**1963**	**63**	**109**	**99**
HL1SX	SOB	87,796	168	467	60	95	33

OGASAWARA

JH1QDB /JD1	**SOB**	**544,101**	**683**	**1857**	**68**	**127**	**98**
JH1QDB /JD1	**28**	**94,657**	**321**	**919**	**20**	**43**	**40**

TAIWAN

BV4VB	**SOB**	**135,408**	**281**	**728**	**56**	**96**	**34**
BV4VB	**21**	**18,963**	**121**	**301**	**20**	**32**	**11**
BV4VB	**14**	**16,055**	**90**	**247**	**16**	**31**	**18**
BV4VB	**28**	**8,350**	**65**	**167**	**17**	**28**	**5**
BV4VB	**7**	**104**	**5**	**13**	**3**	**5**	**0**

TURKEY								
TA3B	**SOB**	**160,072**	**306**	**856**	**52**	**101**	**34**
TA3D	SOB	108,429	258	769	30	65	46
WEST MALAYSIA								
9M2AX	**SOB**	**27,030**	**134**	**318**	**33**	**42**	**10**
EUROPE								
AUSTRIA								
OE3XCW	**SOB**	**30,371**	**92**	**251**	**41**	**50**	**30**
BALEARIC ISLANDS								
EA6ZP	**14**	**63,935**	**265**	**673**	**16**	**40**	**39**
BELGIUM								
ON6NL	**28**	**9,735**	**55**	**165**	**17**	**17**	**25**
ON4APU	**14**	**777**	**13**	**37**	**7**	**7**	**7**
BULGARIA								
LZ5Z	**14**	**242,400**	**567**	**1515**	**32**	**77**	**51**
LZ1IA	**SOB**	**24,304**	**88**	**217**	**36**	**58**	**18**
LZ2KRU	**21**	**5,200**	**55**	**130**	**12**	**24**	**4**
LZ2XA	**3.5**	**2,958**	**49**	**102**	**6**	**20**	**3**
CZECHOSLOVAKIA								
OM2BXW	**14**	**61,776**	**226**	**572**	**20**	**49**	**39**
OK1FGC	**SOB**	**22,464**	**102**	**208**	**34**	**61**	**13**
OK1DJO	**21**	**11,484**	**76**	**198**	**19**	**25**	**14**
OM7TCL	21	8,046	55	149	15	22	17
DENMARK								
OZ1FGS	**SOB**	**202,884**	**339**	**957**	**51**	**77**	**84**
OZ1BBN	SOB	62,155	161	401	39	73	43
OZ6EI	**14**	**2,701**	**38**	**73**	**12**	**18**	**7**
ENGLAND								
G0ARF	**SOB**	**352,500**	**462**	**1250**	**66**	**121**	**95**
G4SKA	**14**	**28,314**	**141**	**363**	**19**	**36**	**23**
G4SKA	**28**	**27,966**	**127**	**354**	**19**	**35**	**25**
ESTONIA								
ES7FU	**21**	**20,286**	**132**	**322**	**16**	**30**	**17**
ES7JW	**28**	**8,904**	**86**	**212**	**13**	**23**	**6**
EUROPEAN RUSSIA								
UA1OJ	**SOB**	**148,074**	**353**	**851**	**39**	**94**	**41**
RA3DX	SOB	61,242	128	354	56	89	28
UW1YY	**21**	**45,036**	**200**	**417**	**23**	**51**	**34**
UW3AT	SOB	7,626	61	123	20	40	2
UA3XBB	**14**	**4,171**	**57**	**97**	**13**	**30**	**0**
F.D.R.								
DJ6JC	**SOB**	**421,960**	**496**	**1370**	**73**	**119**	**116**
DF2UQ	SOB	108,580	231	610	48	80	50
DL4FJ	SOB	76,650	168	438	49	81	45
DF5BX	SOB	41,454	115	294	46	69	26
DJ2YE	SOB	28,677	99	237	38	61	22
DJ2YE	SOB	27,492	99	237	37	79	0
DK7FP/P	SOB	14,678	64	179	23	29	30
DF5BX	**21**	**4,606**	**37**	**98**	**16**	**21**	**10**
FAROE ISLANDS								
OY9JD	**28**	**111,625**	**341**	**893**	**26**	**57**	**42**
FINLAND								
OH2LU	**SOB**	**371,270**	**509**	**1370**	**56**	**113**	**102**
OH2BUQ	SOB	58,646	163	413	39	68	35
OH9SV	SOB	52,000	163	416	31	59	35
OH1TD	SOB	36,600	123	305	44	49	27
OH1NSJ	SOB	15,200	77	190	25	42	13
OH5MN/2	SOB	2,040	23	51	16	21	3
FRANCE								
TQ6JD	**SOB**	**1,157,308**	**1030**	**2809**	**79**	**181**	**152**
F1LVW	SOB	516,432	554	1537	78	135	123
F8XT	SOB	63,640	138	370	59	78	35
F6BFH	SOB	61,787	188	451	58	79	0
F6FGY	**21**	**20,979**	**98**	**259**	**20**	**41**	**20**
G.D.R.								
Y24MN/A	**SOB**	**190,149**	**286**	**789**	**66**	**104**	**71**
Y41ML	SOB	103,113	236	603	51	72	48
Y23VB	**21**	**23,120**	**108**	**289**	**18**	**32**	**30**
Y23YE	**7**	**1,275**	**24**	**51**	**7**	**18**	**0**
HUNGARY								
HA6PX	**SOB**	**634,068**	**700**	**1957**	**67**	**137**	**120**
HA5CP	SOB	193,024	290	754	71	123	62
HA6VV	SOB	174,947	270	697	70	133	48
HA5HO	**14**	**34,977**	**222**	**393**	**22**	**49**	**18**
HA5CP	**28**	**20,400**	**89**	**255**	**23**	**29**	**28**
ITALY								
I2SVA	**SOB**	**481,584**	**558**	**1524**	**73**	**135**	**108**
I3MIQ	SOB	219,085	375	1019	57	94	64
IK8ERL	SOB	132,088	233	632	54	91	64
IKØCNA	SOB	116,560	273	752	33	117	5
IOØKHP	SOB	94,689	204	567	39	59	69
IOØKHP	SOB	91,287	204	567	39	53	69
I4XQG	SOB	31,590	94	270	35	50	32
IKØCNA	**28**	**25,140**	**147**	**419**	**10**	**47**	**3**
I2HWI	SOB	21,070	81	215	33	39	26
IK2IKW	SOB	20,882	78	197	37	53	16
I2WEG	SOB	8,023	41	113	24	28	19
I2FUM	**7**	**2,304**	**32**	**72**	**7**	**22**	**3**
IK1NDB	7	2,130	32	71	7	19	4
LIECHTENSTEIN								
HBØ /HB9NL	**SOB**	**271,558**	**414**	**1141**	**57**	**99**	**82**
LUXEMBOURG								
LX1OM	**SOB**	**274,314**	**399**	**1047**	**59**	**122**	**81**
LX1OM	**28**	**29,565**	**132**	**365**	**20**	**31**	**30**
NETHERLANDS								
PA3DBS	**SOB**	**298,116**	**428**	**1183**	**57**	**98**	**97**
PA3ESZ	SOB	45,402	125	329	41	64	33
PA3DBS	**21**	**44,100**	**174**	**490**	**18**	**32**	**40**
PAØYN	**28**	**4,922**	**40**	**107**	**14**	**19**	**13**
NORTHERN IRELAND								
GI4TSK	**SOB**	**26,051**	**97**	**239**	**32**	**43**	**34**
NORWAY								
LA7AJ	**SOB**	**11,748**	**60**	**178**	**23**	**20**	**23**
LA9RFA	**21**	**11,275**	**81**	**205**	**18**	**28**	**9**
POLAND								
SP9BCH	**14**	**85,359**	**307**	**769**	**22**	**56**	**33**
SP2UUU	**21**	**74,128**	**236**	**656**	**23**	**47**	**43**
SP9AUV	**SOB**	**35,340**	**122**	**310**	**38**	**50**	**26**
SP3BGD	21	27,824	107	296	25	42	27
SP3XR	14	25,200	147	336	20	44	11
SP7FQI	SOB	17,680	90	208	28	46	11
SP6AOI/A	**28**	**16,524**	**87**	**243**	**19**	**28**	**21**
SP5JTR	14	13,992	84	212	16	32	18
SP6CYV	14	12,740	82	196	14	37	14
SP9MAX	SOB	9,864	54	137	27	28	17
SP3MYS	14	2,190	30	73	9	19	2
SP2ZCD	21	620	11	31	8	7	5
SP3RBT	**7**	**551**	**14**	**29**	**5**	**12**	**2**
SP9KVZ	14	216	9	18	4	7	1
SP3IBM	28	36	3	6	3	3	0
PORTUGAL								
CT1CKP	**SOB**	**52,824**	**153**	**372**	**39**	**72**	**31**
ROMANIA								
YO6JN	**SOB**	**81,344**	**198**	**496**	**46**	**92**	**26**
YO3JW	**21**	**13,020**	**91**	**210**	**17**	**36**	**9**
YO6CFB	21	8,232	54	147	18	22	16
SCOTLAND								
GM3UTQ	**SOB**	**98,525**	**237**	**563**	**44**	**100**	**31**
SICILY								
IT9OCP	**SOB**	**54,240**	**133**	**339**	**54**	**77**	**29**
SPAIN								
EA7TV	**SOB**	**169,435**	**281**	**721**	**64**	**115**	**56**
EA3GCV	**28**	**56,500**	**179**	**500**	**25**	**49**	**39**
EA1AW	SOB	47,875	145	383	28	57	40
EA1DCQ	**14**	**37,674**	**177**	**414**	**17**	**39**	**35**
EA3GCT	**21**	**32,085**	**137**	**345**	**23**	**47**	**23**
EA4BAS	SOB	30,411	108	279	26	44	39
EA7TV	14	26,076	113	318	21	36	25
EA3GDH	28	15,111	84	219	19	29	21
EA3GCJ	14	11,700	97	225	11	26	15
EA7MA	SOB	6,820	41	110	22	23	17
EA3DWX	SOB	4,230	33	90	12	13	22
SVALBARD								
JW9MAA	**SOB**	**22,989**	**120**	**291**	**16**	**38**	**25**

TU2UI made many happy from the Ivory Coast.

SWEDEN							
SM5FUG	**SOB**	**549,150**	**583**	**1569**	**77**	**154**	**119**
SM0DJZ	**SOA**	**153,012**	**243**	**622**	**70**	**129**	**47**
SM7AIA	SOB	147,126	301	791	66	54	66
SM6ASD	**21**	**141,778**	**381**	**1066**	**28**	**58**	**47**
SM4CMG	SOB	52,170	137	370	41	63	37
SM7BGE	SOB	32,596	114	281	31	58	27
SM3DXC	SOB	15,400	71	154	33	48	19
SM4CMG	**28**	**11,232**	**74**	**208**	**15**	**24**	**15**
SM4CJY	SOB	9,045	50	135	26	29	12
SM5CCT	SOB	888	16	37	8	11	5
SM5PPS/5	**14**	**24**	**2**	**6**	**2**	**2**	**0**
SWITZERLAND							
HB9DCQ	**21**	**189,758**	**442**	**1201**	**31**	**79**	**48**
HB9CEY	**SOB**	**41,072**	**123**	**302**	**44**	**70**	**22**
UKRAINE							
RB0HZ	**SOB**	**91,280**	**224**	**560**	**38**	**85**	**40**
UB5KN	**28**	**28,244**	**124**	**307**	**24**	**47**	**21**
UB4HQ	**7**	**9,990**	**101**	**222**	**10**	**35**	**0**
UN GENEVA							
4U1ITU	**28**	**236,842**	**547**	**1499**	**32**	**79**	**47**
WALES							
GW3NYY	**SOB**	**35,380**	**125**	**305**	**31**	**59**	**26**
YUGOSLAVIA							
YT2GW	**14**	**219,240**	**570**	**1512**	**30**	**67**	**48**
OCEANIA							
AUSTRALIA							
VK2BQQ	**SOB**	**73,948**	**190**	**556**	**43**	**90**	**0**
VK3EBP	**14**	**62,964**	**198**	**583**	**24**	**48**	**36**
VK2BQS	14	6,174	53	147	12	14	16
VK8BE	**21**	**1,197**	**21**	**63**	**8**	**8**	**3**
GUAM							
KG6DX	**SOB**	**591,839**	**633**	**1867**	**80**	**134**	**103**
HAWAII							
AH6JF	**SOB**	**169,505**	**343**	**1015**	**43**	**57**	**67**
AH6IX	SOB	9,204	53	156	18	22	19
WN6I	SOB	7,050	50	150	13	7	27
INDONESIA							
YC1YMN	**21**	**116,051**	**344**	**1027**	**25**	**50**	**38**
NEW ZEALAND							
ZL2AKI	**SOB**	**237,244**	**356**	**1036**	**63**	**93**	**73**
PHILIPPINES							
KE9A/DU3	**SOB**	**268,882**	**400**	**1154**	**70**	**111**	**52**
KB0FUE /DU3	**21**	**52,332**	**210**	**588**	**24**	**47**	**18**
DU1CSU	SOB	5,382	49	138	16	20	3
DU1CSU	21	1,700	30	85	7	11	2
WESTERN SAMOA							
5W1KT	**SOB**	**246,528**	**435**	**1284**	**46**	**72**	**74**

SOUTH AMERICA							
ARGENTINA							
LU9DBK	**SOB**	**278,411**	**435**	**1283**	**51**	**78**	**88**
BRAZIL							
PP5JD	**28**	**204,953**	**492**	**1541**	**26**	**60**	**47**
ZX4V	28	78,309	267	791	18	39	42
CHILE							
CE6EZ	**21**	**201,312**	**469**	**1398**	**28**	**66**	**50**
CE3BFZ	**SOB**	**76,725**	**169**	**495**	**36**	**67**	**52**
COLOMBIA							
HK4EGW	**14**	**40,128**	**142**	**418**	**12**	**30**	**54**
HK4LLH -	**21**	**31,920**	**156**	**456**	**19**	**30**	**21**
HK3DDD	14	8,190	45	126	24	35	6
ECUADOR							
HC5J	**SOB**	**1,364,972**	**1143**	**3362**	**89**	**185**	**132**
HC5J	**28**	**207,411**	**495**	**1471**	**27**	**69**	**45**
HC5J	**14**	**124,968**	**345**	**1016**	**28**	**55**	**40**
HC5J	**21**	**101,882**	**288**	**842**	**27**	**55**	**39**
PERU							
OA4ZV	**SOB**	**439,967**	**582**	**1739**	**56**	**82**	**115**
TRINIDAD							
9Y4BU	**SOB**	**82,720**	**176**	**517**	**38**	**66**	**56**
VENEZUELA							
4M5RY	**14**	**238,650**	**536**	**1591**	**28**	**74**	**48**
YV6CAX	**28**	**4,522**	**48**	**119**	**8**	**18**	**12**

MULTI-OP SINGLE TRANSMITTER

ASIA							
ASIATIC RUSSIA							
4K0ADS	**MOS**	**802,060**	**857**	**2380**	**78**	**171**	**88**
UZ9CZM	MOS	317,811	402	1131	65	157	59
UZ9LWE	MOS	73,633	170	469	44	97	16
CHINA							
BY4AA	**MOS**	**315,360**	**537**	**1460**	**59**	**106**	**51**
BY4WNG	MOS	202,662	534	1251	60	102	0
JAPAN							
JJ3YBB	**MOS**	**786,942**	**779**	**2242**	**80**	**162**	**109**
JA7YAA	MOS	594,877	733	2117	67	129	85
TURKOMAN							
RH7E	**MOS**	**1,778,448**	**1321**	**3792**	**103**	**238**	**128**
EUROPE							
CZECHOSLOVAKIA							
OK1KQJ	**MOS**	**362,292**	**494**	**1362**	**64**	**111**	**91**
OK1KSL	MOS	186,702	317	841	59	95	68
ENGLAND							
GX0CNC /A	**MOS**	**205,856**	**366**	**919**	**46**	**93**	**85**
EUROPEAN RUSSIA							
UZ3AYR	**MOS**	**891,405**	**864**	**2201**	**86**	**209**	**110**
UZ3PWJ	MOS	8750	62	125	19	37	14
F.D.R.							
DL0GK	**MOS**	**940,443**	**853**	**2357**	**88**	**172**	**139**
DJ2BW	**MOS**	**782,592**	**726**	**2038**	**85**	**176**	**123**
FRANCE							
FF1COM	**MOS**	**782,275**	**879**	**2407**	**68**	**137**	**120**
FF6KRJ	MOS	40,872	114	312	39	47	45
ITALY							
IK1MDL	**MOS**	**748,668**	**750**	**2103**	**76**	**157**	**123**
IY4AJ	MOS	44,776	143	386	26	45	45
KALININGRADSK							
UZ3DWH	**MOS**	**241,119**	**434**	**1101**	**50**	**102**	**67**
LATVIA							
UQ0A	**MOS**	**619,801**	**667**	**1807**	**78**	**147**	**118**
POLAND							
SP3PLD	**MOS**	**55,867**	**138**	**347**	**50**	**83**	**28**
SP4KEV	MOS	13,962	80	179	21	46	11

HB9DCW with second op "HB9CAT," Multi-Single with 534,400 points

			SWEDEN				
SK5WB	**MOS**	**14,973**	**73**	**161**	**27**	**40**	**26**
			SWITZERLAND				
HB9DCW	**MOS**	**534,400**	**615**	**1670**	**69**	**127**	**124**
			YUGOSLAVIA				
YU4EZC	**MOS**	**188,881**	**314**	**847**	**53**	**94**	**76**
			NORTH AMERICA				
			CANADA				
VE3UR	**MOS**	**98,496**	**222**	**576**	**46**	**82**	**43**
			UNITED STATES				
KY1F	**MOS**	**318,108**	**535**	**1082**	**62**	**121**	**111**
W1GZ	MOS	256,564	405	833	67	138	103
W4AQL	**MOS**	**184,576**	**339**	**721**	**59**	**113**	**84**
N6IHQ	**MOS**	**115,092**	**305**	**556**	**48**	**74**	**85**
W3 /VK1GN	MOS	86,436	199	441	41	84	71
K7SS	**MOS**	**18,054**	**87**	**177**	**37**	**42**	**23**
			MULTI-OP MULTI-TRANSMITTER				
			ASIA				
			JAPAN				
JL1ZCG	**MOM**	**315,806**	**409**	**1174**	**69**	**115**	**85**
			NORTH AMERICA				
			CANADA				
VE7ZZZ	**MOM**	**1,522,824**	**1524**	**3558**	**91**	**162**	**175**
			UNITED STATES				
W3LPL	**MOM**	**1,728,520**	**1377**	**3160**	**102**	**260**	**185**

CHECK LOGS: NW8E, WA9TMU, SM5EIT, OH2DW, KB3TS, JH7BFL, SP1PBW, EA4EKB, SM6EZI, WJ2D, SP3DFB, RB5QV, LA0BX, K1TN, IT9ZGY, KP4BJD, RA9JB, UA3DLD, F11COA, RB5QV, KB3DF, W1UDB, SM6APB, SP7OGK, SM7CNA, WJ2D.

LU9DBK took first place in Argentina, Single Op All Band.

Roll your own HF dummy load? It can be done rather easily and economically. John, W4FA, presents an example

A Mini HF KW Dummy Load

BY JOHN J. SCHULTZ*, W4FA

It's amazing how confusing things can become when an antenna system doesn't seem to load correctly, when the control settings on a linear amplifier or antenna coupler seem to be changing from what they were previously on a given band, and so on. Under such circumstances there is nothing quite like having a good, old-fashioned dummy load available so you can check out a station setup step by step, starting with the output of a station's transceiver. Believe me, even old-timers can get confused at times when the more unusual faults develop with items such as coaxial cable lines or connectors between or on various pieces of equipment.

I built the HF dummy load described in this article because by accident (that means cockpit error) I put high power for too long into a commercial dummy load I was using for some tests. The overheating of the dummy load didn't destroy it, but it caused the carbon-deposit resistor used in it to permanently change value such that the SWR load it presented rose to 1:1.5. That's not too terrible, but it's still excessive if you want to make fairly accurate measurements.

What to do fairly quickly to get another dummy load together? I found the resistor I needed for a KW-level dummy load in my collection of "miscellaneous" and found it so easy to assemble a new dummy load that I thought the idea I used might be of interest to readers.

Luckily, I had the resistor necessary (a Carborundum type SP, 47 ohms, which measures about 12 inches long by 1 inch diameter), but the question was how to use it. I certainly didn't want to get involved in a big construction project, but I also realized that a dummy load used at the KW level generates a KW of heat! About the last thing I wanted to construct was a dummy load using oil as a coolant. Years ago I had such a type of dummy load pop out the oil, and never again would I want to experience that mess! Of course, the trade-off with the construction of almost any dummy load is balancing the heat dissipation generated by power input to the dummy load versus operating time. A small carbon resistor suspended in air would probably tolerate a KW for a small fraction of a second, while a proper dummy-load resistor immersed

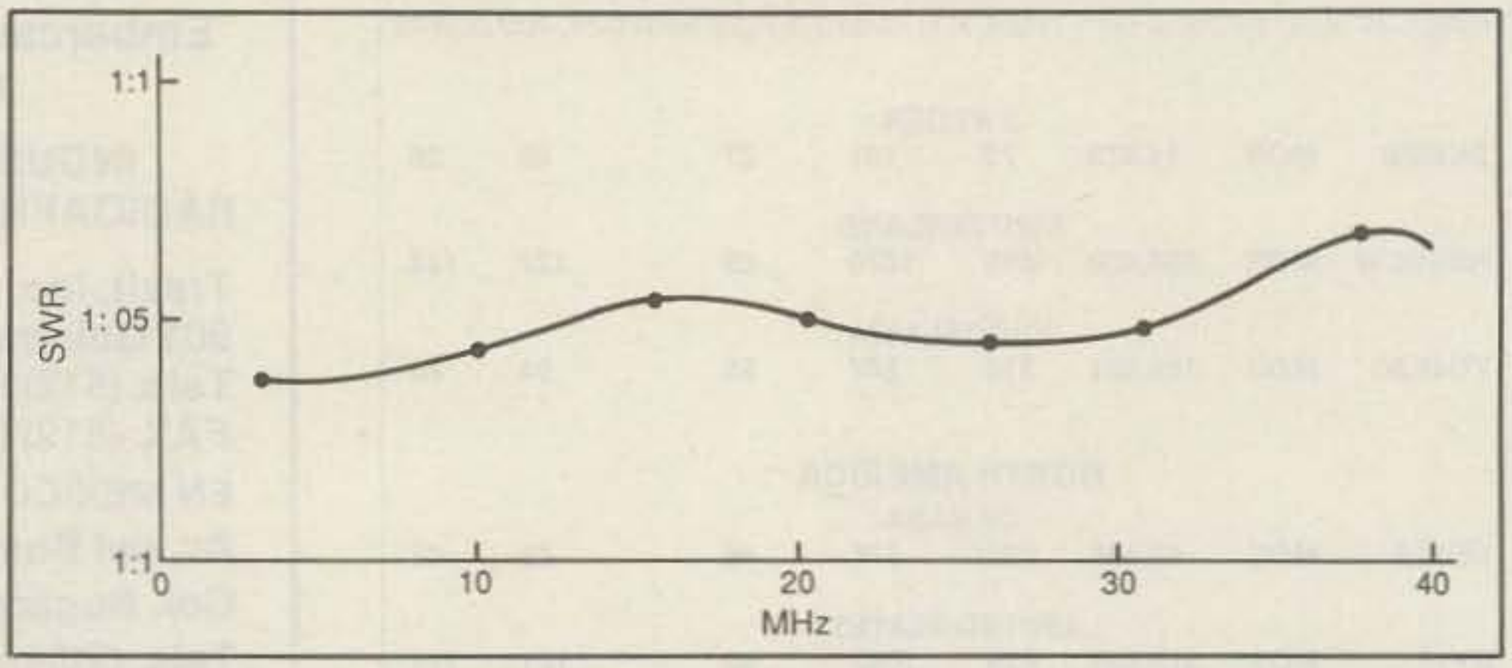
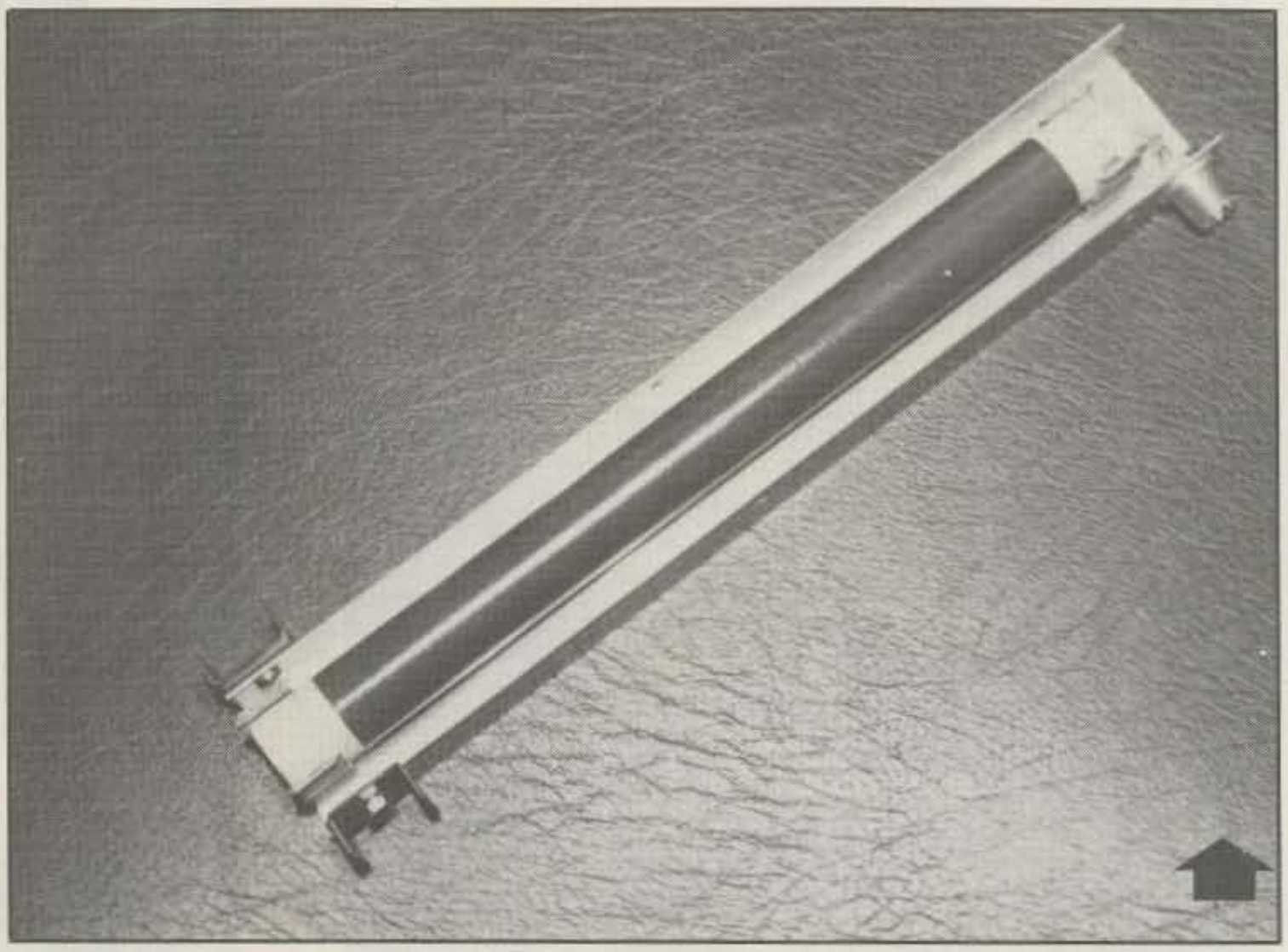


Fig. 1– The SWR response of the dummy load is extremely "flat" up to 40 MHz. It probably is also quite good down to 6 meters, although no specific tests were made on that band.



Details are covered in the text, but the dummy load consists of little more than a 12 inch long RF noninductive carbon resistor mounted in a standard-size piece of aluminum channel stock.

*302 Glasgow Lane, Greenville, NC 27858

in enough oil and/or fan-cooled could be designed to dissipate a KW continuously.

The idea I came up with was to take the 12 inch long resistor and sit it in a piece of aluminum channel stock, which was readily available at a chain-type discount hardware store. The aluminum "U" channel stock (2 inches wide and 1 inch high) came in 32 inch lengths and cost only a few dollars. I think it was intended for some sort of door-sill or window-ledge application, but I'm not really sure. In any case, it seemed to be readily available and inexpensive.

I cut a piece of it to a 13 inch length and mounted the resistor, centered in the channel stock, via large-size fuse clips ($1.50 each from a local electrical supply store). The fuse clip at the *input* end of the dummy load was insulated from the aluminum channel stock by the very simple expedient of using nylon machine-screw hardware. A standard SO-239 connector was mounted on one of the 1 inch channel walls at the input end, and a short wire was soldered between it and the insulated fuse clip. The fuse clip at the grounded end of the dummy-load resistor was very firmly secured to the channel stock using metal hardware.

SWR and power tests were made on the dummy load, and they turned out surprisingly well for the simple construction involved. The SWR response is shown in fig. 1. It runs below 1:1.1 at least up to 40 MHz. Possibly small compensating capacitors (ceramic types in the range of a few pF to 22 pF or so) used across the input SO-239 connector might get the SWR to be even flatter, but the effort hardly seemed worthwhile.

The power tests were more satisfying. The dummy load handled 1.5 KW key-down for 10 seconds with just slight warming of the channel stock. What was interesting was that the warming of the channel stock was greatest at the grounded end of the resistor, and **with the input power off,** you could feel the heat gradient on the resistor decrease rapidly as you felt towards the input end. The obvious conclusion was that some form of heatsinking to the grounded end of the channel stock should be added.

As can be seen in the photograph, small TO-220 heatsinks were added to both sides of the channel stock. Later on, TO-3 transistor-size heatsinks were temporarily added on each side in place of the small TO-220 size heatsinks. The TO-3 size heatsinks, by the way, are available from numerous mail-order sources for less than $1.00. What I finally ended up doing was disassembling the grounding clip and TO-3 heatsinks, cleaning the metal surfaces, using some heatsink compound (Radio Shack item 276-1372 is a relatively good buy) between the metal surfaces, and then tightly reassembling everything. The dummy load would now handle 1.5 KW for 30 seconds with only moderate warming of the channel stock. I'm rather sure it would dissipate 100 watts indefinitely. I considered the results very satisfactory for my needs—when I periodically would want to test a transceiver or linear amplifier.

For safety reasons the dummy load should probably be covered by some sort of cover. Stiff metal screening bent into a "U" form and fastened along the sides of the channel stock is a good bet. I found some having ¼ inch grids (which would allow very good air flow) available at a local hardware store in 1′ × 2′ strips for less than $1.00. Any similar idea would be satisfactory. The addition of the screening had no affect on the SWR response, which was initially measured without any screening. The screening at the apex of the "U" shape was about ½ inch above the top of the resistor.

The resistor is, of course, the key to building this rather simple but effective dummy load. The resistor can be obtained directly from the manufacturer—Carborundum Corp., Box 339, Niagara Falls, NY 14302. However, the far more economical way to go is to look for the resistor, or similar types which can be series or parallel connected to form a 50 ohm dummy load, at hamfests or from surplus outlets. Radiokit and Fair Radio Sales have had the resistors available at various times. Based on my own personal experience, I would not suggest using more than three or four of the resistors, if it has to be, in any form of series or parallel connection. The use of more resistors involves more connection points where something can go wrong, and the slight but invariable difference in ohmic values among the resistors means unbalanced power dissipation.

Is the effort worth it to "roll your own" HF dummy load? Sure, if you have the time to pursue the idea. The chances are you can turn out a very good dummy load at 10% to 20% of the cost of a similar commercial unit and have a bit of fun constructing an accessory item that will prove useful around an HF station setup for many years. CQ

CQ REVIEWS:

ELNEC—The Smart MININEC-Based Antenna Analysis Program

BY PAUL CARR*, N4PC

Although ELNEC is an advanced antenna analysis program, it is not complicated. It is smart and easy to use. It is also lazy. It calculates only what is necessary to fulfill your requirements. This means that it is fast. Are you interested? Read on.

ELNEC is a MININEC-based program written by Roy Lewallen, W7EL, for IBM-PC and compatible computers with DOS 2.0 or higher. Your computer should have at least 360K RAM and CGA/EGA/VGA/Hercules graphics and an EPSON-compatible dot matrix or HP Laser Jet/Desk Jet printer to run this program. Although 360K RAM will provide analysis for the majority of the antennas, 640K RAM will handle just about any antenna that you can conceive of. If you should happen to have insufficient RAM for a particular antenna, the program will not "crash." It will give you a message that there is insufficient RAM. Remember, this program is smart!

When you order the program, you should specify the disk configuration that you desire. The program is available as 5¼ inch 360K or 1.2 MB format and also 3½ inch disk format. When the program arrives, locate the READ ME file and follow Roy's instructions. You will be instructed to run a copy of the manual. Don't let the manual scare you. Although the manual is 78 pages, it is not complicated. It is smart. It is well written and provides examples to ensure your success even in early sessions.

The program is menu driven for easy data entry. There is no need to count "pulses" to determine where to specify the feed point. Simply tell the program how far from the end of the specified wire you want the feed, and the computer will make the assignment. If you change the wire length, the program "remembers" the feed assignment and makes the necessary changes. Are the wires connected the way you want? There are three views of the antenna available at the press of a key. You may also rotate the ends of the wires either vertically or horizontally by a simple command. The heights of the wires can also be changed by a keyboard command. No need to spend unnecessary time using trigonometry to calculate three-dimensional coordinates. Sounds great, doesn't it?

There's more to come. The antenna pattern traces can be saved to compare with future results. These patterns can be superimposed one on top of another, so many patterns can be compared at once. The calculated antenna analysis can also be saved so the analysis does not have to be rerun each time you want to review your design. The patterns can be reviewed

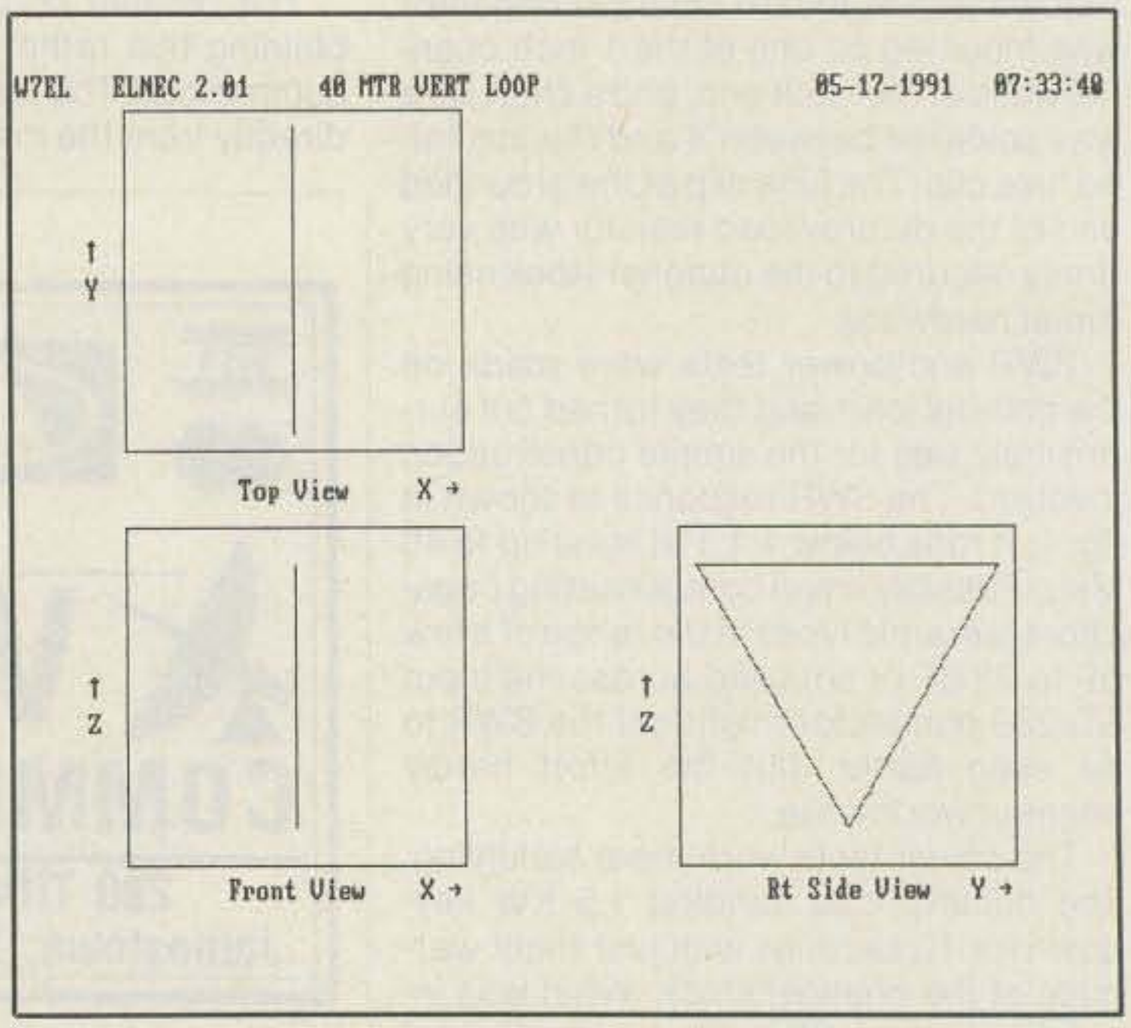


Fig. 1– The basic plot for a 40 meter vertical loop antenna. The next question will be where to feed it and what the results will be.

independently by using the Trace View feature.

Another really great feature is the way the program handles loads. You can input values of inductance, capacitance, and resistance, and the program will calculate the coefficients for the Laplace transform. No degree in engineering mathematics is required. Perhaps the best feature is that the program is not copy protected. This means you can run the program in peace, not worried that a glitch will steal your activation key. I could continue, but I think you get the idea.

To let you see the types of questions this program can answer, consider the following example. Suppose you have a full-wave 40 meter loop configured as an equilateral triangle placed vertically with the apex down. The question may arise, where should I feed the loop for best performance? Enter the data into the computer and check to see if you answered the data correctly. Antenna will tell you at a glance (see fig. 1). Now to answer the question about the feed point. Fig. 2 shows the antenna fed at the center of the top wire.

Next question: What happens if I move the feed point to the apex (at the bottom)? Very little changes from the top-feed ver-

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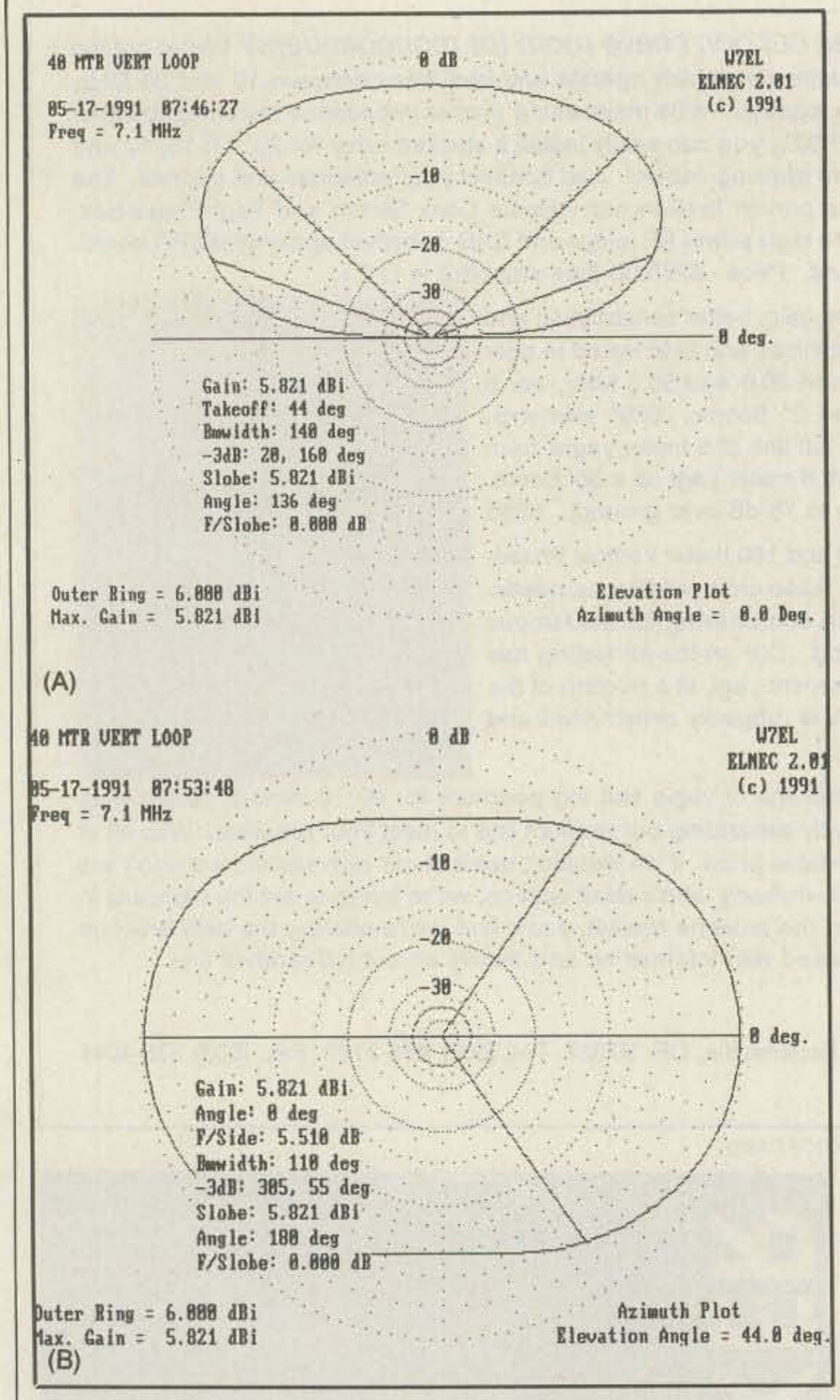

Fig. 2– The 40 meter vertical loop fed at the top of the top wire. At (A) we have the elevation plot, and at (B) the azimuth plot.

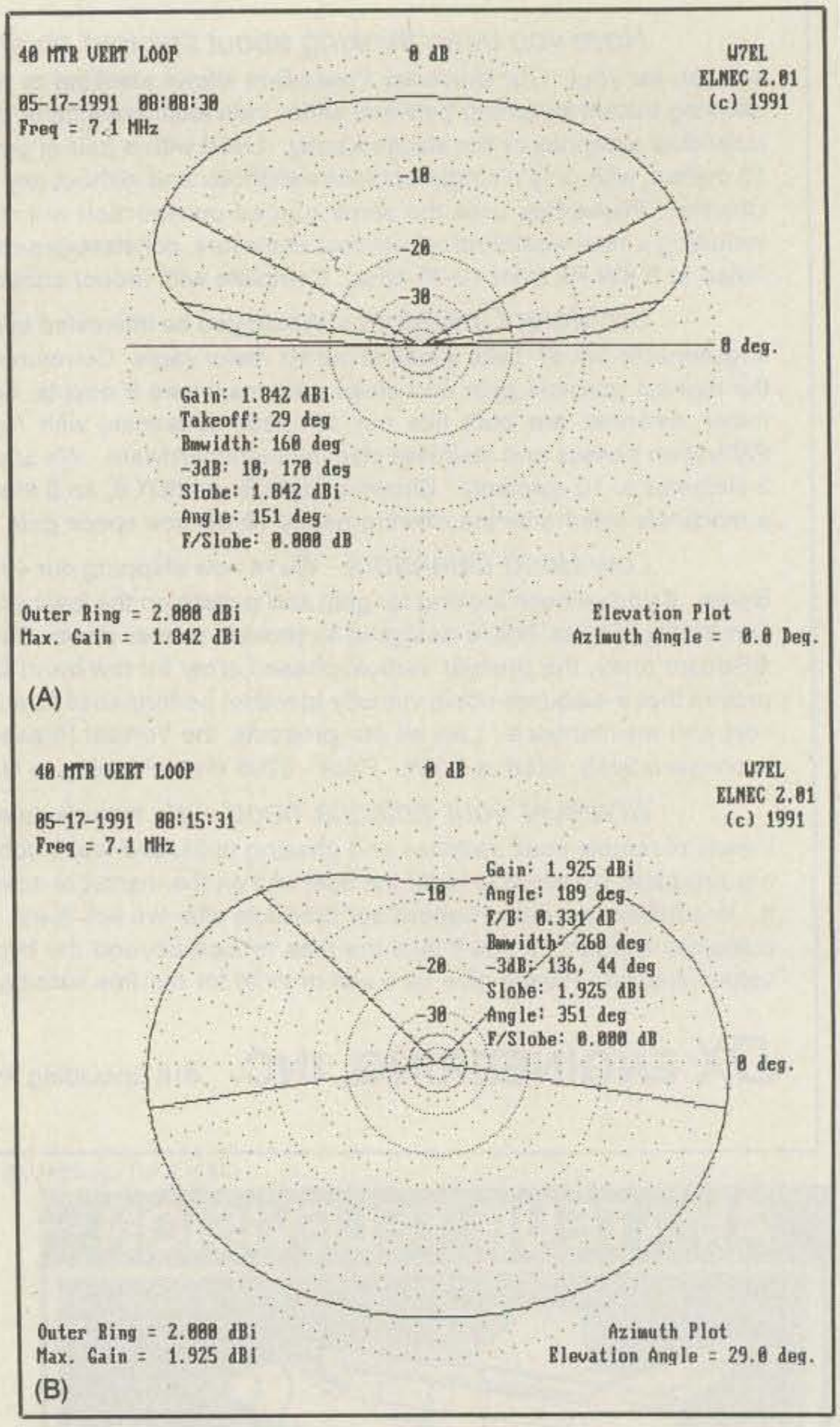

Fig. 3– The same antenna as depicted in fig. 2, except that we now corner-feed it. You can easily compare the differences.

sion. In fact, the patterns and predicted gains are almost identical to the top feed. Well, there is one other logical place to feed the antenna—corner feed. The corner-fed antenna has a skewed horizontal pattern, and the vertical radiation pattern has dropped to 29 degrees. That sounds great for DX, right? Before you get too excited, check the gain. We have lost almost 4 dB.

This brings up another question: How does the gain of the top-fed or bottom-fed antenna compare at a vertical angle of 29 degrees? A quick change to the program and another run will tell you the top- or bottom-fed antenna is almost 3 dB better at an angle of 29 degrees (see fig. 4). You almost have your answer. You are going to choose top or bottom feed, but which one? One thing the program does not take into account is the effect of feed line on the radiation pattern. As a result, I would choose a bottom-fed antenna to keep the feed line out of the pattern. There you have it. It's easy.

The program is available in two versions. If your computer has a coprocessor, get the standard version. If not, get the non-coprocessor version. The program is available from its author, Roy Lewallen, W7EL, at P.O. Box 6658, Beaverton, OR 97007. The price is $49.00 postpaid to the USA, Canada, and Mexico (add $3.00 for airmail to other countries). CQ

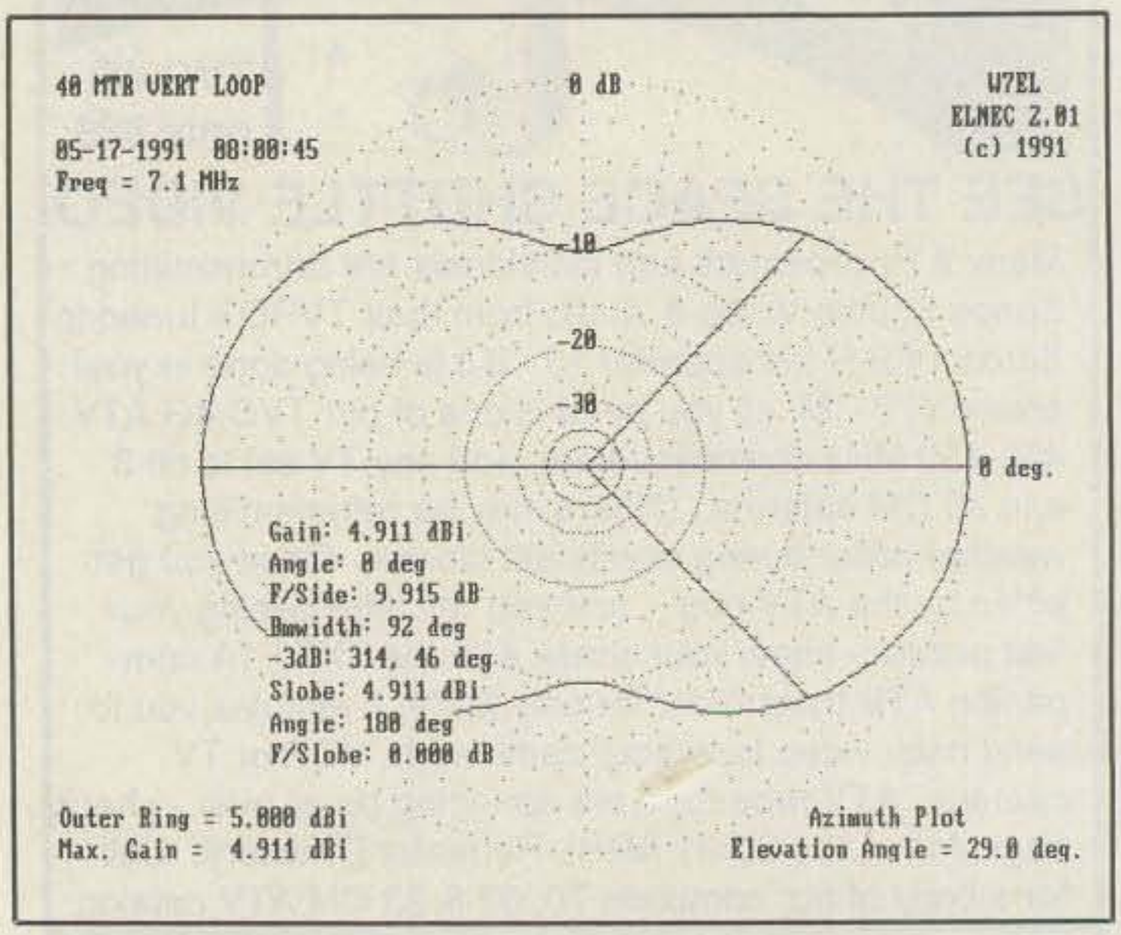

Fig. 4– This plot compares the gain of a top-fed vertical with that of a bottom-fed vertical at a vertical angle of 29 degrees.

BEST OF MFJ

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This MFJ Keyer is small in size but big in features. you get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/ tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 volt battery or 110 VAC with MFJ-1305, $12.95.

The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only $79.95 to mount on **your** Bencher paddle.

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MFJ-949D **$149.95**

MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

SWR Analyzer

MFJ-207 **$99.95**

MFJ's innovative new SWR Analyzer gives you a complete picture of your antenna SWR over an entire band -- without a transmitter, SWR meter or any other equipment.!

Simply plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR. You can instantly find your antenna's true resonant frequency,something a noise bridge can't do. Covers 1.8-30 MHz (or choose **MFJ-208, $89.95** for 2 Meters). Use 9 V battery or 110 VAC with MFJ-1312, $12.95.

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Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Swtich two receivers and aux. or active antenna.6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, $12.95.

MFJ-1024 **$129.95**

VHF SWR/Wattmeter

MFJ-812B **$29.95**

Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4½x2¼x3 in.

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MFJ-1702B **$21.95**

MFJ-1704 **$59.95**

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MFJ-1701, $34.95. Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Covers 1.8-30 MHz. 10x3x1½ inches.

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MFJ-262 **$69.95**

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MFJ-262, $69.95. HF.1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in.

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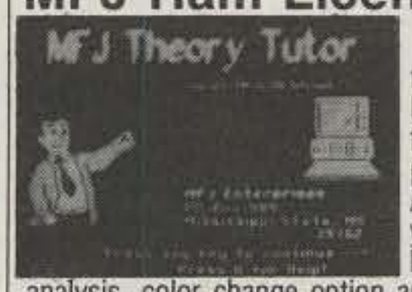

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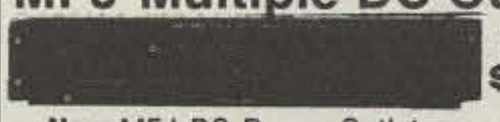

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1A0KM
A 1990 DXpedition To SMOM

BY EDGARDO PETRONZIO*, IK8DOI

I believe that every active DXer has a dream or fantasy of someday going on some exotic DXpedition. I'm certainly no exception.

My dream started to come true on April 23, 1990, when I telephoned my friend Tony, I0IJ. Tony was one of five amateurs who had persevered to complete the documentation that allowed SMOM to count as a separate DXCC country. During our conversation Tony told me to get the word out that he would be activating SMOM between April 27th and May 1st, a matter of a few days.[1] I couldn't resist and asked Tony about the chances of being part of the operation. He was way ahead of me and surprised me by letting me know that my name had already been submitted for permission from the Villa Malta, the operating site.

Two days later I received from Tony my official invitation making me part of the 1A0KM team. The only stipulation was that I had to remain at the site for the entire operation and couldn't leave before the end. My dream was coming true much quicker than I could have imagined.

Although SMOM exists physically in Rome, preparing for a DXpedition there is exactly like a trip to the other side of the globe. Everything, and I mean everything, connected with the station must be brought in, set up and used, and equally important, brought out. The Knights of Malta living and working there do not permit nor provide for a permanent amateur radio installation.

SMOM, or more precisely the Villa Malta, is located on the Aventino Hill, one of the seven Roman Hills. My home QTH is about 125 miles away, so it was not too far to go to complete a dream. On the other hand, it's extremely difficult to secure permission to operate from SMOM, and such permission is only granted for special circumstances.

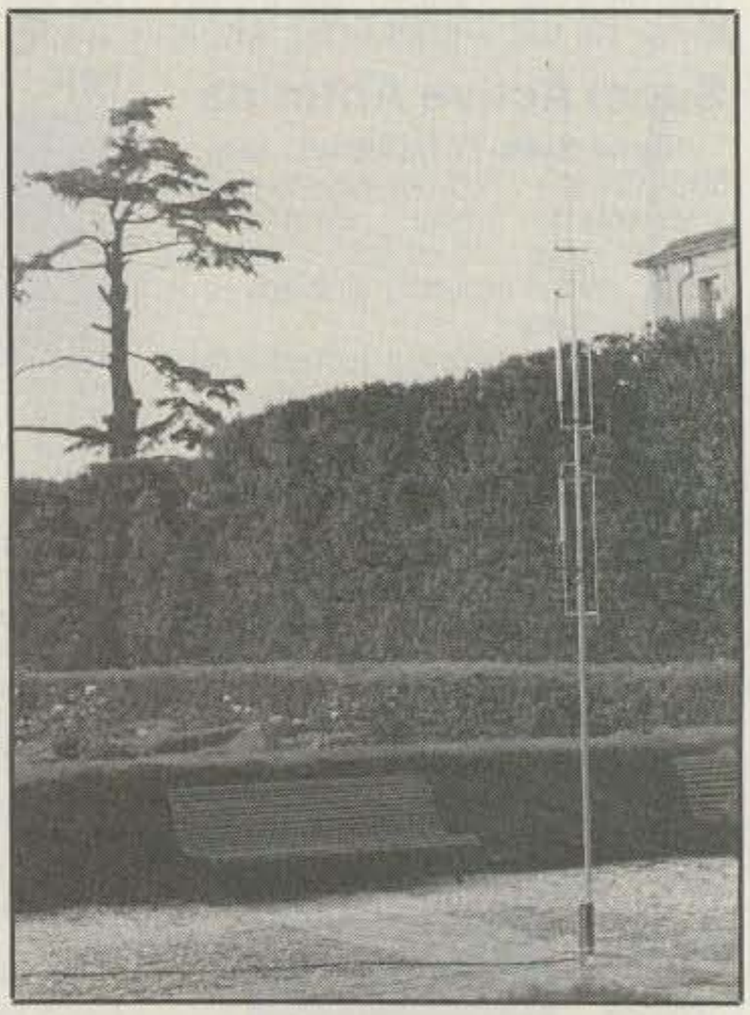
*Via Castellammare n. 132, 80054 Gragnano (NA), Italy

The Villa Malta, which is indeed a separate country, though located in Rome.

When you actually arrive in Knights of Malta Square on the Aventino Hill, you find the square full of people day and night. All of these people are attracted to the main entrance of the Villa Malta, where there is a portal from which you can see, from a certain vantage, the dome of Saint Peter's Church in the Vatican State, about two miles away. For a DXer it really is fantastic, and maybe the only opportunity to see three different countries at the same time—Italy, SMOM, and the Vatican.

The Operation Begins

The morning of April 27th was very busy for me. I packed my car with a TS-940S, an LK500Z amplifier, a Vibroplex keyer, plus assorted hardware and things I would need, and then drove almost 3 hours to meet Tony in Rome at his office by 12:30 PM. Once there, we loaded



The vertical antenna nestled in the beautiful garden of the villa.

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You get MFJ's new Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

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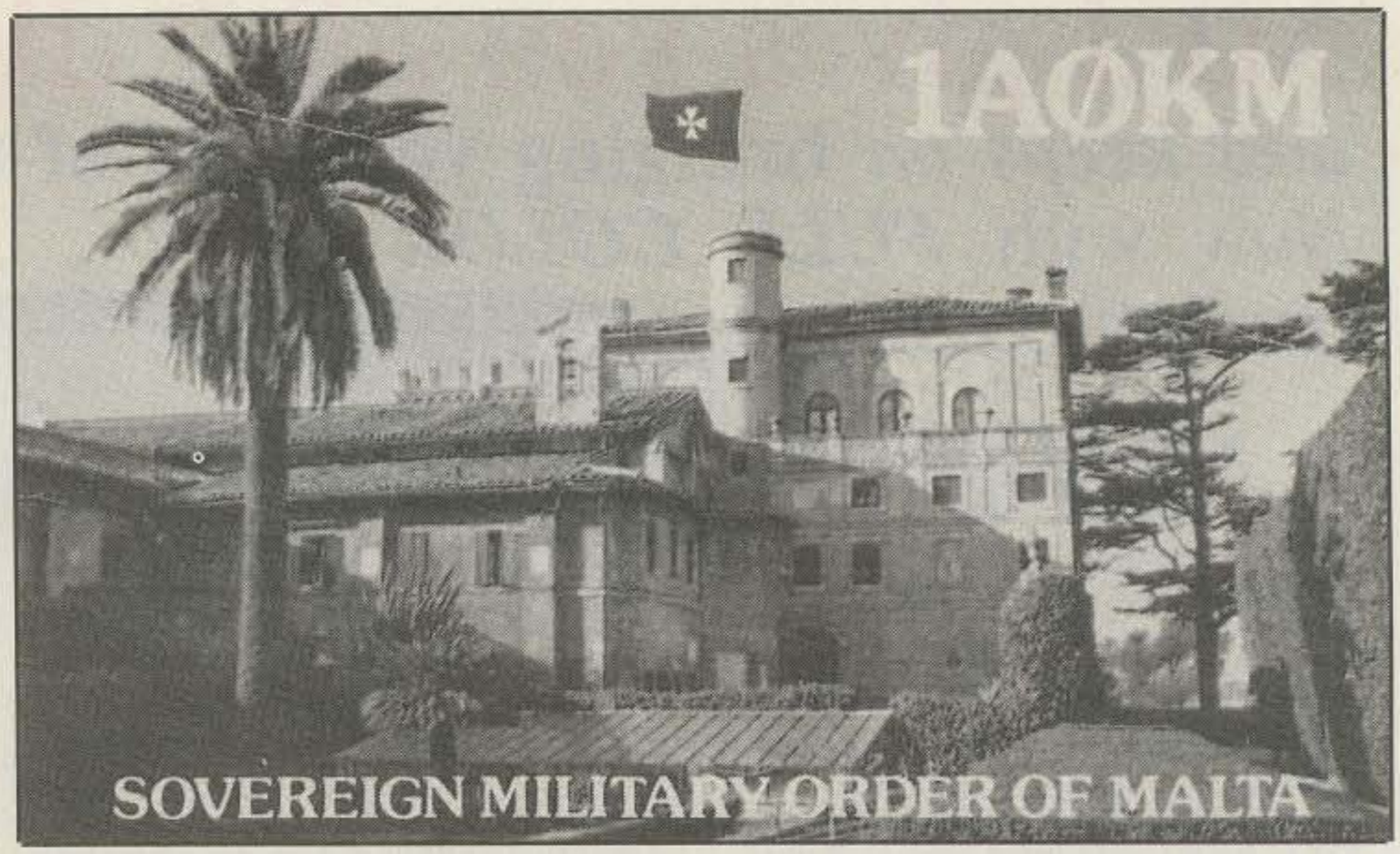
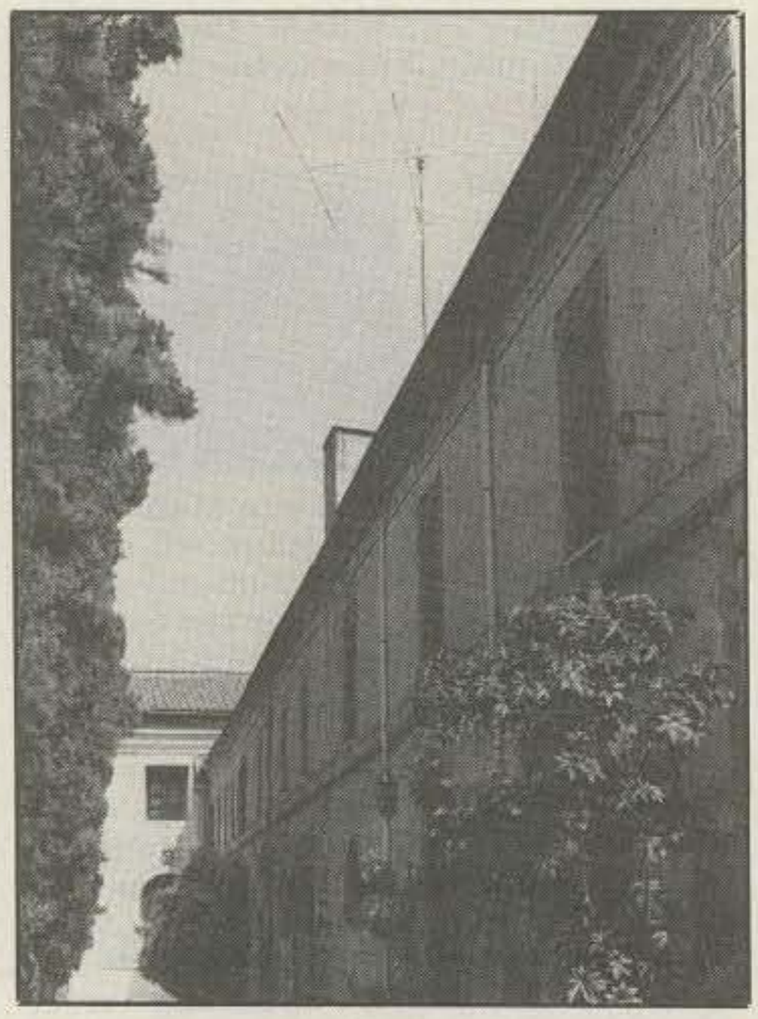


The 1AØKM QSL card features a view of the Villa Malta and the flag of SMOM.

Tony's car with a Cushcraft A3 three-element beam, a 10 through 80 meter KLM vertical antenna, a Henry 2K-D amplifier, another TS-940S, and a TS-440S. We also managed to wedge in some coax, guy wire, about 36 feet of antenna mast plus more spare hardware, connectors, and so on.

By 2 PM we were in Knights of Malta Square waiting by the main gate (the border) for our other friends to show up. Within a few minutes we were joined by Alfonso, IØAMU; Federico, IØDZW; Ugo, IØCUT; Meo, IØER; and Sat, JH1LPF. Later we would be joined by Marco, IKØDWN, and Tonino, IØSLD. The timing was important, as we only had permission to enter the Villa Malta with three cars to unload all of our equipment. Having everyone there made the task easier.



The three-element beam was secured to the roof.

Once inside the villa we made a quick study to determine where to put up the four antennas we had brought so as to minimize any mutual interference. Alfonso and Ugo, who were to be our operators on 18, 24, and 50 MHz, started to set up dipoles for those bands. We would be using an IC-751 for 18 and 24 MHz and an IC-505 for 50 MHz. Sat and I climbed to the roof using an old ladder and carefully crossed over the tiles to a balcony where we would hoist the hardware to secure the beam. We all were trying to make as little noise or fuss as possible, considering that we were adjacent to the private apartment of one of the two SMOM Ambassadors who live at the villa.

Down in the garden area the others were at work assembling the three-element beam. It had been partially preassembled by Meo, our resident antenna expert, and then we all worked at hoisting it to the roof. When it was completed, it stood at 50 feet. Federico checked the SWR, and everything was okay on 10, 15, and 20 meters. The vertical antenna was next, and we sank a ground rod in the garden to mount it. It took a few hours for Tony and Meo to spread out about 180 square feet of chicken-wire mesh, plus about 370 feet of radials to complete the installation. The last antenna to go up was the 80 meter dipole. There were several reasons, including bad propagation conditions, which made us forgo 160 meter operation at this time even though SMOM is still needed by a lot of amateurs on that band.

By dusk we were assembling the operating positions in a large room graciously provided. On one side, near the main entrance, was the WARC/6 meter operation, and at the other side of the room facing the garden the rest of us situated the HF gear. As the HF stations went together, Alfonso and Ugo fired up on the WARC bands and 6 meters.

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Model	8030	3000	2600H	2600HA	2210A	2300
Function	Freq, Period Ratio, Interval	Freq, Period Ratio,Interval,	Frequency	Frequency	Frequency	Frequency
Range	10Hz-2.6GHz	10Hz-2.6GHz	1MHz-2.6GHz	1MHz-2.6GHz	10Hz-2.4GHz	1MHz-2.4GHz
Display	10 Digit LCD w/Function Annunciators	10 Digit LCD w/Function Annunciators	10 Digit LCD	10 Digit LCD	8 Digit LED	8 Digit LED
RF Signal Strength Indicator	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	•	•	•
Price	$579.	$375.	$325.	$225.	$199.	*$99.

Sensitivity: <1 to <10mV typical. Time Base: ± 1.ppm.; ±.2ppm add $100. - LCD Models. Nicads & AC charger/adapter included except for 2300. *For 2300, NiCad installed, $20. & AC charger/adapter, $9.
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We completed the HF site by 8 PM and decided to start the official operation at 10 PM, giving us a bit of time to enjoy some dinner. Tony made a telephone call to the DXNS Voicebank,[2] leaving the starting time of the SMOM operation. At the appointed hour we fired up the Henry amplifier on 20 and instantly realized that we had also inadvertently fired up the entire Villa Malta electronic security system with our RF. Needless to say, it was quite a shock to us to have this problem, and additionally it was not amusing at all to the villa custodian. He suggested that we cease immediately and start up in the morning, when the alarm would be off. Trying to operate barefoot even tripped the alarm system. The custodian was at this point adamant and categorically refused to shut off the alarm system in favor of a DXpedition. For some strange non-amateur reason he felt that security was more important. He did say that we could begin our operation after 6 AM, however.

The next morning at 6:15 AM SMOM was on the air. I called CQ three times on 40 meter CW, and the returning pile-up was instantaneous and tremendous. It rivaled anything I had experienced in any of the major DX contests or when I operated from 4S7 or 5H3. The whole world of DX seemed ready to pounce on all of us. It was really exciting.

I spent most of my time transmitting on 7.005 MHz listening up, 7.010 to 7.020 MHz. I worked a lot of DX and quite a number of US stations first on CW and then on SSB, listening up at 7.186 MHz for US only.

Tony very ably handled the huge pile-ups on 20 meters and then switched to 15 meter SSB, listening for worldwide at first, then to selective areas following the propagation conditions. Sat spent his operating time during the hot propagation hours with Japan. He was maximizing the updated daily propagation forecasts we were receiving by FAX from JA1ELY in Japan. In this way we were able to satisfy a lot of the Japanese operators in their quest for SMOM.

Tony, IØIJ, takes his turn at the mic.

Everyone had a turn at operating the pile-ups for 1AØKM. Federico and Meo focused in on the crowded 40 meter band, especially during the morning hours when the Italian and other European pile-up was enormous. Marco was kept busy trying to handle and prioritize the many sked requests coming in from all over the world. Tonino was invaluable during the antenna work, as his regular job is as a fireman in the Vatican State, so he is quite at ease with ladders and heights.

The only sad note to this story is that we couldn't satisfy all of the 80 meter requests due to the restriction on nighttime operating. Somehow we have to work on the RFI problem with the alarm system.

About 4 PM on May 1st we began to take down the DXpedition station. We kept one station going on the vertical antenna while everything else was taken down and packed in the cars. At 9:30 PM it was all over, and we were ready to leave. The operation produced about 10,000 QSOs. It was sad in a way to say goodbye and leave the villa after five hectic days of amateur radio and new friendships. I would like to thank Tony in particular for offering me this opportunity, and all of you out there who helped make a dream come true.

Footnotes

1. Because of the procedural problems with permission and short-term arrangements necessary, advance word of operation by 1AØKM is *very* unusual, as the story demonstrates!

2. DXNS Voicebank: The *DX News Sheet* is published by the RSGB and edited by G4DYO. It is the most popular DX bulletin in Europe. They maintain a "Voicebank" by telephone; anyone can call in timely info or urgent updates related to DX, and anyone can also call another telephone number to hear what has been left as information. CQ

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AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for August is:

Hugh S. Unger, MD, WB4UHN
USA-CA All Counties #658
All 20M SSB, 4-23-90

"I became interested in ham radio when I was in the Navy in 1964. After moving to Miami I took two amateur radio courses, one given by the Brothers at Chaminade High School in Hollywood, and the second course given by Adult Education of the county, which subsequently led to my passing the General Class License examination in 1972.

"I became very active on the YL International Single Side Band Net, and that is where I first met Dorothy, WB9RCY. I subsequently acquired most of the YL awards and then heard about the county hunters from some of the YL members, especially W5AWT, Mel. I think that I received my first county hunting award in 1975. As a practicing orthopedic surgeon, it was very difficult for me to get on the air at the right time for most of the counties, especially those close to me in Florida. The 40 meter band was loaded with QRM, and that made any attempt to get my counties impossible. Thus, I stopped trying for a long time. I don't know what made me start again, but this time I was more intense and started to work my counties.

"I sat with about 13 missing counties for a long time. Then they started to come in gradually. I missed counties that were scheduled in the club newsletter or were in lists that the mobile operators sent to me. However, when it came near the end, club members did the job for me. Jay, KD8GL, was instrumental in getting my last Georgia counties by calling my office and my house to let me know that my last counties were going to be on the air.

"It was fortuitous that I had just finished surgery and returned to my office to receive the pleasant message from my receptionist to go home and get on the air. Lo and behold, I finished my Georgia counties and everybody congratulated me! Then Cecil, W0UM, and Dave, N7BKW, blew my mind when they said that I should check my new log book to be certain that I had worked all 3076 counties, including the new ones in Arizona and New Mexico. I could have strangled them through my mike, after 15 years, to be so close and yet so far. Luckily, I had worked Cibola, New Mexico and only needed La Paz, Arizona.

"Everybody felt sorry for me, and someone mentioned that WB6ALC goes there frequently, so I was able to talk to him. One night Gene, N4ANV, called and said that my station would be on the air. Five minutes later KK7X came on from La Paz, and net controls made sure that I got him for the very last county to complete USA-CA All Counties.

"I must thank so many people for their help in getting me my USA-CA Award. Those I mentioned are only a few of the many members of the county hunting group that pulled me through. My little struggle shows that with persistence one can get the award, and there are hams out there who don't know anything else but being helpful. My family finally understood what a 'nut' I am and what crazy, helpful people are in the ham fraternity for the most part.

"I have recently seen a change in the ham community since I started back on DX, with deliberate jamming of the frequency both on our mobile net frequency and the DX. I thought that I had enough with the Los Angeles jammer, name to be deliberately left out. These guys are worse, if that is possible. I guess that jealousy is leading to the destruction of the airwaves, and we really don't have much power except to conduct ourselves in a proper fashion. Maybe then others will follow.

"Thanks to all for all your help.—73, Hugh, WB4UHN."

333 South Lincoln Ave., Mundelein, IL 60060

Dr. Hugh Unger, WB4UHN, USA-CA All Counties #658 at home in Florida.

USA-CA Special Honor Roll

Eugen Goffriller, OE2EGL
USA-CA All Counties #703
All SSB, 4-1-91

Ada (Jan) J. McLernon, NV6L
USA-CA All Counties #704
Mixed, 4-6-91

O. Allen Landreth, NA5F
USA-CA All Counties #705
Mixed, 4-10-91

L. T. Fortune, Jr., KF4FP
USA-CA All Counties #706
All Mobile, 4-13-91

Guy Bourgie, VE2YM
USA-CA All Counties #707
Mixed, 4-17-91

David W. Nelson, WI9C
USA-CA All Counties #708
Mixed, 4-26-91

Awards Issued

Eugen Goffriller, OE2EGL, collected his final groups of county confirmations and claimed USA-CA All Counties #703, USA-CA 3000 #732, and USA-CA 2500 #812, All SSB, #1 to OE-land, dated 4-1-91.

Ada "Jan" J. McLernon, NV6L, put the finishing touches on her good record and received USA-CA All Counties #704, Mixed, dated 4-6-91.

O. Allen Landreth, NA5F, filed his completely filled and certified Record Book

Gene, OE2EGL, USA-CA All Counties #703, number one to OE-land.

USA-CA Honor Roll

3000

OE2EGL	732	KF4FP	978
NA5F	733	VE2YM	979
KF4FP	734	KE0AY	980
VE2YM	735	K3IMC	981
W0AWP	736	WI9C	982
WI9C	737	KB9AFA	983

2500

OE2EGL	812	AA4HL	1168
AA4HL	813	NA5F	1169
N7LWX	814	KF4FP	1170
NA5F	815	VE2YM	1171
KF4FP	816	KE0AY	1172
KM1I	817	K3IMC	1173
VE2YM	818	WI9C	1174
WI9C	819		

2000

AA4HL	887	N4VFC	2505
WB9HPR	888	AA4HL	2506
NA5F	889	NA5F	2507
KF4FP	890	Y35UG	2508
VE2YM	891	I3UBL	2509
KA5IAT	892	KF4FP	2510
WI9C	893	VK3CBS	2511
		N1WR	2512

1500

		VE2YM	2513
AA4HL	976	KA7FZE	2514
NA5F	977	KE0AY	2515
		WI9C	2516

1000

AA4HL	1168		
NA5F	1169		
KF4FP	1170		
VE2YM	1171		
KE0AY	1172		
K3IMC	1173		
WI9C	1174		

500

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to *CQ* 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 Communications, 76 North Broadway, Hicksville, NY 11801 USA for $1.25. To qualify for the special subscriber rate please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for airmail reply.

and received USA-CA All Counties #705, USA-CA 3000 #733, USA-CA 2500 #815, USA-CA 2000 #889, USA-CA 1500 #977, USA-CA 1000 #1169, and USA-CA 500 #2507, Mixed, dated 4-10-91.

Layard T. Fortune, Jr., KF4FP, completed all of his paperwork and claimed USA-CA All Counties #706, USA-CA 3000 #734, USA-CA 2500 #816, USA-CA 2000 #890, USA-CA 1500 #978, USA-CA 1000 #1170, and USA-CA 500 #2510, All Mobile, dated 4-13-91.

Guy Bourgie, VE2YM, also did it in one giant stride, receiving USA-CA All Counties #707, USA-CA 3000 #735, USA-CA 2500 #818, USA-CA 2000 #891, USA-CA 1500 #979, USA-CA 1000 #1171, and USA-CA 500 #2513, Mixed, dated 4-17-91.

David W. Nelson, WI9C, made a clean sweep by claiming USA-CA All Counties #708, USA-CA 3000 #737, USA-CA 2500 #819, USA-CA 2000 #893, USA-CA 1500 #982, USA-CA 1000 #1174, and USA-CA 500 #2516, Mixed, dated 4-26-91.

Alvin B. Unruh, W0AWP, updated his good record and received USA-CA 3000 #736, All CW, dated 4-19-91.

Chester MacKenzie, AA4HL, took a big initial step in his quest by claiming USA-CA 2500 #813, USA-CA 2000 #887, USA-CA 1500 #976, USA-CA 1000 #1168, and USA-CA 500 #2506, All CW, dated 4-6-91.

Charles "Bart" Bartlett, N7LWX, filed his qualifying application and received USA-CA 2500 #814, All 20M SSB Mobile, dated 4-8-91.

Cary R. Wallace, KM1I, qualified for USA-CA 2500 #817, Mixed, dated 4-15-91.

Charles William Lenhart, WB9HPR, received USA-CA 2000 #888, Mixed, dated 4-8-91.

James Brownlee, KA5IAT, received USA-CA 2000 #892, Mixed, dated 4-22-91.

Frank Tissot, KE0AY, gathered in a good group of confirmations and claimed USA-CA 1500 #980, USA-CA 1000 #1172, and USA-CA 500 #2515, All SSB, dated 4-19-91.

Donald L. Flynn, K3IMC, filed his good application for USA-CA 1500 #981, and USA-CA 1000 #1173, Mixed, dated 4-23-91.

Sally E. Butzow, KB9AFA, received USA-CA 1500 #983, Mixed, dated 4-29-91.

USA-CA 500 certificates went to:

William H. Hobbs, Sr., N4VFC, USA-CA 500 #2505, All SSB, 4-4-91.

Chester MacKenzie, AA4HL, USA-CA 500 #2506, All CW, 4-6-91.

O. Allen Landreth, NA5F, USA-CA 500 #2507, Mixed, 4-10-91.

Uwe Rasel, Y35UG, USA-CA 500 #2508, Mixed, 4-10-91.

Ulisse Bertoncello, I3UBL, USA-CA 500 #2509, Mixed, 4-11-91.

Layard T. Fortune, Jr., KF4FP, USA-CA 500 #2510, All Mobile, 4-13-91.

Bill Howe, VK3CBS, USA-CA 500 #2511, All 10M SSB, 4-13-91.

Wayne Rogers, N1WR, USA-CA 500 #2512, Mixed, 4-17-91.

Guy Bourgie, VE2YM, USA-CA 500 #2513, Mixed, 4-17-91.

Eddie S. Giampapa, KA7FZE, USA-CA 500 #2514, Mixed, 4-19-91.

Frank Tissot, KE0AY, USA-CA 500 #2515, All SSB, 4-19-91.

David W. Nelson, WI9C, USA-CA 500 #2516, Mixed, 4-26-91.

Awards Available

Worked All Club Operators Award. The LACARA WACO! Award is given by the Lake County Amateur Radio Association (Ohio, USA) to all fellow amateurs in Lake, Cuyahoga, and Geauga counties who work 30 LCARA members who are in good standing at the time the contact is made. The LACARA WACO! is given to amateurs in North America but outside of the three counties listed above for contacting 20 LCARA members in good standing. DX stations can receive the LCARA WACO! Award for contacting 10 LCARA members.

The contact will be declared invalid if either operator is operating in violation of FCC rules and regulations at the time of contact.

Only one contact with each member on each band will count toward the WACO! Award. Contacts can be on any band in any mode. The only exception is that repeater contacts do not earn WACO! credit.

After earning your WACO! Award you may work toward earning endorsements for additional contacts (in multiples of 10) or endorsements for additional bands or modes.

All WACO! Awards are numbered beginning with the first award. The earliest log date will determine the next number when more than one award is to be given at any time.

WACO! Awards are given to local amateurs at the monthly LCARA meetings. Those unable to attend the monthly meetings may apply and receive their award by mail.

All decisions concerning this award shall be made by the WACO! committee. Final judgment as to the validity of contacts shall be at the full discretion of said committee. The official rules are as stated herein.

WACO! logs are provided by the club. Other logs may be used provided that the following information is given for each contact: Station Worked, Name, GMT Time/Date, Band, and Mode.

The purpose of the LACARA WACO! is to promote communication between and with LCARA members and to publicize the club among fellow amateurs.

Mail logs to: LCARA WACO!, P.O. Box 868, Painesville, OH 44077, USA. A large SASE is required to receive the award by mail.

The OR0OST Award (25 years OST: 1965–1990). The OR0OST Award is issued by the radio amateurs of the club station OR0OST of the coast station OST in Oostende (JO11LF Belgium). The award may be applied for by all licensed amateurs and SWLs if they can provide evidence that they worked or heard OR0OST (a single QSO) on the HF bands or on VHF.

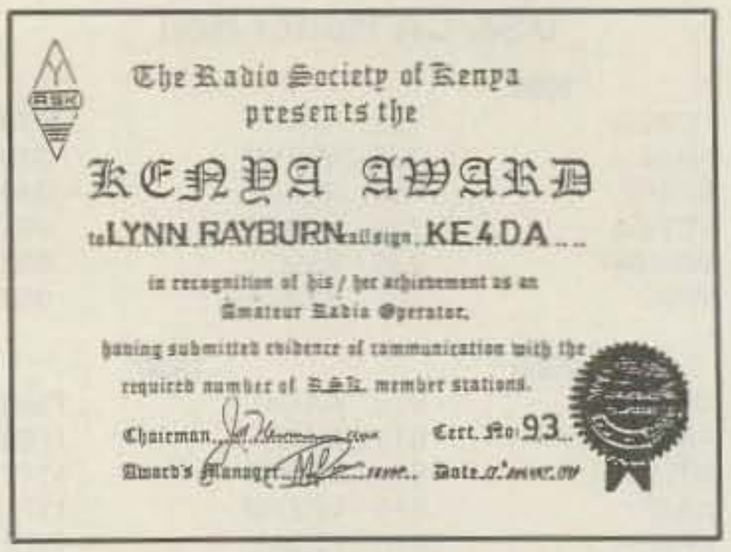
The coast station OST of Oostende is offering this award in observance of its 25th anniversary. The club station is QRV on weekdays at 1100 UTC SSB or CW on the 10, 12, and 15 meter bands, and also on the 20 or the 40 meter band. Station OR0OST goes QRT at 1200 UTC.

There are no band or mode limits, but contacts through repeaters are not valid.

No QSLs are required, only a certified GCR list. Applications must be sent to the Award Manager, Plovie Ronny, ON6CQ, Vriendenkring Club Station OR0OST, Perronstraat 6, 8400 Oostende, Belgium. The fee is $5 U.S. or 6 IRCs or 150 Bfr. After verification and acceptance, the beautiful color award will be sent.

ON6BY is the QSL manager of club station OR0OST.

The Kenya Award. The Kenya Award is available to amateurs and SWLs worldwide. It is sponsored by The Radio Society of Kenya, a member of the International Amateur Radio Union. Requirements for the award are as follows. A total of ten (10) points are required.


The Radio Society of Kenya
presents the
KENYA AWARD
to LYNN RAYBURN callsign KE4DA
in recognition of his / her achievement as an
Amateur Radio Operator,
having submitted evidence of communication with the
required number of R.S.K. member stations.
Chairman ... Cert. No: 93
Award's Manager ... Date ...

The Kenya Award, for contacts with club station 5Z4RS and members of the Radio Society of Kenya.

1. A contact with a 5Z4 station who is a member of RSK counts 2 points. Only one contact per station is allowed.

2. A contact with RSK's club station 5Z4RS counts 4 points.

3. All modes are allowed.

4. All bands are allowed.

5. Only contacts after 31 December, 1977 are allowed.

Submit log extract certified by an official of a local amateur radio club or licensing authority. QSLs are not required. Enclose 15 IRCs or $8.00 US banker's draft made payable to the Radio Society of Kenya, by registered mail. Do not send cash. Address applications to The Kenya Award, Radio Society of Kenya, P.O. Box 45681, Nairobi, Kenya.

European Ten Metre Award—ETMA. This award, jointly sponsored by the Ten Metre Group of the REF (Reseau des Emetteurs Francais) and the Ten Tech (French Chapter), is aimed at fostering both two-way amateur radio transmission on the 28 MHz band and SWL reports on amateur transmissions in the 28 MHz band.

Any mode may be used and awards


-E-T-M-A-
Le Conseil d'Administration du Réseau des Emetteurs Français Certifie Que Mr ... Indicatif ... s'est Distingué Par La Qualité De Son Trafic Sur 10m et 1m Décerne l'European Ten Meter Activity Award pour un Total de ...
Le Manager ... Le Président du rel

European Ten Meter Award jointly sponsored by The Ten Meter Group (France) and Ten Tech (French Chapter).

can be endorsed "All RTTY" on request. The award is issued on the submission of proof of obtaining a certain number of points as set out below. The minimum number of points is 3000, and only contacts or reports after 1st January 1975 are valid.

Points can be claimed as follows.

a. For participation in the annual 10 Metre Challenge, for which F3CY is responsible, by sending in quarterly reports whereby 10 meter contacts or reports are counted as follows: Local (your own country) 1 point, Europe 2 points, Africa 3 points, North and South America 5 points, and Oceania 6 points.

b. Upon receipt of logsheets connected with a special 10 meter contest, 1 point per QSO.

c. First place in a 10 meter contest organized by your own National Society, 1000 points.

d. First place in your country in a 10 meter contest *not* organized by your own National Society, 100 points.

e. For being a member of the Ten Tech Inc., 200 points.

f. For QSL proof of contact or SWL confirmation from a Ten Tech member, 50 points.

g. Upon receiving a certificate of the Paris Region Ten Club, F6DEH, 50 points.

h. Upon receiving a certificate from the Chapter Rhone-Alpes, F6CSK, 50 points.

i. For having obtained special 10 meter awards as follows:

WAC 10m—10 points
DXCC 10m—2000 points
DUF4 10m—1000 points
DNF2 10m—1000 points
DTA 10m—500 points
DPF & DDFM 10m—100 points
DLD 10m—100 points

The point value of other 10 meter awards will be determined by the REF Ten Metre Group upon application.

The fee is 15 IRCs. Send application to Awards Manager, F11ADB, Pierre Fournier, 3bis Rue Pasteur, F-78000 Versailles, France.

Canadian DX Association Awards. The three following awards are issued by the Canadian DX Association. The following general rules apply.

The awards are available to licensed amateurs. No band or mode limitations. The QSL cards must be in the possession of the applicant. Do not send QSL cards. A list of contacts showing date, time, mode, and definite location of the station worked must be submitted. This list should be certified by either one radio club official or two other licensed amateurs.

The fee for each award is US $2.00 or 10 IRCs. The address for application is: Canadian DX Association, P.O. Box 717 Station 'Q', Toronto, Ontario, Canada M4T 2N7.

Canadian Provincial Capitals Award. Applicants need to work and confirm with an amateur radio station in each of the 10 provincial capitals of Canada.

Provincial capitals of Canada: Alberta/Edmonton; British Columbia/Victoria; New Brunswick/Fredericton; Newfoundland/St. Johns; Nova Scotia/Halifax; Manitoba/Winnipeg; Ontario/Toronto; Quebec/Quebec City; Prince Edward Island/Charlottetown; Saskatchewan/Regina.

SEA Award. Applicants need to work 10 different amateur stations along the route of the St. Lawrence Seaway. One of those 10 contacts must be in each of the following areas: Thunder Bay, Greater Toronto, Greater Montreal, and Greater Quebec City. The remaining 6 may be from any municipality located along the route.

Trans Canada Award. Applicants need 5 contacts with each of the 8 Canadian Call areas of VE1-VE8 (thus a total of 40 contacts), an additional 5 stations in VO1 or VO2 call areas of Newfoundland and Labrador, and 1 VE0 Maritime Mobile station. Note: Of the VE8 call area, at least one contact must be with a Yukon station (VE8 or VY1) and one must be with an offshore island of the Northwest Territories. Total contacts to confirm are 46.

Award Program of Karelian DX Club "Kivach." Following are the rules for this award program.

Kivach Pennant. Work/hear members of KDXC "Kivach." EU stations—10 members; DX—5 members of KDXC. Send log extract and 12 IRCs or 6 US dollars to Award Manager Alex N. Abramov, UA1NDR, P.O. Box 225, Petrozavodsk-34, 185034 Karelia, USSR.

Karelia Award. Work/hear stations from the Soviet Karelia (UN, UA1N, RA1N, U1N, UZ1N).

Class 3: EU—10 QSOs; DX—5 QSOs.
Class 2: EU—20 QSOs; DX—10 QSOs.
Class 1: EU—30 QSOs; DX—20 QSOs.

There are no mode or band limits. Dupe QSO on different bands. Send log extract and 10 IRCs or 5 US dollars for every class to award manager UA1NDR.

HI-HI Award. Work/hear 10 different suffixes from the callsigns of amateurs all over the world, which repeat the most popular amateur radio codes. Suffix "HI" counts twice. There are three stickers for this award:

1. 20 different suffixes or 10 different calls with the same suffix.
2. 40 different suffixes or 20 different calls with the same suffix.
3. Excellence—60 different suffixes or 40 different callsigns.

All QSOs on or after January 1, 1980, any band any mode, are valid for the HI-HI Award. Send GCR and 7 IRCs or 4 U.S. dollars to Awards Manager UA1NDR. Stickers cost 2 IRCs.

A list of valid suffixes follows: ADR,

AGN, ALL, AM, ANT, AS, BK, BOX, BY, CFM, CQ, CUL, CW, DE, DR, DWN, DX, ES, EX, FB, FM, GA, GB, GD, GE, GL, GM, GN, NI, ITU, KW, LID, LOG, LW, MHZ, NO, NOT, NR, OK, OM, OP, OPR, PA, PSE, RIG, RPT, RX, SSB, SWL, TKS, TKU, TNX, TO, TU, TX, UFB, UHF, UP, UT, VIA, VHF, WKD, WX, XYL, YL.

Neuvosto Karjala Award. To receive this award, you need to earn 70 points with Karelian stations, from January 1, 1990. All the special stations give you 36 points, all the Karelian members of KDXC "Kivach" 20 points, all other Karelians 10 points. Every station could be worked once. Send log extract and 12 IRCs or 6 U.S. dollars to Award Manager UA1NDR.

WA-UA1 Award. Work/hear different stations from northwestern Oblasts of the USSR: UA1A, UA1C, UA1N, UA1O, UA1P, UA1Q, UA1T, UA1W, UA1Z. EU stations need to make 2 QSOs with every oblast—total 18 QSOs. DX stations need to make 1 QSO with every oblast—total 9 QSOs. All QSOs count from May 1, 1984. Send GCR list and 12 IRCs or 6 U.S. dollars to Award Manager UA1NDR.

5 Band WA-UA1 Plaque. To receive this plaque, EU stations need to make 2 QSOs with every oblast of the northwestern part of the USSR on 5 different bands of 1.8, 3.5, 7, 14, 21, 28 MHz from May 1, 1984—a total of 90 QSOs. DX stations need only one QSO with every oblast on 5 bands—a total of 45 QSOs. Send GCR list and 32 IRCs or 16 U.S. dollars to Award Manager UA1NDR.

9 Band WA-UA1 Prize. To receive this prize EU stations need to make 2 QSOs with every oblast of the northwestern part of the USSR on 9 different bands of 1.8, 3.5, 7, 10, 14, 18, 21, 24, 28, 144 MHz from January 1, 1990—a total of 162 QSOs. DX stations need only one QSO with every oblast on 9 different bands—a total of 81 QSOs. Send GCR list and 50 IRCs or 25 U.S. dollars to Award Manager Alex N. Abramov, UA1NDR, P.O. Box 225, Petrozavodsk 185034, Karelia, USSR.

Members of Karelian DX Club "Kivach" are: UZ1NWB, UA1NDR, UA1NDV, UA1NDY, UA1NCR, UN1-088-594, UA1NDW, UA1NDX, UA1NAW, UA3DCZ, UB5IIA, RA3LDV, UA3EAC, UA3PDE, UZ1NWA, UW9SG, UA3LBS, RB5IQ, RA4HIM, RA6LES, UA3SDT, UA0UAG, UA0QO, UA1OB, UO5OAB, UA4-091-430, UA1NBY, UN1-088-750, UA1NEJ, UI8TAO, UI8TAN, UC2-008-282, UQ4-091-406, UA0QIQ, UB5-066-432, UT5UNX, UY5YY, UA9MFG, UW3DG, UB5VLP, OH7NYL, PP5IW, UB4JJA, UT5-187-150, FE1JUJ, UZ1NWO, RA1NC, UA1NBS, UA1NBW, UA1NEK, DJ9KR, UA3-170-1062, UC2OBL, OH0XX, RA9UR, UA0HAE, UL7FCW, UN1-088-649, UA1NEF, UA2FGG.

Note: The Karelian DX Club "Kivach" publishes "The Express-Info" bulletin twice monthly for the Soviet radio amateurs. There are more than 1000 subscribers. The bulletin contains rules for awards and contests, information about expeditions, contests, bureaus, managers, advertisements, etc. You are welcome to submit information for publication which may be of interest to Soviet amateurs or clubs. The club "Kivach" also offers *The USSR Award Directory* for 12 IRCs or 6 U.S. dollars, and *The QSL Bureau's Callbook of The USSR* for 10 IRCs or 5 U.S. dollars. Send orders to P.O. Box 225, Petrozavodsk 185034, Karelia, USSR.

The USA-CA Award
The Story of County Hunting

By Arnie Bachmann, K9DCJ

I am going to start this article in a way that may seem to be a long way from county hunting. As you read on, you will see that the following had a definite bearing on county hunting as we know it today.

In the February 1953, November 1955, and August 1956 issues of *CQ* articles were published entitled "The Certificate Seekers Directory" by Howy Bradley, W2QHH (later to become USA-CA All Counties #4). The February issue had eight pages of awards, mostly for working DX or a certain number of members of

clubs. For example, county awards were listed for working all California and New Hampshire. The November issue had ten pages of awards, again mostly DX awards. The August issue had eleven pages of awards, again mostly DX. Also listed were awards for working counties in Arizona, Maine, New York, Ohio, and Pennsylvania.

Sometime in 1958 William Clark, W3RPG, started publishing a Directory of Certificates and Awards. Some of the awards listed had to do with working and confirming counties. Only a few states had awards for working all counties in that state.

In the May 1961 issue of *CQ* magazine the United States of America Counties Award (USA-CA) was inaugurated with Cliff Evans, K6BX, the custodian. The award was carefully planned and meticulously rendered, and the rules were designed to be clear and concise. The Directory of Post Offices, Post Office Publication #26, was and still is a helpful guide in determining county identity for some contacts.

CQ Publishing Company made available a record book to simplify handling and recording of county data. The first book, 8½ × 11 inches, also contained rules and individual state maps in alphabetical order. The program started with a total of 3078 counties with no restrictions as to the starting date.

The award has seven classes: USA-CA 500, USA-CA 1000, USA-CA 1500, USA-CA 2000, USA-CA 2500, USA-CA 3000, and USA-CA All Counties. In mid-1961 twenty-six states had all county awards and County Hunting was off and running. Applications were processed by a *CQ* staff member, and the record book became *CQ*'s file record. The first problem was to determine, "fair and square," who was to receive USA-CA 500 #1.

For the United States and Canada, they took the date of the first application received from the East, Midwest, and West and added three days to each of those dates. This established a period within which all application receipts were assumed to have arrived under equal conditions of competition. The same system applied for DX countries.

After the equal opportunity period had elapsed, all qualifying calls were put into a "hat" for drawing, not to determine who would be number one, but who among all the number ones would be 1A, 1B, 1C, and so on, and for the issuance date. Those who had their applications in within the three-day date period were considered to have equally won USA-CA number one.

The printer of the record books had promised 10,000 copies would be delivered to *CQ* in July of 1961. After many delays the books finally arrived on September 13, 1961 and were mailed out the following day. The rush was on!

Ed Hopper, W2GT, was appointed USA-CA custodian, and his first awards column appeared in *CQ* magazine in January 1965. On August 15, 1965 Cliff Evans, Jr., K9EAB, became the first to complete USA-CA All Counties. Activity during the 1960s follows: 748 applied for USA-CA 500, 176 applied for USA-CA 1000, 112 applied for USA-CA 1500, 80 applied for USA-CA 2000, 56 applied for USA-CA 2500, 28 applied for USA-CA 3000, and 16 applied for USA-CA All Counties.

During the 60s the awards column gave a tremendous boost to SWLs, and continues to do so into the 1990s.

To be continued next month.

73, Dorothy, WB9RCY

Announcing

The 1991 CQ World-Wide RTTY DX Contest

Starts 0000 UTC Saturday
Ends 2400 UTC Sunday
September 28-29, 1991

I. **Announcing:** The Fifth Annual *CQ* WW RTTY DX Contest, co-sponsored by *The RTTY Journal*.

II. **Objective:** For amateurs around the world to contact other amateurs in as many *CQ* zones and countries as possible using the digital modes.

III. **Contest Period:** 0000 UTC September 28 to 2400 UTC September 29, 1991. The total contest period is 48 hours, but no more than 30 hours of operation are permitted for single operator stations. The 18 hours of *off* time can be taken any time during the contest period, but *off* periods may *not* be less than three (3) hours in length. All *on* and *off* periods *must* be clearly noted in the log and summary sheets.

(a) Multi-operator and multi-multi stations may operate the entire 48 hour period.

(b) A single operator *may* operate more than the 30 hours, but only the *first* 30 hours will count toward the official score. (This allows rarer DX to give their multiplier to more stations.)

IV. **Operator Classes: Note operator classes!**

1. **Single Operator, All Band and Single Band.** One person performs all operating and logging functions. Use of spotting nets, DX Alert Packet Systems, telephone, etc., is *not* permitted.

2. **Single Operator Assisted, All Band Only.** One person performs all operating and logging functions. However, the use of DX spotting nets or any other form of DX alerting assistance *is* allowed. The operator can change bands at any time.

3. **Multi-Operator, Single Transmitter.** All band entry only. More than one person operates, logs, checks for duplicates, use of a spotting net, etc.

a. Only one (1) transmitter and one (1) band permitted during the same time period (defined as ten [10] minutes). Once the station has begun operation on a given band, it *must* remain on that band for 10 minutes; listening time counts as operating time.

Exception: One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier. Logs found in violation of the ten (10) minute rule will be automatically reclassified as multi-multi to reflect their actual status.

4. **Multi-Operator, Multi-Transmitter.** All band entry only. No limit to the number of transmitters, but only one (1) signal per band permitted.

a. All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

V. **Entry Categories:** Single Operator entries may enter either (A) All Band or (B) Single Band. Single Operator Assisted and Multi-Operator entries can only enter all band only.

VI. **Modes:** Contacts may be made using Baudot, ASCII, AMTOR (FEC & ARQ) Packet. (No unattended operation or contacts through gateways or digipeaters.)

VII. **Bands:** 80, 40, 20, 15, and 10 meters. Don't forget that VE stations cannot operate below 7.100 and that the Novices/Techs cannot operate below 28.100.

VIII. **Valid Contacts:** A given station may be contacted only *once* per band regardless of the digital *mode* employed. Additional contacts are allowed with the same station on each of the other bands as well.

IX. **Exchange:** Stations within the 48 Continental United States and the 13 Canadian areas must transmit RST, State or VE area, and *CQ* zone number. All other stations must transmit RST and *CQ* zone number.

X. **Countries:** The ARRL and WAE DX Country lists will be used. **Note: The USA and Canada count as country multipliers.** Example: The first US State and Canadian area you work not only count as a multiplier for the state or area, but also count as a country multiplier for each band.

XI. **QSO Points:** One (1) QSO point for contacts within your own country. Two (2) QSO points for contacts outside your own country but within your own continent. Three (3) QSO points for contacts outside your own continent.

XII. **Multiplier Points:** One (1) multiplier point for each US state (48) and each Canadian area (13) on each band. One (1) multiplier point for each DX country in the ARRL and/or WAE lists on each band. *Note:* KL7 and KH6 are country multipliers *only* and *not* state multipliers. One (1) multiplier point for each *CQ* zone worked on each band. A maximum of 40 per band.

Note: Canadian areas are VO1, VO2, VE1 N.B., VE1 N.S., VE1 P.E.I., VE2, VE3, VE4, VE5, VE6, VE7, VE8 N.W.T., and VY Yukon.

XIII. **Final Score:** Total QSO points times the total multipliers equals the total claimed score.

XIV. **Contest Entries and Logging Instructions:** *CQ* WW

RTTY DX logs and forms should be used to facilitate scoring and checking. All logs **must**:

1. Show times in UTC.
2. All sent and received exchanges are to be logged (call-sign, RST, Zone, Country, State/VE, points claimed).
3. Indicate State/VE area, Zone, and Country Multiplier only the *first time* it is worked on *each band.*
4. Use a separate log sheet for *each band.*
5. A check list of duplicate contacts for *each band* (dupe sheet).
6. A *multiplier* check sheet for each band.
7. An overall *summary sheet* showing total QSOs, Points, Zones, countries, and States/VE areas worked.
8. Each entry must be accompanied by a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

Contest forms are available from *CQ, The RTTY Journal,* and the Contest Director. *The RTTY Journal*'s address is 9085 La Casita Avenue, Fountain Valley, CA 92708. Please include a large SASE with 2 units of US first-class postage or IRCs.

XV. **Disqualification:** Operating in an unsportsmanlike manner, manipulating scores or times to achieve a score advantage, or failure to omit duplicate contacts which would reduce the overall score more than 2% are grounds for disqualification. The use of non-amateur means such as telephones, telegrams, etc., to elicit contacts or multipliers *during* the contest is unsportsmanlike and the entry is subject to disqualification. Actions and decisions of the Contest Committee are official and final.

XVI. **Awards:** Plaques will be awarded to the first-place finishers in each of the operator classes. Certificates will be awarded to second and third. Certificates will be awarded to the first-place finishers in each country.

XVII. **Deadline:** All entries must be postmarked **no later** than December 1, 1991. An extension may be given if requested. Logs should be mailed to: Roy Gould, KT1N, *CQ* WW RTTY DX Contest Director, P.O. Box DX, Stow, MA 01775, USA.

XVIII. **Plaques (Donors):**

Single Operator, All Band
World—AEA, Advanced Electronic Applications ,Inc.
North America—HAL Communications Corp.
South America—Association of DX-EX, Ecuador
Europe—HAL Communications Corp.
Oceania—*The RTTY Journal*
Asia—N5JJ Memorial
Africa—Roy Gould, KT1N, Roland Belanger, N1FTD

Single Operator, Single Band
Single Band, High Score—Kunihiko Fujii, JH1QDB
21 MHz—WD4KXB and KA4RRU

Single Operator Assisted
World—Open
Continents—Open

Multi-Operator Single Transmitter
World—AEA, Advanced Electronic Applications, Inc.
Continents—Open

Multi-Operator, Multi-Transmitter
World—Open
Continents—Open

There are many plaques looking for sponsors—single band, a specific country, multi-op by continent, etc. If you are interested, contact the Contest Director.

WB6NOA shows us that sometimes one plus one makes more than two. Using an Optoelectronics frequency counter plus an MFJ SWR analyzer, he comes up with a new instrument that helps tune your antenna.

Tuning Antennas Without A Transceiver

BY GORDON WEST*, WB6NOA

Remember the last time you put up a multi-band vertical antenna on the roof? Once it was up, it was a shouting match between you and the operator down at the rig to find out exactly where the antenna was resonant—and whether or not you were moving the elements in the right direction to minimize SWR.

The most common practice to determine the resonant point of an HF or VHF antenna is simply to sweep the band and look for the SWR dip. This causes untold QRM, and sweeping the band outside of the band limits authorized by your license is downright illegal. Yet everybody does it, and there's nothing more annoying than hearing the swooshing whistles as daily you hear people going up and down the band looking for their minimum SWR resonant spot.

I urge newcomers to build their own vertical radial counterpoise system. This usually consists of quarter-wavelength

*2414 College Drive, Costa Mesa, CA 92626

The MFJ SWR analyzer sends out a signal to be read by the Optoelectronics frequency counter.

Changing the frequency on the MFJ unit lets you check to see where your HF whip is cut.

wires, four per band, to fan out and down from the base of the vertical antenna mounted on the roof. I also recommend copper foil for a low-inductance DC earth ground for lightning protection. While I realize that four radials per band may be overkill, nonetheless, it's good practice to acquaint new amateurs with doing it right—the first time.

In my classes I use an antenna bridge to illustrate the importance of downward-sloping radials. I can illustrate that raising the radials to go out 90 degrees from the base of the antenna (such as on a flat roof) will cause the characteristic feed-point impedance to hover around 30 ohms. Drooping the radials will show a marked change in the noise bridge, and now the impedance is closer to 50 ohms.

Optoelectronics and MFJ Equipment Come Into Play

The MFJ SWR Analyzer Model MFJ-207 is actually a tiny micro-watt transmitter calibrated to a rough VFO setting. You dial up any one of 5 different bands between 2 and 30 MHz and set the VFO tuning dial to the approximate band location in MHz. The built-in SWR bridge is self-calibrating, and as soon as you sweep the particular band on which the antenna is resonant, the meter quickly deflects to the left. This gives us a ballpark reading that the antenna is fairly resonant and the ground plane is adequate.

To fine-tune the antenna for a specific spot on the band, however, such as 7125 kHz for the middle of the CW Novice band, we need a more precise readout. This is where the Optoelectronics frequency counter comes into play.

We simply hook up to the SWR analyzer signal output jack directly into the frequency counter antenna jack. In fact, there's enough signal coming out of the MFJ SWR analyzer so that you don't have to make an electrical connection. Simply hold the counter antenna near anything metal stuck to the top of the analyzer, and presto! You begin reading the exact frequency of the miniscule signal going into the antenna.

A quick sweep of the VFO dial while watching the frequency counter, and you instantly can see which way the antenna must be adjusted to bring it into perfect resonance on a particular spot on the band. Just an inch longer will pull most frequencies down at least 100 kHz, so minute antenna adjustments are called for when we are within 25 kHz of being right on the nose.

Since both the Optoelectronics frequency counter and the MFJ SWR analyzer work on internal batteries, this set-up is entirely portable. This sure beats the way we used to do it in the old days, doesn't it? CQ

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Potpourri—Part III

Last time we covered a variety of antennas topics. This month we'll continue with more Antennas & Accessories topics in the same vein. Let's get started.

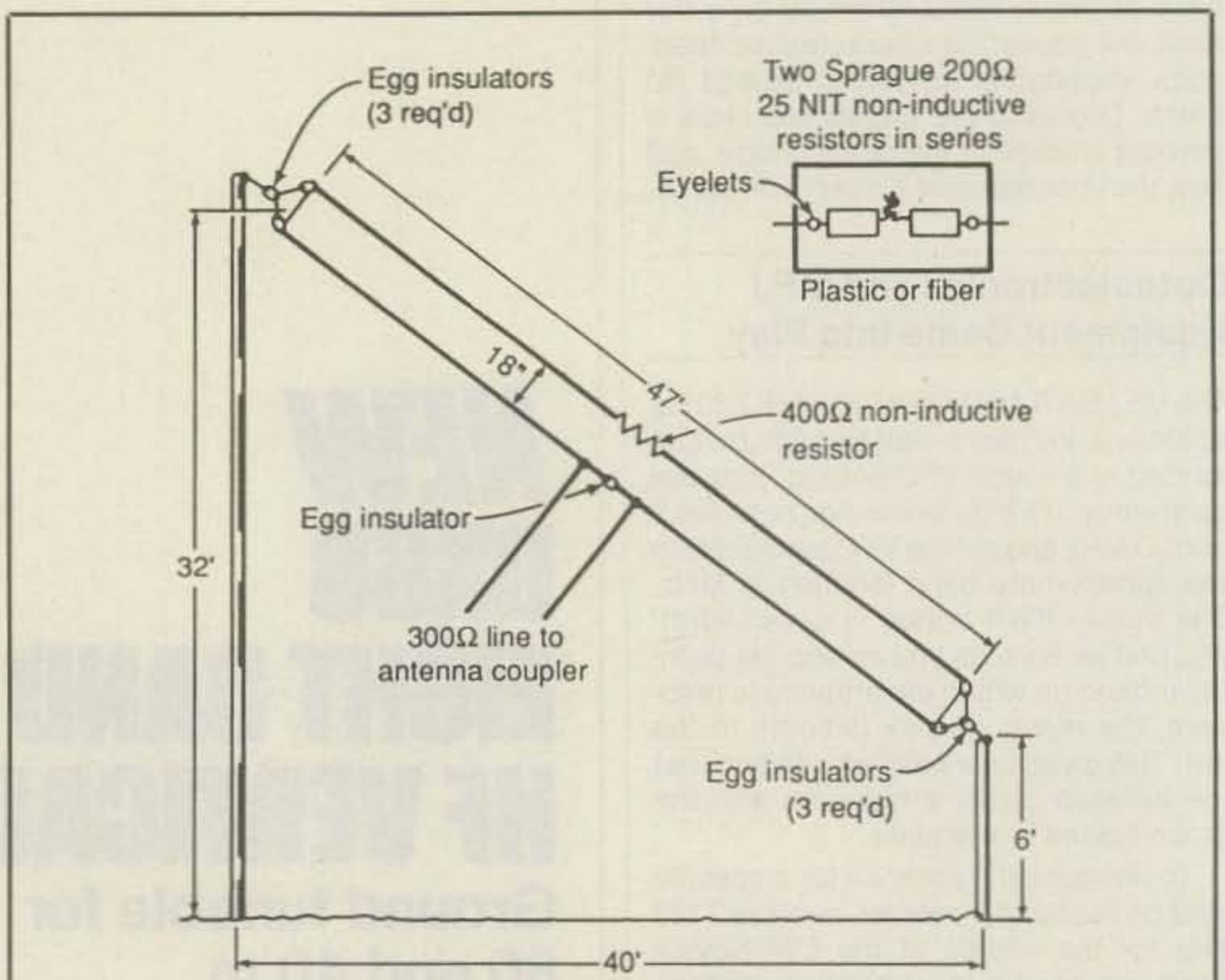


Fig. 1– Here's the 47 foot version of the T2FD, short for "Terminated Tilted Folded Dipole." This version is based on Gil Countryman, W3HH's early multiband design as shown by CQ's Novice Editor, Don Stoner, W6TNS, in his June 1957 Novice column. The T2FD design is based on 1940s-era Navy vertical monopole antenna research that was published by W3HH as early as 1949 in QST and 1951 in CQ. The original W3HH design used a 600 ohm resistor for openwire line feed, while the W6TNS version used a 400 ohm resistor for use with 300 ohm twinlead.

Antenna Notes

LSU-111 Lightning Sensor Unit. Although we haven't personally tried this one out, it does look interesting. We're talking about the LSU-111 Lightning Sensor Unit.

This is a newly patented storm lightning sensor unit by Stormwise™ that claims to give you up to three hours warning that thunderstorms, with the associated possibility of dangerous lightning ground strikes, are approaching your area.

When storms are far away, the sensor will sound the piezo buzzer briefly for about ¼ second. As the storm activity draws closer, the buzzer will sound longer, up to two seconds or more for each lightning discharge that strikes the earth. If the approaching storms are severe, the alarm will sound almost continually until storm activity dissipates. The sensor resets automatically after each detection.

The sensor uses an Extremely Low Frequency/Very Low Frequency (ELF/VLF) impulse detection design that is said to provide accurate warnings with a detection range up to a 250 mile radius, with immunity to man-made or skip radio static even at maximum range. You can adjust the detection range down to less than 10 miles if you so choose.

In operation, the sensor takes no power from the battery. When it detects lightning activity, the sensor drops from an infinite resistance down to a level where current can flow through it, thus activating an alarm circuit. You have to provide some parts yourself, including the buzzer, an LED, an on-off switch, lead-in cable, and an earth ground rod. The sensor is designed to mount on a TV mast 10–30 feet high.

The LSU-111 is priced at $29.95 and is available from McCallie Manufacturing Corp., P.O. Box 17721, Huntsville, AL 35810.

Static Buster Antenna Static Discharger. Have you ever wondered why your receiver "noise floor" becomes elevated? It's no big secret that electrostatic discharge (ESD) in the form of precipitation static and corona discharge noise significantly degrade receiver system performance. ESD can raise the local noise level by 20–30 dB above normal ambient conditions and can result in receiver desensitization. Static Buster, Inc. offers a "discharge wick" or Antenna Static Discharger, the model AS-1, patented and manufactured by the TCO Manufacturing Company.

The AS-1 bleeds off excess electrons to reduce the undesired electrical noise that results in receiver desensitization. The discharger is essentially the same type of device used on aircraft to minimize ESD interference. The only difference is that this model has been optimized for antennas rather than for airframes to ensure no detuning of the antenna even if mounted directly on an element. The unit is designed to provide good results on virtually any type of antenna, including longwires, dipoles, HF through UHF Yagis, verticals, TV antennas, and satellite dishes. In some cases, the discharge wick will lower the noise level by several dB even under normal weather conditions. The AS-1 units mount easily to any antenna, boom, or tower. They are maintenance free, small (¼" × 6½") and weigh 1 oz. They are priced at $12.95.

Static Busters has a very informative information packet they include with requests for information on the AS-1. Included in the packet is a short technical paper that discusses electrostatic receiver noise, its causes, and its prevention. The paper discusses how and why current flows between the earth and the sky; precipitation static; corona discharge noise; hardware noise; noise desensitization, characteristics, and prevention; testing of discharge wicks; wick mounting and availability; and maintenance.

For more details, contact Static Buster, Inc., 3535 Shepherdsville Rd., Elizabethtown, KY 42701.

T2FD Update: Obtaining Noninductive Power Resistors. Do you remember the broadband Terminated Tilted Folded Dipole (T2FD) antenna we described in several previous columns? The T2FD is a very old amateur antenna that dates back to at least 1949 in the pages of *CQ* and *QST* and even earlier in the

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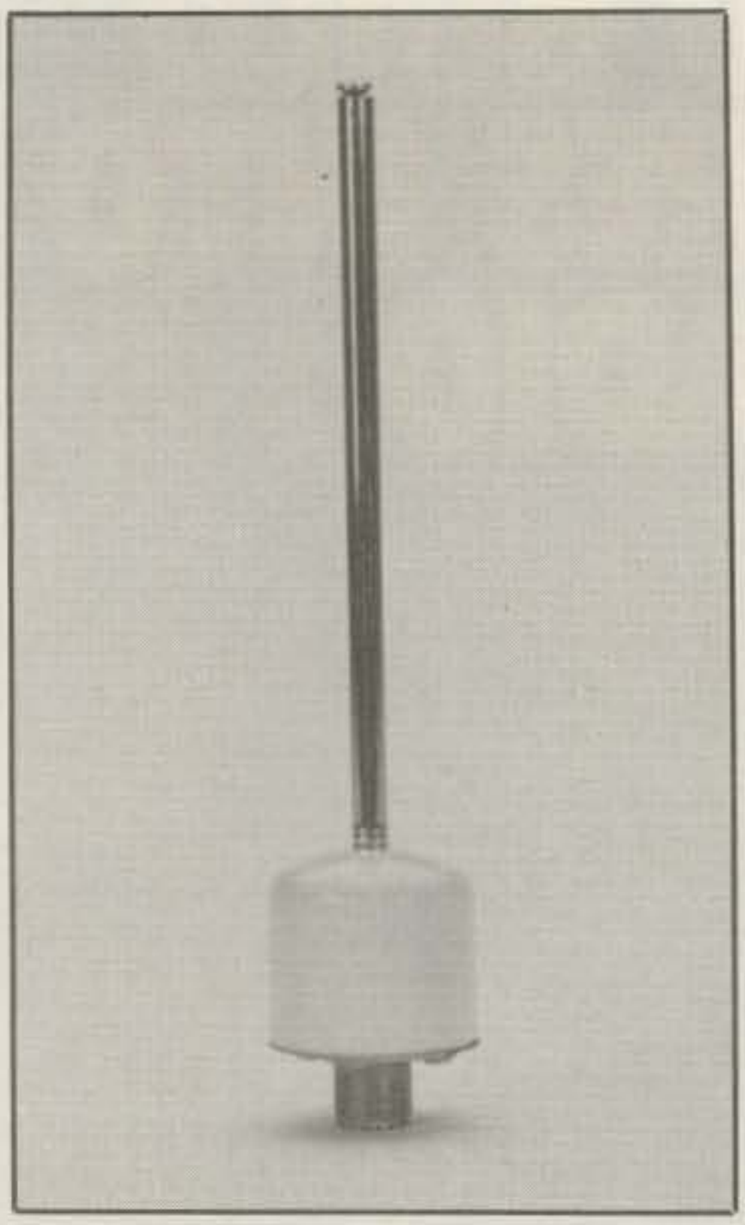

Of special interest to mediumwave and shortwave listeners, the Palomar Engineers PA-355 Super Snooper (TM) SWL Antenna is a 36 inch whip antenna that provides access to the 0.5–30 MHz range in situations where space limitations or zoning restrictions prevent use of a full-size outdoor antenna. It is of nonamplified design.

annals of U.S. Navy antenna research. We won't bore you with all of the technical considerations and historical details again, and instead suggest that you obtain back issues of *CQ* for the antenna's interesting journey through history. Take a look at the June 1988, January and September 1989, May 1990, and January 1991 Antennas & Accessories columns for some of the flavor of the T2FD.

To review briefly, the T2FD is a unique type of multiband sloping dipole that is usually set to a length of 47 feet for operation on 80 meters and up, using a spacing of about 18 inches between the two wires of the antenna and also making use of a 300–400 ohm noninductive resistor (see fig. 1).

Over a period of years, readers who attempted to construct the T2FD have reported difficulty in obtaining the high-power noninductive resistor that's required. Apparently, these are no longer as readily available as they were a few decades ago. Anyway, several readers (N9HRS, N5OKD, W3BRX, W5PEK, and NØIHM) recently wrote in about the T2FD, and several brought to my attention that the mail-order Tucker Surplus Store at the Tucker Electronics Co., P.O. Box 551419, Dallas, TX 75355-1419 offers a good selection of Carborundum "noninductive power units," as they refer to these resistors; they're on p. 46 of their 1991 hobbyist catalog. Tucker offers a dozen different resistors that range from 10 ohms to 450 ohms with power ratings of from 15 to 750 watts. The resistors should also make great homebrew RF dummy loads, since they will handle considerably greater power if immersed in oil.

Dwight B. Olson, Sr., W5PEK, wrote us that he first used the T2FD professionally and in his amateur station more than 37 years ago. He constructed three of them for an Air Force radar site, two for receiving and one for transmitting. Later he built for himself a couple of T2FDs for 40 through 10 meters. For home station use he used the 47 foot design of fig. 1. He terminated the antennas with 390 ohm, 250 watt noninductive resistors and ran 700 watts AM phone to them without overheating, using 300 ohm twinlead as the feedline. Dwight believes that the 250 watt resistors he used were manufactured by OHMITE specifically for the T2FD.

Carlton D. Trotman, W3BRX, wrote to tell us that he currently has two T2FDs in operation. Both use 390 ohm resistors. One of the antennas slopes per the classic configuration, and one is mounted as a vertical with 23 foot copper tubing elements. Both versions work well on 80 through 10 meters.

We should point out that the very broadband characteristic of the T2FD is achieved at some cost (remember that free lunches are few and far between). The power resistor absorbs some of your transmitted power. Also, the antenna is really designed to be fed through a transmatch with parallel conductor line such as openwire line, ladderline, or twinlead, not coax. You can experiment with coax feed using a balun if you like, though you very likely will experience unpredictable results with the balun and coax feed. Some readers have suggested using a 300 ohm resistor and a 4:1 balun for feeding with 75 ohm coax. Other readers have suggested using a 6:1 balun for use with 50 ohm coax. Reader Paul Charbonneau, N5OKD, notes that if you feed the antenna in this manner, you should end up with an antenna that is similar to the wideband dipoles widely advertised and sold by Barker and Williamson and SGC.

Palomar Engineers Super-Snooper. Palomar Engineers offers a miniature SWL receiving antenna, the PA-355 Super Snooper™, for difficult receiving situations. The new antenna is housed in a white PVC case, encapsulated and waterproof. It is designed for receiving applications where a full-sized outdoor antenna is not possible and an amplified outdoor antenna is not desirable from signal overload considerations. The small (36 inch) antenna is nonamplified, but contains a broadband passive network that covers the 0.5 to 30 MHz spectrum. The antenna is designed to be placed in a noise-free location, outside the building if possible, on a roof or balcony. The antenna is designed to be connected to the receiver with RG-8/U or similar coax. Up to 200 feet of cable may be used.

For more information, contact Palomar Engineers, P.O. Box 455, Escondido, CA 92033.

Oak Hills Research Catalog. We recently received an interesting catalog of electronic components and kits from Oak Hills Research, operated by Dick Witzke, KE8KL. According to Dick, in December of last year the Small Parts Center of Lansing, Michigan discontinued business. Oak Hills Research acquired the center's kits and component inventory, much of which is offered in the latest Oak Hills Research catalog.

Some of the inexpensive kits offered include single band QRP transmitters for 80, 40, 30, and 20 meters; two HF receiver kits; a short-wave converter; a QRP SWR bridge kit that works well with less than 1 watt RF; a wideband untuned HF/VHF preamp; and two CW superhet transceiver kits. Various electronic components (transistors, ICs, capacitors, diodes, etc.) are offered, as is the Van Gorden Engineering line of antennas and antenna accessories and parts.

For a catalog, contact Oak Hills Research, 20879 Madison St., Big Rapids, MI 49307.

Electron Processing Update. We've noted the wide variety of antenna accessory products offered by John Martin, WB2VTN, of Electron Processing, several times previously (in the August 1988, June 1989, and March 1990 columns). Many of the firm's products are what might be termed "receiving enhancers" of one sort or another—preamps, boosters, interference filters, amplified antennas, and the like. Most are thus of special interest to shortwave listeners (SWLs) and scanner enthusiasts.

In a new flyer I note a number products that I hadn't particularly noticed before, including the Scanner Stick for wideband 30–1000 MHz reception, a multiple receiver adapter used to connect three scanners to a single antenna, several SWL and scanner amplified antennas, and a wideband (0.5–2000 MHz) "receiver supercharger" preamplifier that claims 15 dB gain with a 2.8 dB noise figure.

For a copy of their latest flyer, Contact Electron Processing, Inc., P.O. Box 68, Cedar, MI 49621.

VectorFinder Update. Radio Engineers of San Diego offers several unique products. In the May 1986 and January 1987 columns we described their 2 meter portable Cubical Quad antenna, the PortaQuad. In the August 1989 column we described the VectorFinder VHF direction finding (DFing) systems. We'd like to update you on the latter systems.

The VectorFinders are handheld VHF direction-finding systems that are available for several bands. The VF-142 covers 144–148 MHz and 220–230 MHz, the VF-142M covers 144–500 MHz and is housed in a water-resistant enclosure, and the VFM (for marine use) covers 156–160 MHz only but also makes use of a water-resistant enclosure. Pricing runs from $129.95 to $215.95, depending on model. Special-order models with custom specified frequencies are also available.

All of the Radio Engineers models incorporate phase-sensing antennas mounted in a handheld package that includes the battery and compass. The equipment is connected to any FM receiver or transceiver using 50 ohm coax (the receiver must be FM, not AM or SSB). In operation, a tone is superimposed on the received signal; it becomes inaudible at the receiver when the handheld unit is oriented line-of-sight to the incoming signal. You then read the compass for the line-of-sight heading. The VectorFinder units are said to eliminate directional ambiguity through the use of space diversity DFing techniques. Included with each unit are two vertically polarized dipoles that are configured in the form of a phase-sensing array; the antennas collapse and fold flush with the enclosure for stowage.

For more detailed information, contact The Radio Engineers Company, 3941 Mt. Brundage Ave., San Diego, CA 92111.

Postscript: In the January 1990 issue of *CQ*'s sister publication *Popular Communications,* Gordon West, WB6NOA, briefly reviewed the VectorFinders and other direction-

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Software Notes

DELTACOMM Communication Manager. Delta Research has introduced DELTACOMM™, a high-tech communications manager for the ICOM IC-R7000 receiver using the IBM PC. The product is designed with speed as a design goal. It can sweep a frequency range at speeds in excess of 1300 channels per minute to eliminate the missing of very short transmissions, in the process generating a histogram and logging frequency activity to disk. DELTACOMM's custom interface allows software control of a tape recorder during scanning operations.

DELTACOMM offers a number of sophisticated features, including lockout of receiver birdies, elimination of redundant logging of channels during the search process, complete priority channel monitoring while scanning, file exchange with spreadsheet or database software for custom report generation, user-friendly window-style screens, on-screen help, and a smart setup program.

DELTACOMM is priced at $299 including interface and is available from Delta Research, P.O. Box 13677, Wauwatosa, WI 53213.

PC-ECAP. Peter Volpa of Circuit Systems sent us a copy of his shareware program, PC-ECAP for the IBM PC. Peter's software is an AC circuit analysis program for electronic circuits that should be very useful to amateurs or anyone interested in electronics. The program analyzes circuits consisting of resistors, capacitors, inductors, transistors (bipolar and FET), operational amplifiers, and transconductance amplifiers.

The program is completely menu driven and has been designed with ease of use in mind. It contains an online help function so you don't have to remember the correct format for the circuit elements. The program also is fully integrated, containing a full screen text editor and file selector, a display plotter, and a plotter for IBM and Epson printers. The program will plot its results on practically any video adapter, including the CGA, EGA, VGA, MDA, and Hercules.

Peter charges a registration fee of $69 for the disk only, or $79 for the disk and a professionally printed and bound manual. Registration includes support and low-cost upgrades. He notes that since PC-ECAP is shareware, the best way for someone to obtain a copy to evaluate is through one of the many shareware disk distributors (he's sent copies to most of the distributors who are associate members of the Association of Shareware Professionals). For a registered copy, directly contact Peter Volpa at Circuit Systems, 418 Church Rd., Sicklerville, NJ 08081.

Circuit Search Database. Peter Sawatzky of Circuit Search sent along a copy of the Circuit Search database of articles containing practical electronic circuits. While *CQ* was sent a sample database containing only 400 records, the complete Circuit Search database contains nearly 12,000 references to articles containing practical electronic circuits

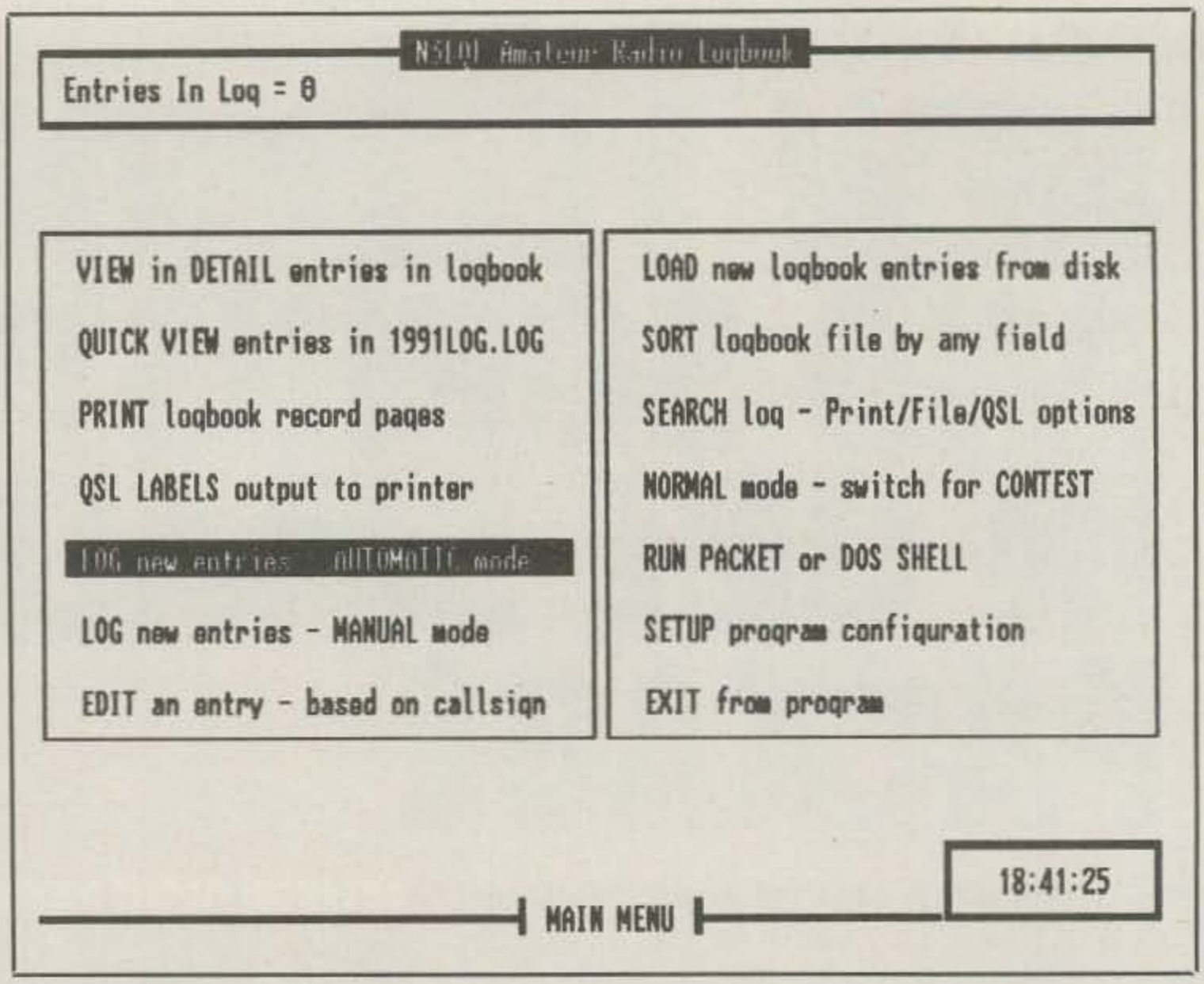

Fig. 2– Shown here is the main menu from N3EQF's very professional logging program for the IBM PC. This popular and highly capable shareware logger is now a mature shareware program that has gone through several major revisions.

drawn from over 250 technical and scientific journals, including *CQ* and most of the other amateur radio journals. The full database occupies about 7 MB of disk space and is furnished on a series of disks that are installed and decompressed using a simple menu-driven installation routine. The database is compatible with dBase® III and dBase III+ ".DBF" files so that you can, if you like, use your own dBase commands and program.

As a reference source, circuits can be located by keywords from a variety of electronic journals as well as many other journals where electronics can be applied. You can locate circuit references by title, circuit description, device type, author, author affiliation, journal, data, and more. The firm also is able to provide users with FAXed or mailed photocopies of most articles. These represent about two-thirds of the total number of articles referenced, and are from journals that are registered with the Copyright Clearance Center. Updates and revisions to the database are issued semiannually.

The complete Circuit Search database for the IBM PC is priced at $375 and includes one free update/revision. For more details, contact Circuit Search, P.O. Box 268, Breslau, Ontario, Canada N0B 1M0.

LOG-PCF Database. Kenneth P. Jacobs, N4RJZ, sent us a copy of his PC-File-compatible database which he's dubbed LOG-PCF. Ken offers his PCF-compatible product as an alternative to the many "freestanding" logging programs that currently are popular with the amateur community. His desire is to reach those amateurs who use, or are considering using, ButtonWare's PC-File shareware product for other database management purposes. Kenneth notes that he particularly likes the PC-File 5.0 database and uses it to track articles submitted to magazines for publication, photography slides, books, and VCR tapes.

Features of his LOG-PCF database include QSO entry and maintenance; defaults for QSL send and receive fields, and the QSO label field; relational lookups to automatically enter the CQ Zone and continent of the contact when you enter the country; and report formats to track areas that include DX and USA contacts, QSL cards sent through the Bureau and direct, pending QSL cards, and QSLs requiring routing instructions.

The program also offers customized report formats to allow you to review your status at any time concerning awards such as WAS, WAC, WAZ, WPX, and DXCC. For these awards, the reports show Worked, Worked Not Confirmed, and Confirmed. The status reports for WAS, WAC, and WAZ not only show which states, continents, or zones are confirmed, but also show which ones are still needed. Handily, one DX report keeps track of the countries confirmed above the initial 100 required for DXCC so that you know when to submit the next multiple of 25 for endorsements. The program also generates QSO labels with QSO and station information and address labels for QSL cards going direct or via a QSL manager.

Ken offers LOG-PCF as shareware for $12 postpaid. Contact Ken Jacobs, N4RJZ, 1240 Howard Way, Lawrenceville, GA 30243.

Note: Bear in mind that you need PC-File to run LOG-PCF. If you don't have PC-File, it is available from many IBM PC shareware distributors and on bulletin boards (BBSs) across the country. Or you can contact ButtonWare, Inc., P.O. Box 96058, Bellevue, WA 98009. Also, to head off some possible confusion, note that while they're both loggers, N4RJZ's

Here's a bottoms-up prelightning-damaged photo of my roof-peak-mounted Cushcraft R3 antenna nestled among the trees. This is the antenna I wrote about in the February issue that was severely damaged by a nearby lightning strike. As discussed in this month's text, the internal motor was fried and zapped, and so was the remote tuning unit; no replacement, at least for the motor, appeared to be available. Two readers came to the rescue and offered me both the tuning unit and remote control unit for a very reasonable fee, and others were able to offer a replacement motor. Who says hams aren't "good guys"?

LOG-PCF bears no relationship to N3EQF's standalone product, LOG-EQF, to be discussed below.

LOG-EQF Update. Tom Dandrea, N3EQF, once again has advised us of a major update to his IBM PC LOG-EQF shareware logbook program, this time to Version 3.31 (I'm sure it will be higher by the time this appears in print).

We've covered LOG-EQF in three previous columns—December 1989, March 1990, and March 1991. To recall, LOG-EQF is a full-featured electronic logbook when used alone on an IBM PC compatible computer. If the program is used on a computer that is connected to a Kenwood transceiver via the RS-232C serial port, many additional logging and control features are enabled.

The new edition includes some noticeable improvements over previous versions, mostly derived from comments and suggestions from registered users. Key new features include online beam headings for DX callsigns, a quick startup option, alternate ways to move the cursor around the entry screens, and multiplier tracking and partial callsign checking in the contest mode.

Tom notes that the shareware distribution mode has propagated LOG-EQF into at least 10 different countries, and it's been picked up by several major shareware distributors. So far, he's managed to keep the user registration fee to a "measly" $10.

For more information, contact Tom Dandrea, N3EQF, 396 Sautter Drive, Coraopolis, PA 15108.

Fig. 2 shows the LOG-EQF Main Menu.

PC-Kwik Power Pak and Power Disk. I'm a certifiable "nut" for IBM PC utility programs. The problem is, some of my favorite utilities—disk caches, keyboard accelerators, command editors, and the like—don't work together particularly well. And even if they do so, they certainly don't want to share memory among themselves. Multisoft Corp. has come up with a slick, truly integrated PC performance enhancing utility package that comes close to "doing it all." Their new product is the PC-Kwik Power Pak Version 2, and it's a one-stop power user's dream.

The new product contains a number of important utilities that complement each other very well. It offers functions such as advanced disk caching, video screen acceleration, a RAM disk, enhanced keyboard speed-up, a pop-up command line editor, a smart print spooler, and much more. The package can boost the performance of your PC by making it from 1.5 to 9 times faster, depending on whether it's a slow PC-XT or a 33 MHz 80386 machine. By replacing DOS's slow disk, screen, printer, keyboard, and command line functions with much faster and more sophisticated RAM-based alternatives, the complete suite of Power Pak utilities reduces or eliminates the

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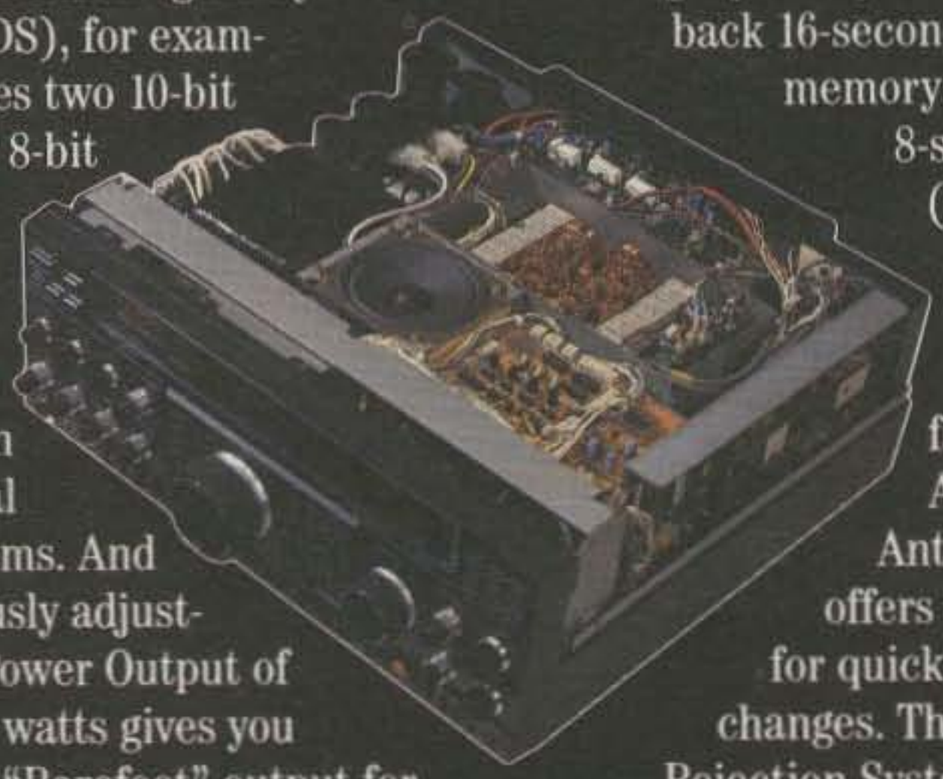

Auto-Antenna Circuitry

The FT-1000 also has the optional Digital Voice Storage (DVS-2) to let you play back 16-seconds of receive memory and two 8-second (or four 4-second) messages in transmit. A fast-action Automatic Antenna Tuner offers 39 memories for quick band changes. The QRM Rejection Systems include cascaded filter selections, IF width control, IF shift, IF notch filter, all-mode squelch, dual-mode noise blanker and CW audio peaking filter. Additional features include:

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- **Front Panel RX Antenna Selection**
- **Digital Voice Storage DVS-2 Option**
- **Band Stacking VFO System**
- **Accessories/Options:** TCXO-2 (Temperature Compensated Crystal Oscillator), XF-10.9M-202-01 (2nd IF SSB Narrow 2.0kHz), XF-445C-251-01 (3rd IF CW Narrow 250Hz), SP-6 (External Speaker), MD1C8 (Desk Microphone), YH-77ST (Headphones), LL-5 (Phone Patch Module).

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bottlenecks that can slow down even the fastest computer, resulting in a potentially dramatic increase in the computer's overall speed and responsiveness.

At the heart of the package is the Super PC-Kwik disk cache (probably the fastest cache on the market) which has the unique ability to automatically establish a disk cache buffer in any of the three types of PC memory: conventional, extended, and expanded. In fact, the most unique feature of the package probably is the integrated, intelligent use that is made of the computer's memory. Power Pak dynamically shares extended and expanded memory among its internal programs and with other DOS applications, even including Microsoft's Windows.

Instead of requiring preset parameters, Power Pak automatically finds expanded or extended memory in a system, creates a cache buffer in this memory, and then shares parts of this memory with other applications. Thus, it can use all available expanded or extended memory to boost performance, release memory to applications programs as needed, and recover that memory when the applications are not being used. Thus, you no longer need to assign memory to disk caching and print spooling while trying to leave enough memory available for regular programs. The package is list priced at $129.95, and from my experience with it, I'd say it's well worth the price.

Power Disk is Multisoft's newest product, a comprehensive, speedy, and safe-to-use disk enhancement utility. Offered separately from Power Pak, it is several products rolled into one—a high-performance disk defragmenter, a disk data reliability test and repair utility, and a tool for viewing file structures on a disk. The program allows you to reorganize or defragment your hard disk in several different and sophisticated ways, and it provides highly useful disk-sector read testing and data recovery. If Power Disk detects that a file has a bad or marginal sector, it recovers all the data possible from that sector, rewriting the data and relinking the file.

The Power Disk package, which is priced at $79.95, also includes Disk Explorer™, a diagnostic tool that provides a full-screen map of a disk's file clusters, the ability to zoom in for a close-up view of a disk's file structure, and the know-how to locate file fragments for any file by file name. The Power Disk package also allows extensive control of its features through the use of batch files that allow automatic, daily disk reorganizing based on several factors you can select yourself.

Although I found a great deal to master with these two complex software packages, I must say I'm quite impressed with both of them. I'd be very reluctant to part with either, after having used them for a couple of months. They're in the same all-star league as utilities such as PC Tools and the Norton Utilities.

You can obtain more information on the two packages by requesting a copy of their informative "Optimizing Performance" booklet, which offers a number of excellent suggestions on getting optimum performance from your PC. Contact Multisoft Corporation, 15100 SW Koll Parkway, Beaverton, OR 97006.

As this column went to press, Multisoft announced Version 1.1 of Power Disk. While we've not yet had the opportunity to check it out, we understand that the new version sports new features such as mouse input in interactive mode, directory sorting, a slicker way to jump to DOS from the main menu, and several other features. Also, the Disk Explorer function has been beefed up to include mouse support and has been renamed PowerScope. We hope to report on the new version in an upcoming column.

Short Bursts

A Happy Ending. You may recall my "brush with lightning" tale in the February column. To recap, last summer a nearby lightning strike induced miscellaneous havoc on lots of electronic equipment in the hamshack and around the house. An electronic telephone, two cable TV block converters, two PC modems, and two PC circuit cards were zapped into never-never land. Although the episode was annoying, most of these devices were relatively easily replaced over the next month or so.

However, the lightning strike severely damaged my trusty old Cushcraft R3 vertical. The remote control box gave up the ghost, and the small, out-of-production AIRPAX tuning motor at the base of the antenna was fried. While it was possible to repair the control box, the motor was a goner, and neither Cushcraft nor AIRPAX could supply a replacement motor, at least not without retooling for production at prohibitive cost.

In the February column I asked if anyone out there knew of a source for the tuning motor. Dick Sanford, W3EOT, and John Anning, W7WD, both responded. Both gentlemen offered the complete tuning unit and remote control box from their R3s, which they no longer used. Others offered replacements for the scarce-as-hen's teeth tuning motor itself. Where else but in amateur radio could you get "such a deal"? Thanks, gang.

Wrapping It Up

That's it for this time, guys and gals. Next month, more Antennas & Accessories topics of current interest. See you then.

Overheard: It's very hard to make electronic equipment or anything else completely foolproof because fools are so ingenious!

73, Karl, W8FX

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190-192 PC-File:dB - a great dBase 3 compatible database system. Fully relational w/ has LAN support.

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425 AM-Tax - a great shareware tax prep program.

683, 684 C Tutor (2 disks) - good introduction to C.

726 Personal C Compiler - a very professional C compiler. Top notch MAKE facility, linker & examples.

735 GTE's DOS Tutor - a fabulous graphically oriented DOS tutor. Very complete.

1082 Ham Radio 2 - Packet-related - YAPP 2.0 and PackTalk terminal programs.

1084 Ham Radio 4 - programs for the ham. Counties, antenna design and more (requires BASIC).

1085 Ham Radio 5 - antenna analysis, RF engineering & HF/VHF propagation, Smith chart, CW decoder.

1086 Ham Radio 6 - Sunrise/Sunset predictions, RF/circuit analysis tools and tropo loss prediction.

1087 Ham Radio 7 - QSL maker, engineering programs, grid square calculation AND MORE!

1089 Mapper - a top notch world map that shows grayline, MUF, shortpath, beam headings & more.

1090 MiniProp 2 - The king of propagation forecasting. Gives detailed conditions. Easy to use.

1091 TrakSAT - nice satellite tracking system with very good graphics, good documentation and satellite data.

1092 PC-Track - A favorite EGA/VGA satellite tracker. Great graphics and easy to use.

1093 - Telemetry Decoders - programs to decode the telemetry signals from the new PACSATS.

1094 - Icom Rig Control - a collection of programs to control your IC725/735, ect., with your PC.

1096 Radio Mods - a complete listing of several modifications to many popular scanners, HT's, ect.

1097 RD-SSTV - easy way to receive SSTV pictures with the PC. Hook up via serial port & speaker output.

1098 - FT767 Rig Control - control the FT757 & FT767 rigs.

1099 Kenwood Rig Control - control your TS440 and TS940 with your PC. Even works on the TS140.

1100 Icom R7000 control - PC control of the R7000 - even has logbook, frequency database and more.

1103 TS940 Spoiler - top notch PC control for the TS940.

1105 - ProCAT - graphically oriented rig control for most Kenwood, Icom & Yaesu rigs - (hard drive req'd)

1110 DX Contest Logger - version 4.25 of the legendary K1EA contest logger.

1119-1120 Total Ham! (2 disks)- a popular multi-purpose, all-in-one utility program. Simultaneous logging, beam headings, awards, counties & record keeping. (hard drive req'd)

1121 Amateur Radio Logbook - a great little logbook program - Uses FAST indexing and generates full reports.

1122- LOG-EQF - top notch logging program that also controls the Kenwood line of radios.

1131 HAMFEST - a great mailing list system for hamfest attendence. Many, many features!

1132 Packet Radio Tutorial - in depth text tutorial for newcomers to packet radio.

1135 PackTALK PBBS - N3DFD's entry into the packet BBS wars! Has autofoward, RLI/MBL compatible.

1140 W0RLI Packet BBS - the dominant packet radio BBS program. Complete w/ all information. (hard drive req'd)

1143 KAM RTTY - A dedicated RTTY/ASCII/AMTOR/CW program for the Kantronics KAM.

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1145 PK232 Terminal Program - two programs for the AEA PK232 TNC.

1146 AA4RE Multiconnect Packet BBS - top notch, very popular multiconnect packet BBS. A local favorite!

1148 PicPro/WeFAX - WeFax and packet pictures via your Kantronics TNC (EGA req'd for WeFAX)

1149 GeoClock - Real-Time grayline map of Earth. Like DX-Edge. (CGA/Herc) -for EGA/VGA version order #1150.

1155 USN Floppy Almanac - US Naval Observatory yearly directory of astronomical data.

1156 SKYGlobe - EXCELLENT star "gazer" system. Shows 89 constellations plus MUCH more!

1249 World 29 - good world-view map system. Even allows you to zoom in on any location.

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PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Future of Digital Communications

In this month's "Packet User's Notebook" I'm going to move away from my usual manner of writing and talk about a topic that has been sidestepped by too many writers in this field. I'm sure I will tread on some unwitting toes, and test the feelings of those who are part of the subject at hand. The ARRL, and some digital groups, have taken steps to assist the FCC with a solution to the crowding that is beginning to show up in packet and other digital modes.

The time has come for someone to step forward and confront this problem head-on. If we don't, the problem will only become worse. In this month's column I'm not going to offer the solution, but I will offer a vehicle to bring your solutions to the attention of those who can make the difference in *the future of digital communications*.

By the time you read this column, I will have completed my relocation from Atlanta to Nashville. The move is brought about as a result of some changes that are taking place in the cellular industry. As a microwave RF systems engineer, the position that I hold with this company requires that I be centrally located within the states that are part of my domain.

Some benefit has resulted from my recent moves. I've had an opportunity to see many different packet systems, and some of these networks are using the older methods that require the users to link from node to node. Most of the networks in the southeast are converting to the systems which use the callsign/area-code routing scheme. This latter method makes packet keyboard-to-keyboard communicating so much easier to use that some users often find themselves trying to add extra steps to the use of it. This sometimes confuses the user because he/she has over-compensated, thinking it was harder to use. The routing is already installed into the switches; thus they know the way to one another, and to the area code that is specified in the connect string.

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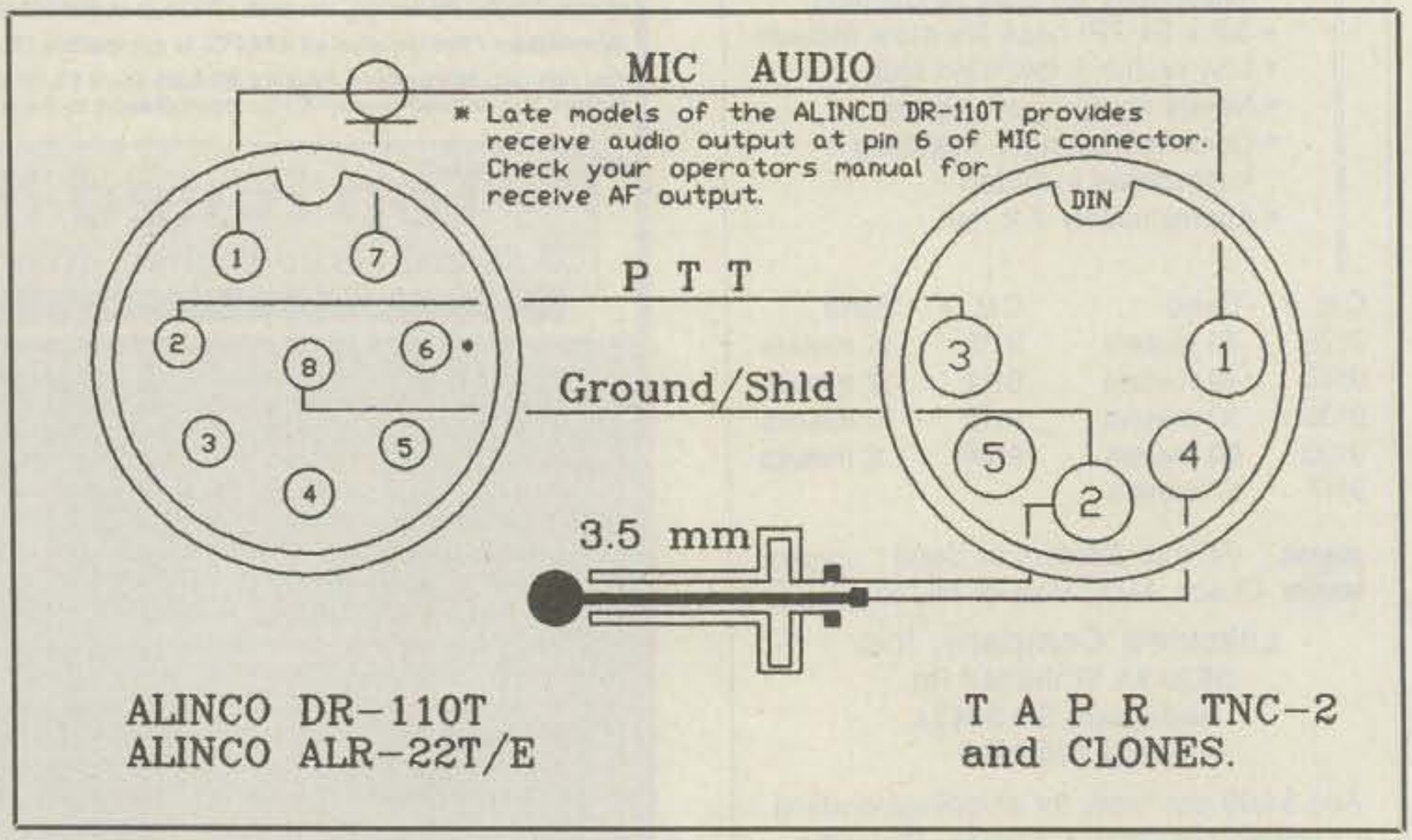

Fig. 1– For the Notebook: Alinco DR-110T, ALR-22T/E to TAPR TNC-2 and clones.

It's Time For The New Technology

Some of the systems that I've observed recently are so spread out or scattered that it would seem impossible to get a signal across the city, much less across the state.

This new system is daily undergoing refinements that improve its performance in getting a connect through, and after the connect is made it will stay connected until one of the connected stations issues a disconnect.

In some cases there may be so much use that a link will be dropped or broken. This is often because a BBS is trying to forward on the same frequency as the keyboard LAN operation.

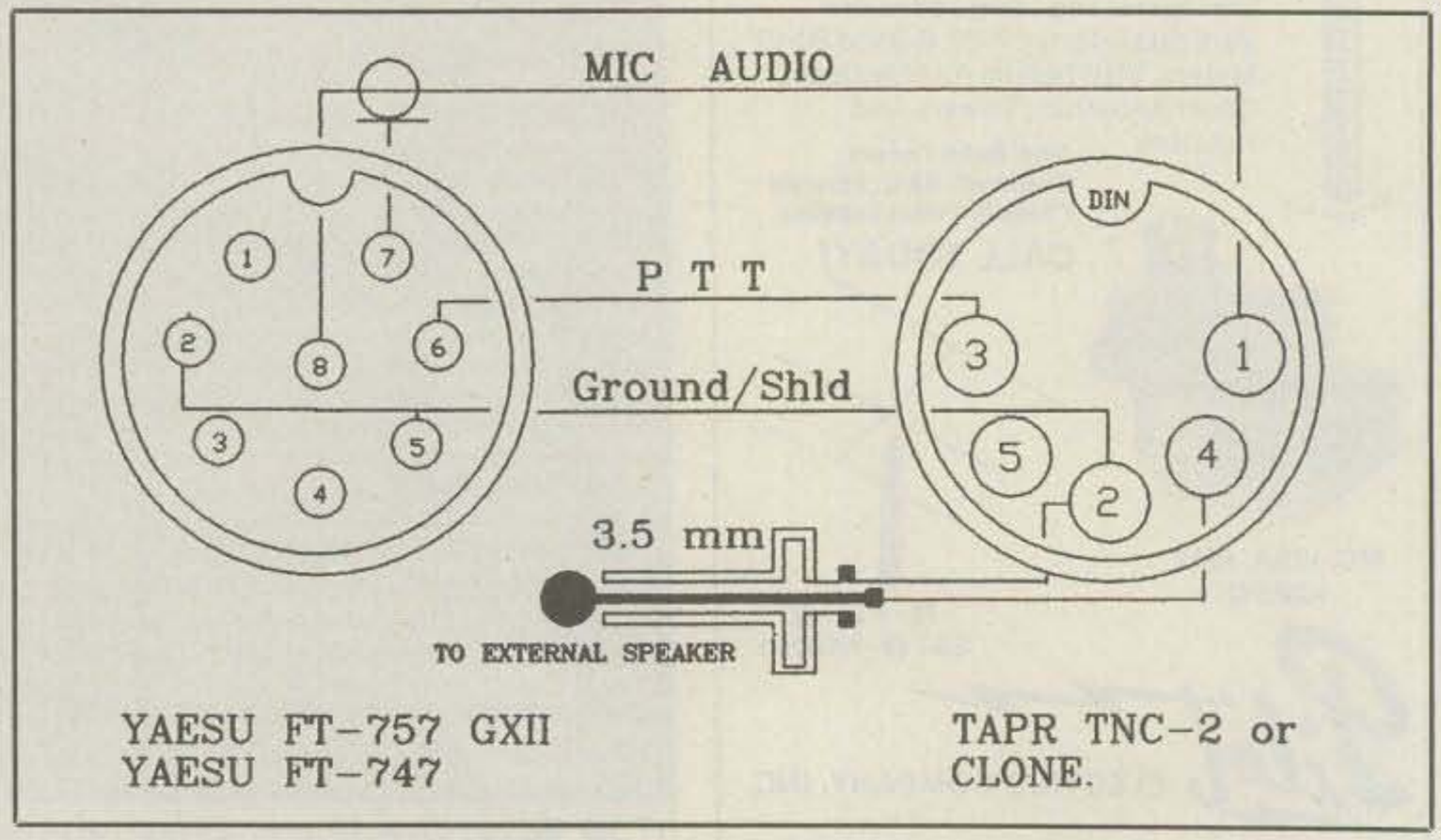

Fig. 2– For the Notebook: Yaesu FT-757 GXII, FT-747 to TAPR TNC-2 or clone.

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DIAMOND ANTENNA

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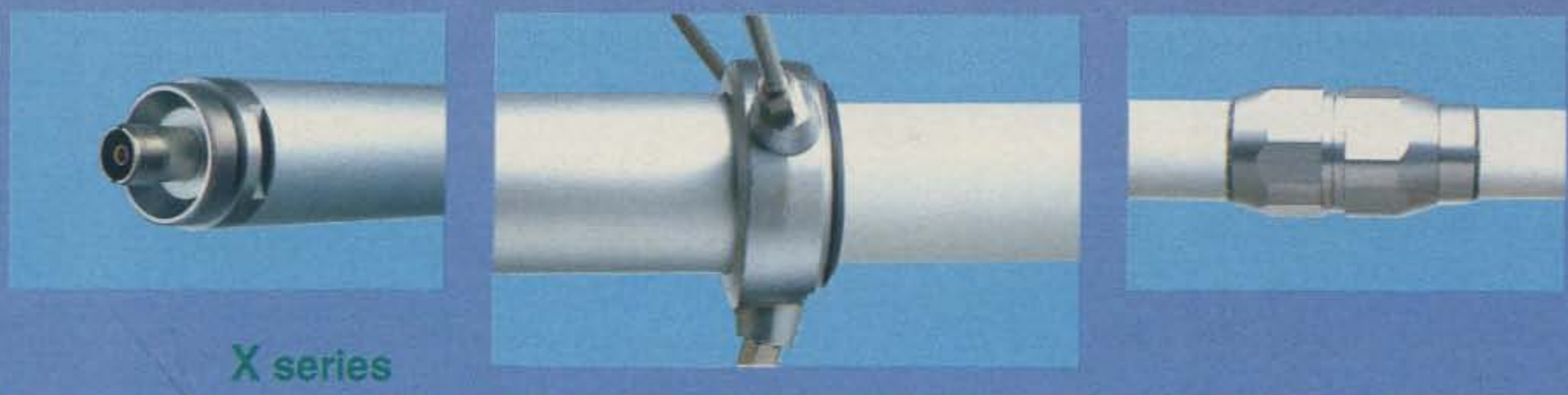

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X-500HNA	2m/70cm	8.3/11.7	200	17.2	N	90	2m:3-5/8λ,70cm:8-5/8λ
X-500NA	2m/70cm	8.3/11.7	200	17.2	N	90	2m:3-5/8λ,70cm:8-5/8λ
X-200A	2m/70cm	6.0/8.0	200	8.3	UHF	112.5	2m:2-5/8λ,70cm:4-5/8λ
X-50A	2m/70cm	4.5/7.2	200	5.6	UHF	135	2m:6/8λ,70cm:3-5/8λ

U series VHF/UHF MULTIBAND

U-5000A

PART #	FREQ	GAIN(dB)	PWR(W)	LENGTH(FT)	CONNECTOR	WIND RATING	ELEMENT PHASING
U-300A	70cm/23cm	8.6/13.2	150	8.3	N	110	70cm:4-5/8λ, 23cm:10-5/8λ
U-5000A	2m/70cm /23cm	4.5/8.3 /11.7	150	6.0	N	135	2m:6/8λ,70cm:3-5/8λ, 23cm:7-5/8λ

F series VHF/UHF MONOBAND

F-23A

PART #	FREQ	GAIN(dB)	PWR(W)	LENGTH(FT)	CONNECTOR	WIND RATING	ELEMENT PHASING
DP-GH62	6m	6.0	200	21.0	UHF	78	2-5/8λ
F-22A	2m	6.7	200	10.5	UHF	112	2-7/8λ
F-23A	2m	7.8	200	15.0	UHF	90	3-5/8λ
F-142A	1 1/4m	5.5	200	6.0	UHF	110	2-5/8λ
F-718A	70cm	11.5	250	15.0	N	90	18-1/2λ
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MY GAP CHALLENGER DX-VI

Lew McCoy, W1ICP
CQ Technical Editor
(March 90 Review)

..."could actually hear signals that were in the noise on the beam. In my comparisons between the base-fed vertical and the GAP, the GAP consistently outperformed the base-fed antenna. Most of my reports were approximately one s-unit better with the GAP. One other surprise was that the GAP vertical was quieter (less noise) than the two base-fed verticals. I would rate the GAP as a quality product, but even more important a good performer."

Richard Morrow, K5CNF
73 Magazine
(October 90 Review)

"another very good thing about the GAP antenna is that you don't have to tune it. Usually broadband antennas are not very efficient, but this one is. If I could have only one antenna, I would definitely rather have this one. The lack of lossy coils, and the coverage of a very wide part of 75 meters by an all band vertical, impressed me more than a little!"

Kurt N. Sterba
Worldradio Magazine
(February 91 Review)

"These guys have solved a problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. How does it perform? Like a hot knife through butter. I was just a barefoot boy answering the CQ callers. They just kept coming back to me. POW! POW! POW! I am almost struck with disbelief myself. I mean, this is a vertical. But then, it's a vertical with a big difference. I was indeed pleased. If I were a whole lot younger and I had two of those GAPs phased, I'd tell those contest hotshots to . . . look out!"

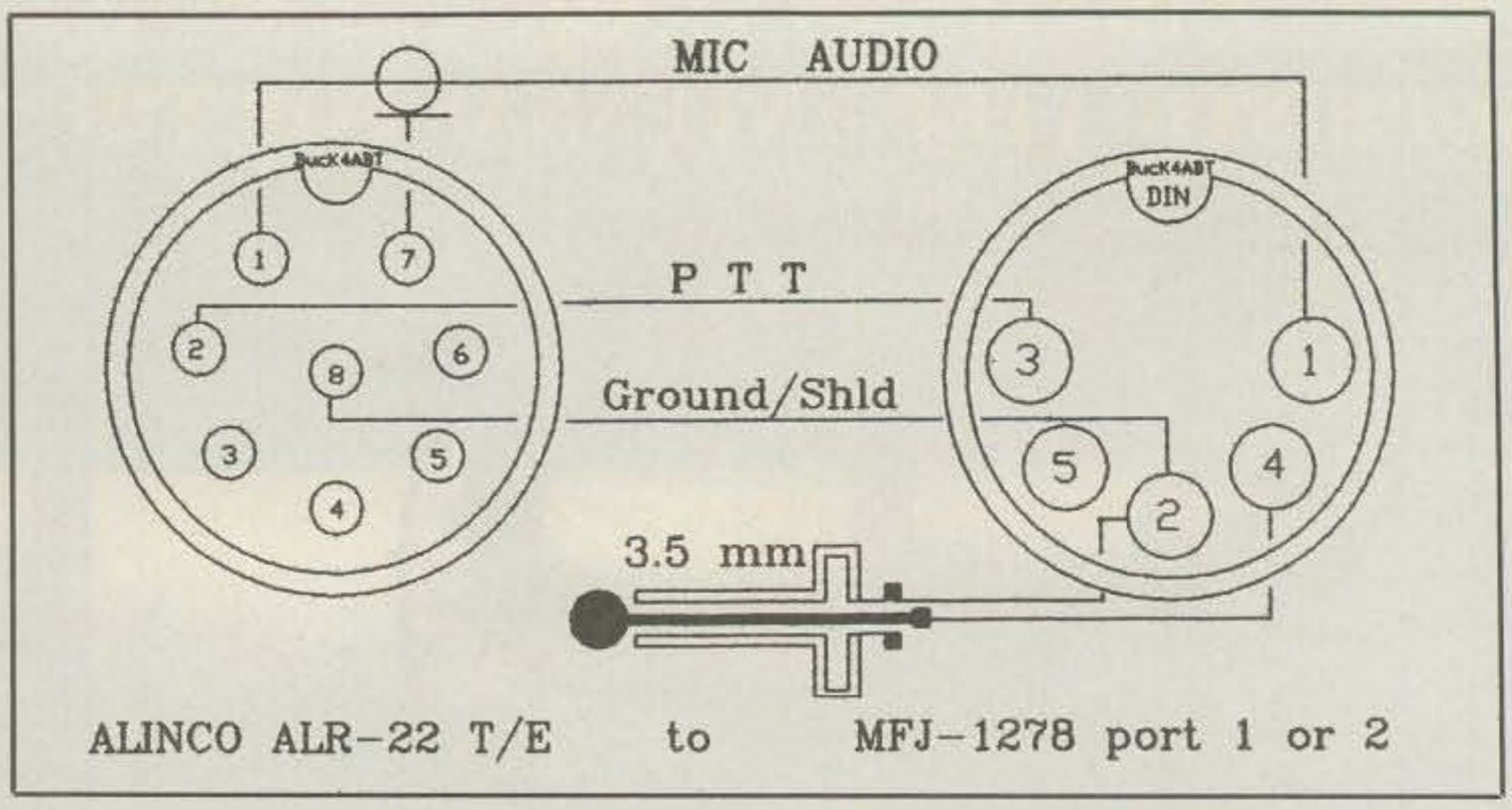


Fig. 3– For the Notebook: Alinco ALR-22 T/E to MFJ-1278 port 1 or 2.

"If It Ain't Broke, Don't Fix It" Syndrome

The systems from which I've recently operated could easily link and communicate from border to border of the state I was operating within. In most situations we can connect to stations several hundred miles away and carry on a contiguous keyboard-to-keyboard QSO.

The Georgia keyboard network is composed of around 40 ROSE Switches and a couple of leftover "TheNet" nodes. By following the ARRL suggested band plan they utilized the keyboard-to-keyboard frequency of 145.05 MHz as an Emergency Communications and keyboard-to-keyboard frequency statewide.

Operating under this band plan, there are no BBSes. The keyboard-to-keyboard statewide LAN allows linking to other stations across the state as easily as connecting to a station across the street. The ROSE network makes this kind of continuity easy.

With this system, an Emergency Operations Center (EOC) anywhere in the state can issue an announcement or request system wide and the network would come under the control of the concerned EOC.

A similar network is also functioning very well throughout Florida and central and south Alabama. The state of Mississippi is nearing the completion of their statewide ROSE network. From all indications the Mississippi Amateur Packet Group has put a lot of thought into the statewide network, making the system an end-to-end network all contained within the same frequency, and all switch callsigns have the same SSID.

Dedicated Networks

There are some networks that are set up to link nodes across several states. These networks are usually dedicated to practices such as DX spotting. The users of these systems frown on those who might try using it for purposes other than gathering DX information.

In some areas the DX spotting nets are being implemented with gateways to and from the LANs that are used for keyboard-to-keyboard contact. This practice has begun to creat some ill feelings among the LAN users and the DX chaser who is using the LAN to access these gateways. Rather than move to the DX spotting frequency, or install a node on the DX spotting frequency that is local to the DX chaser, these users try to circumvent the system by using the LAN frequency to get to the gateway to the DX spotting frequency. *Here is where personal feelings begin to get involved, and problems begin.*

If you can, imagine trying to conduct a QSO on the keyboard-to-keyboard frequency while DX spotting information is flowing at 1200 bauds. It's like being on the same frequency while a BBS is forwarding a 100,000 byte file. If two or three stations decide to circumvent the system by using a gateway to a DX spotting network from a LAN, the problem is compounded even more.

The Packet Band Plan

I don't object to the recent ARRL VHF/UHF packet band plan. However, I think it would be more suitable for our use if we all tried to somehow adhere to and abide by this plan.

As of this writing, I've watched the efforts of five states as they try to implement a much needed emergency communications keyboard-to-keyboard packet frequency. When the frequencies are not in emergency use, the keyboard communicators can use the LANs to have long-distance QSOs.

Here is the one big ticket that "torques" many users, and rightly so!

There are a few (renegade) BBS stations that decide that the ARRL packet band plan does not apply to them. These few SOPs will forward to a distant LAN across the keyboard-to-keyboard frequency without regard for those who are using the frequency.

The same lack of consideration for other packet users is a scenario which applies to a *few* DX chasers who connect through many switches and nodes across the keyboard-to-keyboard LAN to reach a gateway into the DX spotting network.

Although the practice is somewhat common, there should *never* be a gateway that allows connectivity from the local area network into a DX packet spotting system. To place a bridge between the two is simply asking for trouble, problems, and ill feelings—in both directions.

To add insult to injury, many of us have spent many hours and lots of money building the keyboard-to-keyboard communications network only to find ourselves being plundered by a few renegade freeloading BBS SOPs who feel they will take over the network by forwarding files to other BBSes during prime time. These few BBS SOPs don't seem to care for the users who have expended the time and effort to build the keyboard-to-keyboard system so they can be rid of the problem that exists on other frequencies. Thus, it becomes a problem to communicate just because these few egotistic SOPs want to satisfy their alters.

It's Time To Consider Others and Other Alternatives

The GRAPES (Georgia Radio Amateur Packet Enthusiasts Society) began several years ago with a program to assist the various LANs in the southeast with the construction of a UHF high-speed (56 kb) backbone network to help alleviate the congestion that occurs at VHF LAN frequencies.

The program is working, but slowly. Again, there are some users who use, but don't contribute. In the future the trunks and backbones will become more organized, thus opening the backbones for use at 9600 bps. The trunks will be the heavyweights operating from 19,200 bps to 56,000 bps.

First of all, this will take time and money. But most of all, we must have regulation. There are parts of our country which don't see the packet load that we are witnessing. The growth of packet will soon move to these areas, and the burden will become tenfold.

It is time to develop some rules that can be used as a guide to the the users, whether they be BBS SYSOPs or key-

CIRCLE 7 ON READER SERVICE CARD

board-to-keyboard types. Let's all work toward correcting *modus operandi*. Maybe then there will be some coordination in the manner that we use to address our switches and routing.

Even HF Has Its Problems

As I compose these lines, there are many new methods being tried for both HF and VHF packet communications. HF is not without its problems, too.

The new "CLOVER" technique is being tested in the HF spectrum, and first tests show that an improved through-put (600 bps approximately) is possible in much less bandwidth than those being used with other forms of HF digital communications.

In a recent eyeball QSO with a friend (Steve Waterman, K4CJX) in Nashville, he told me about some of the problems that are being encountered at 30 meters. It seems that several groups have converged on the APPLINK stations without considering the good that is being done by these guys.

The packet stations are merging into the same spectrum/frequencies as the APPLINK users, and in fact, they have gone so far as to ask the APPLINK SYSOPs to move to another frequency. The SYSOPs did move, but the system 64 users still insist that the APPLINK stations move farther away.

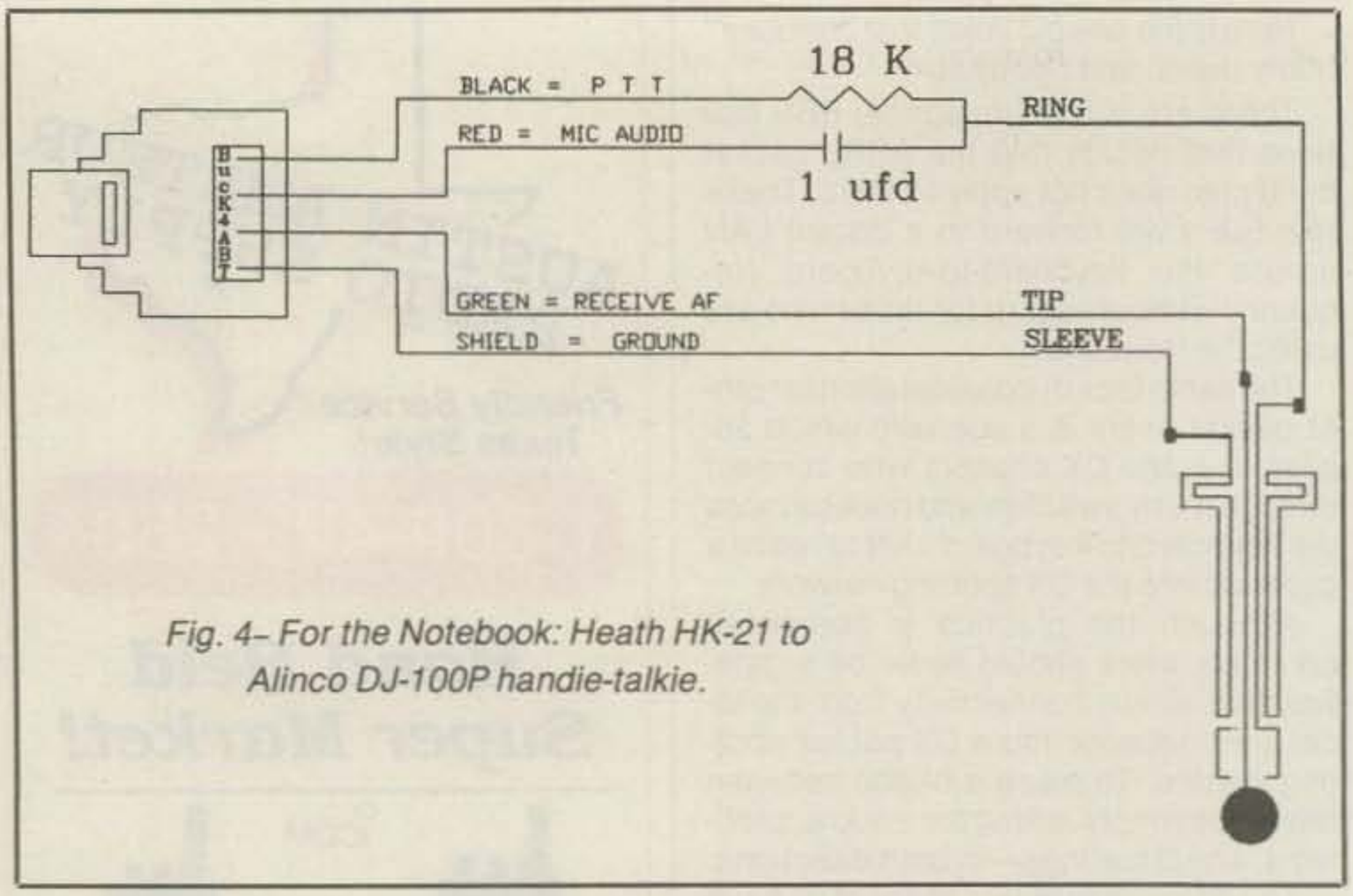


Fig. 4– For the Notebook: Heath HK-21 to Alinco DJ-100P handie-talkie.

To put this quandary into perspective, the APPLINK stations read their frequency with respect to the "Mark" tone. The system 64 guys read their frequency with respect to the lower sideband. Here again is an example of what can happen if there is no band plan or guidelines to follow. The end result is the APPLINK stations and the neighboring stations are bumping heads due to a difference in the manner in which the frequency dials are being read.

Last year there was proposed rule making that sought to bring the RTTY, AMTOR, CW, and packet station into the same portion of 20 meters. The end result could have been disastrous. There were other motions attached to the same proposed rule making, but in essence the problem was resolved. The reason I men-

tion this is because the growth of packet and the other digital modes has increased at a rate far greater than most soothsayers could foretell.

In retrospect, that proposed rule making was an opening attempt at building a band plan and developing guidelines that would set aside frequencies for each purpose.

The ARRL in its wisdom moved to make these changes, but they forgot the constituency that needed to be consulted about the options and pitfalls that would be encountered. In turn, precious time was lost that could have been used more efficiently with just a little more thought.

They are now consulting some of those users who are actively involved in this facet of the hobby, and who are using these modes. There might be some real progress ahead because the League has since consulted with a few of the users. They asked Dale Sinner, the editor of the *RTTY Journal* to join the digital committee, but that seems to be the extent of the action with regard to any proposals or guidelines for HF and VHF packet. The ARRL band plans I've mentioned herein were in place prior to the actions I've just mentioned. Serious band planning is long overdue, and it is reaching a point where the users are making some of the rules as they go In other instances the manufacturers are building into the controllers features that can make infractions and violations easier.

Rules Are Not Made To Be Broken

Somewhere there is a happy medium, yet that medium has yet to be approached with any common reasoning. Commonality with respect to the BBSes, users, keyboard-to-keyboard communications, backbones, trunks, and speed has been sidestepped long enough. I thought we had placed some form of vehicle in motion that would look into these problems when the appointment of Dale took place. The Digital Committee at the League needs to hear from *us*. Dale, Frank, and the other members of the Digital Committee alone cannot change the tide of events that is coming down hard and fast.

It is time that we who are concerned about the future of digital communications take a moment and write a letter to Dale Sinner, Frank Butler, and other members of the Digital Committee(s) and offer some well thought-out solutions to the growing problems in the non-voice portions of the amateur spectrum—not just the HF bands, but the VHF and UHF spectrum.

I hope that the League will use this input to build an across-the-board band plan that will encompass the needs and requirements of both the HF and VHF digital ham. They are but a small group compared to those of us who are in the daily combat zone.

We Have The Numbers And The Clout

During the period last year when the RM-7248 action was smoldering, there were several good ideas that were worth considering with respect to the future of HF packet band planning. One in particular was submitted by Bill Henry of HAL Communications. There were others that could also use some positive consideration.

We have some options, but these options can be lost if we don't begin now to put the wheels of progress into motion. I will again remind the readers of this column who are active in packet communications: *Don't scream later if you fail to voice your feelings now!*

Write to the members of the Digital Committee, or at least send a letter to me about the concerns that you would like to have passed on to the members of the Digital Committee. Let them know your thoughts on this subject.

I'm not looking for complaints or bickering. We are seeking solutions, or some suggestions that may lead to the final answer. I will forward your letters to the responsible parties so they may be considered or used to build a resolution that will be the common ground for us all. Please don't send them to me via a BBS. Use the US Postal Service. This will make it easier to compile them and submit the letters to the members of the Digital Committee for consideration.

A final note along this subject line: Remember that some solutions may need to be looked into prior to the WARC meeting in 1992. This means we need your solutions and comments by the end of November 1991.

Happy Packeting!

de BucK4ABT @ WA4JUB.TN.NA

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Emergency Communications

One of the reasons why our Amateur Radio Service has valuable frequency segments (bands) available for our use is its proven ability to provide radio communications during emergencies. We have a proud history of serving the public when regular means of communications are overloaded or disrupted. Therefore, amateurs should prepare themselves to provide this service, and they should provide communications assistance whenever emergencies arise. We have frequencies which several other radio services would like to take away from us. Servicing the non-amateur public helps us retain our bands.

A related reason why our Amateur Radio Service exists is that it provides a pool of trained technicians and operators. We are people who can assemble equipment and accessories into an efficient radio station. We understand what each part does in the overall station, and we have some understanding of how the various functions are accomplished. Very few amateurs can design or repair equipment, but they do know how to use it. In addition to being able to quickly assemble an efficient station under all conditions, amateurs know enough about antennas, propagation, and band usage to select a suitable frequency to use to handle traffic anywhere on earth. We can communicate despite atmospheric noise (QRN), man-made interference (QRM), weak signals, and intermittent fading (QSB). We can even compensate for the operating deficiencies of amateurs with limited traffic-handling capabilities. We are a unique group, and each of us can be an asset to our community, county, state, country, continent, and planet.

Becoming an FCC-licensed amateur radio operator does not automatically make you a skilled and useful emergency communications operator. The licenses just give opportunities to "learn by doing." Studying printed material about emergency communications is beneficial, but it must be supplemented with "hands-on" operating experience. You must learn the mechanics and procedures of traffic handling. The times, frequencies, and purposes of nets (networks) must be known. A lot of traffic must be handled before an operator becomes able to do the job rapidly and without error. Message precedences must be understood and followed.

Participating in annual ARRL Field Day Contests will not be enough to mold you into a useful emergency communicator. However, Field Day can be used to help inexperienced amateurs learn how to set up a good station in a hurry. Experienced amateurs can offer advice and simple explanations to beginning amateurs. Field Day is supposed to be a simulated emergency operating exercise, and it should serve as such. In addition to gaining emergency station and antenna installation experience, new amateurs can acquire improved operating skills under the guidance of experienced amateurs.

There are contests in progress almost every weekend. The contest section of this magazine is a superb source of such data. Many amateurs consider contests to be a nuisance because they often clutter up the bands. However, national and international radio groups realize that contests provide the training opportunities that inexperienced amateurs need to increase operating proficiency. Do not be afraid to participate in contests. It does not matter if you have a relatively poor station, low output power, a mediocre antenna, or very little operating experience. The station configuration is not close to being as important as the amateur's willingness to operate.

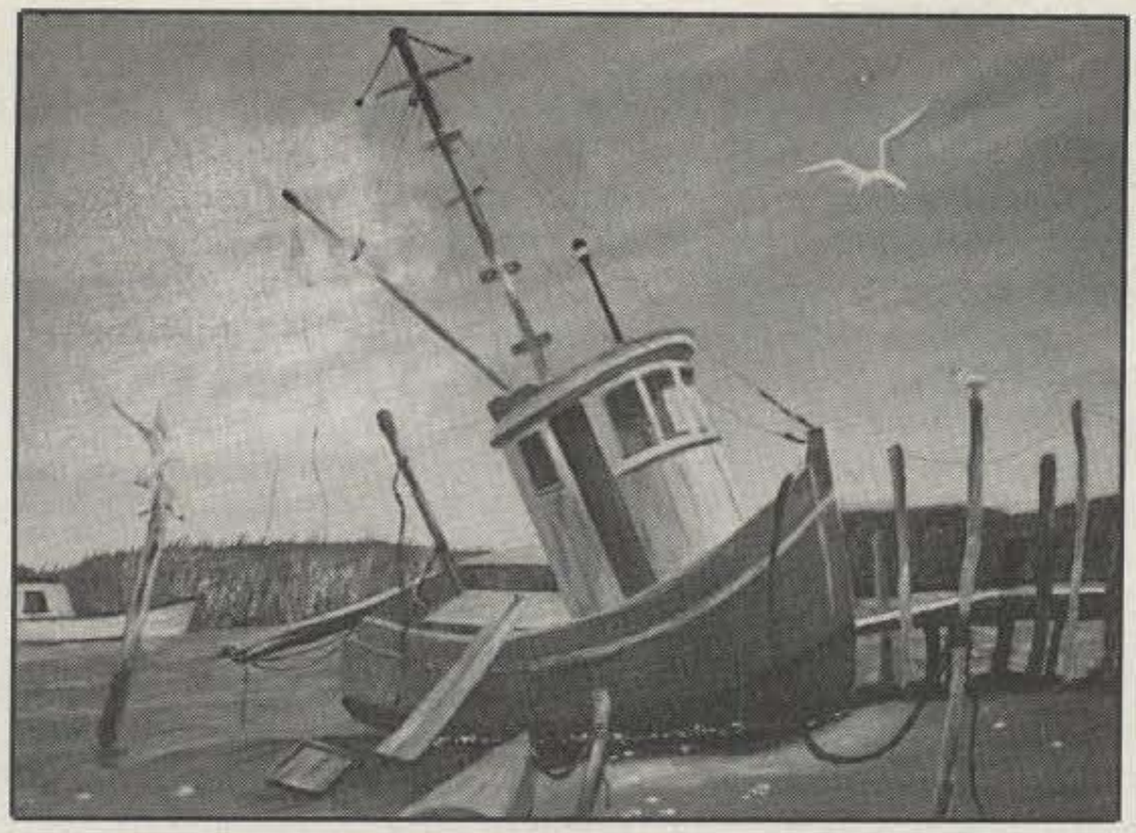
Almost every amateur was a lid (poor operator) when she/he first started to operate. Your mistakes will be understood, and they will be tolerated by other amateurs. In addition to improving operating skills, contests improve confidence and can help you qualify for many desirable operating awards. Your contest operating does not have to be a major effort. Just operate for a short time, if that suits you. The important thing is to use contests to improve your operating proficiency, and to retain it.

In addition to participating in contests, you should become active in nets. The ARRL Net Directory lists a lot of nets. Pick one that suits your operating time and station capability. Some of the Novice band nets are particularly informative since they are accustomed to training new operators. Nets exist for many modes of communication. You will probably progress through a series of specialized nets as you acquire more knowledge and capability. Each type of net can help you in some way. Both contest and net

This is 5-year-old Veronica Harrington, KC6TQR, of Long Beach, California. She shares a station with her mother (Ann, N6YGP) and father (Curt, N5HMR). Veronica has made many contacts on 10 meters, and she is studying to pass the Technician examination. Her other interests include reading ghost stories and watching vintage horror films. Veronica recently completed the first grade at the Edgewater School and is entering the Gate Program of the Long Beach School System.

Yoshi Hayashi, JA1UT, provided this QSL card of the National Amateur Radio Station of Cambodia (XU1DK). If any reader is interested in operating from Cambodia, Yoshi advises the person to contact is Mr. Lorn Norin of Cambodia. Lorn can be reached through Mr. Shintani, Liaison Office of Democratic Cambodia, POB 80, Kojimachi, Tokyo, Japan 102-91.

45527 Third Street East, Lancaster, CA 93535-1802



Jim Logan, K2HSY, of Massapequa, New York enjoys painting in addition to amateur radio. I recently enjoyed a pleasant contact with Jim, and his 3 watt output sounded great. He sent this picture entitled "Low Tide" with his QSL. The original oil painting is 16 by 20 inches.

Ten-year-old James Catalano, KC4SZT, of Woodbridge, Virginia is a Cub Scout and likes to play Nintendo and the piano. He has earned an orange belt in Tae-Kwon-Do. James shares this shack with his father, WD4KXB. Denis Catalano provided this picture and information.

operating can contribute to improving your operating skills. I advise new amateurs to give both activities a try; you may be surprised to learn that you like them. When an emergency exists, untrained operators are a hindrance to established nets. Traffic handling is a satisfying experience for every amateur.

Emergency traffic nets are active in most states and ARRL sections. The statewide emergency frequency is usually the section NTS (National Traffic System) SSB net frequency. As examples of this, 3947 and 3965 kHz are the emergency frequencies which are used in Virginia and Connecticut, respectively. Your local ARRL officials should be able to furnish you with your area's emergency frequencies. The ARRL Net Directory and your local Emergency Coordinator can provide you with emergency frequencies. If you are unable to locate this information, you can obtain it by writing to the ARRL, 225 Main Street, Newington, CT 06111. It is essential to be familiar with local, state, national, and international nets.

The International Assistance and Traffic Net (IATN) has earned worldwide recognition of its excellence in handling emergency traffic. The ARRL National

Emergency Response Committee (ANERCOM) expressed their approval of IATN's performance following Hurricane Hugo and the Bay Area earthquake during 1989. Their use of packet forwarding and AMTOR-to-packet BBS linking expedited accurate traffic handling. Entry points are usually channelized, making it easy for users to select frequencies appropriate to their license class. Digital transmissions improve the accuracy, speed, and reliability of traffic handling. These advantages also apply to inexperienced operators with all classes of licenses.

The preceding paragraphs are intended to motivate amateurs to become proficient participants in established nets. I hope many readers will do that. However, I realize that the vast majority of amateurs are likely to find themselves being asked to handle emergency traffic without having associated training.

We had no Novice licensees prior to 1951, and no Technician licensees before 1954. These two classes of licensees are quickly approaching one-half of our USA amateur radio operator total. Established nets exist on frequencies which are available to Novices and Technicians, but these licensees are unlikely to become active in nets during their first few years on the air. It would make sense to use calling frequencies 10 kHz above the bottom ends of Novice/Technician and General segments when attempting to handle emergency traffic outside of a traffic net. After using a directional call (CQ Los Angeles, as an example) to establish contact with a station in the desired area, move to a frequency about 10 kHz above the calling frequency to exchange emergency traffic. All non-net stations who are willing to handle traffic should monitor the calling frequency (without transmitting) when not handling traffic. It would be beneficial to have such calling and working frequencies available to non-net amateurs. This type of experience could easily prompt a lot of amateurs to become efficient traffic handlers serving established nets.

Established nets do an excellent job of handling traffic, but they need more operators. Simple exposure to handling a few emergency messages should increase the number of operators active in nets. If you are interested in such operation, try it following future disasters. Remember that traffic initiated in a disaster area takes precedence over almost all messages generated elsewhere.

If you handle emergency traffic, try to get favorable publicity for amateur radio due to your work. If you participate in any amateur radio activity which benefits the non-amateur public in any way, make it known through your local newspapers and broadcast stations. Amateur radio seldom receives adequate recognition of its efforts in support of Walk-A-Thons, Bike-A-Thons, parades, Special Olympics, and similar events. We need to do a better job of communicating our public service to the general public via the media.

Code Signals

Our end of message signal is $\overline{AR}$ (.-.-.), which is nothing more than the abbreviation for finish (fn) in the American Morse Code. Our end of work signal, $\overline{SK}$ (...-.-), is taken from the landline 30. 30 signified the end of the operator's work shift, which occurred at 30 minutes past the hour. Both of these tidbits appeared in the summer 1989 issue of *Morsum Magnificat*.

VT-To-Commercial Tube Numbers Cross-Reference List

I have a list which cross-references Army VT (vacuum tube) numbers to equivalent commercial numbers. Much to my surprise, I continue to receive requests for copies of this list. If you would like to receive a copy of it, please send your request to my California address as shown on the first page of this column. Please remember to send a self-addressed envelope with double first-class postage (52 cents) attached.

Jump-Starting A Stalled Vehicle

Amateurs are primarily extroverts who are very likely to offer assistance to anyone in trouble. If you encounter someone trying to start a vehicle with a dead battery, this is the safe procedure you should follow.

1. Make certain both vehicles have batteries of the same voltage (6, 12, etc.).
2. Position vehicles where there is no metal-to-metal contact between them.
3. Keep lit cigarettes, pipes, and cigars (plus open flame) away from batteries; they emit explosive hydrogen gas.
4. Wear safety goggles, if they are available.
5. Connect battery jumper cables with both engines not running.
6. Connect positive (red) cable clamps to the positive (+) post of each battery.
7. Connect negative (black) cable to the negative (–) post of the good battery. Take care that the other end of the negative cable does not contact any part of the stalled vehicle.
8. Connect the other end of the negative cable to the engine, frame, or body of the stalled car. Make a firm connection, far from the battery, and clear of moving parts (belts and fan).
9. Start the vehicle with the good battery and then attempt to start the stalled vehicle.
10. Remove the negative cable first (from both vehicles), and then remove the positive cable.

The National Society to Prevent Blindness offers a sticker containing the preceding procedure. To get one, send a quarter and a self-addressed, stamped, business-size (#10) envelope to your state's chapter of their society. If you cannot find their address, you can call them; their telephone number is 212-684-3222. This step-by-step procedure was provided by the National Society to Prevent Blindness.

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

WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Amateur Radio, The Changing Hobby
1991 FCC Activity Hits High Gear!

So far it has been a very interesting and newsworthy year for amateur radio! As I write this, the 1991 year is half over, and much has happened during the past few months that will impact our hobby for decades to come. Since it is driven by constantly changing communications technology, amateur radio is always in a state of evolution. It appears, however, that more than a normal amount of FCC activity has crept into our hobby this year!

Changing License Testing Requirements

The year started off with the FCC declaring that Morse code proficiency would no longer be a requirement to obtain an entry-level amateur radio license. Up until February everyone had to pass a Morse code test to become a licensed amateur radio operator. No more.

Actually, the Commission has been on a deregulation kick for more than a decade. One by one stringent radio operator licensing requirements have been relaxed, and not only for the amateurs, but for the professionals as well! And well they should. Advances in equipment design and communications technology no longer dictate that radio operators need to have solid backgrounds in electronics engineering. Very few amateurs build their rigs these days, especially for the higher frequency bands.

The FCC changed their amateur license written examination procedures in the mid-1980s when they adopted a system of identifying answers to multiple questions selected from large pools.

The questions became public information and are widely published—a far cry from the unknown examination questions that had been administered at FCC field offices for more than 50 years.

The multiple-choice examinations are administered by senior-level amateur radio operators serving as volunteer examiners. They cover FCC rules, operating procedures, electronics, communications, and station equipment. There is a different question set for each of the five license classes. As a general rule the questions get progressively more difficult as the license classes and accompanying privileges increase. The beginning question pools emphasize amateur procedures, safety and basics, with the senior levels requiring more electronics knowledge. The pools consist of about ten times as many questions as will be asked in any one written test.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

Morse Code De-emphasized

After a lengthy and somewhat turbulent rulemaking process spanning nearly two years, on February 14th the FCC eliminated the requirement that amateur operators be code proficient when operating at the VHF and higher frequency level. The Commission's hands were tied by international constraints below 30 MHz, since Morse knowledge at the HF level continues as a worldwide requirement.

The code-free approach the FCC took was simply to eliminate the 5 words-per-minute requirement from the Technician Class. This method was suggested by the Quarter Century Wireless Association, a respected national organization of longtime licensed amateurs. The requirement for the Technician Class license is now correctly answering 41 out of 55 questions extracted from the Novice (Element 2) and Technician (Element 3A) question pools. There are about 700 questions in these two pools. You receive a credit slip if you pass only one of the two examination elements.

License preparation manuals for the new Codeless Technician are widely available. Our education office distributes the *No Code Handbook* at $9.95 postpaid. We have distributed over 5,000 of these 200-page books in just two months! It contains all of the questions, multiple choices and answers, with explanations.

If you have an IBM-compatible computer, we suggest the *No-Code Education Package*, which contains software permitting you to study and take sample Technician tests right at your PC. Cost: $21.95 from The W5YI Group, P.O. Box 565101, Dallas, TX 75356. For VISA/MasterCard orders call toll-free 1-800-669-9594.

The FCC action on a code-free entry level into amateur radio was long overdue. Actually, the United States is the last major power to adopt a codeless amateur ticket, and it is really only a matter of time before the code requirement is totally eliminated.

The Morse code qualification is also in the process of being discontinued for professional radio officers aboard ocean-going vessels. It is more complicated and time consuming to remove worldwide telegraphy standards, since many nations must agree and international conferences where such decisions are made are not held very often. Removal of the code requirement has indeed been very traumatic for many long-time operators who share a common telegraphy bond.

When a Codeless Technician passes the 5 words-per-minute Morse code exam, he (or she) becomes what is known as a "Tech Plus" operator—for Technician plus code. This permits additional telegraphy privileges in the 80, 40, 15, and 10 meter bands, plus voice privileges in a portion of 10 meters.

The FCC still retained the Novice Class as an alternate entry level for those individuals who find telegraphy easier than passing the 25 question Element 3(A). You therefore can begin your amateur radio career as a Novice or a Codeless Technician. Novices must pass the 30 question Element 2 in addition to elementary Morse code.

Examinations at the Novice level are less formal and without cost. They are usually conducted by two volunteer examiners. It takes three VEs (and a $5.25 test fee) to examine for the Technician and higher classes. Any amateur radio operator or equipment outlet in your neighborhood can tell you the location of the nearest amateur radio exams (or call our business office at 817-860-3800 during regular business hours). There is bound to be a test session taking place near you!

The early results are in, and it appears most newcomers prefer to enter as a Technician. The number of new Novices has not declined, but new Technician operators are sprouting everywhere! It has already added many thousands of new amateur operators to the amateur radio ranks.

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General Coverage HF XCVR, 100W, Available W/out Autotuner. A Good Performer ..... **Call!**

AT-250	Autotuner	Call	R-2000	HF Receiver	Call	TH-225	2m 5W HT	Call
AT-440	TS-440 Autotuner	Call	R-5000	HF Receiver	Call	TM-941	Triband Mobile	Call
AT-850	TS-850 Autotuner	Call	RZ-1	Scaner Receiver	Call	TM-631	2m/220 Mobile	Call

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DSP-100	Digital Signal Unit	Call	SP-940	External Spkr	Call	TR-751	2m All Mode	Call
PC-1A	Phone Patch	Call	TH-26	2m Small HT	Call	TS-140S	HF Mobile	Call
PS-50	Power Supply	Call	TH-27	2m Tiny HT	Call	TS-680S	HF & 6m Mobile	Call
PS-430	Power Supply	Call	TH-77	2m/440 Tiny HT	Call	TS-790	Dual Band Base	Call

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FT-767	HF XCVR	Call
FT-757	FX Mobile Rig	Call
FT-747	HF Mobile Rig	Call
FT-736	V/UHF Xcvr	Call!
FT-5400	2m Mobl Xcvr	Call!
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CIRCLE 55 ON READER SERVICE CARD

Telegraphy and the Handicapped

Also in mid-February the FCC adopted new rules that permit severely handicapped amateurs to upgrade without passing additional Morse code exams. Volunteer examiners must give 20 words-per-minute examination credit to any disabled amateur who has previously passed a 5 wpm test.

The applicant must submit an application (FCC Form 610) with a special physician's Certification of Disability and patient's Release of Medical records through a VEC. A copy of the applicant's current amateur license must also be attached. The VEC then approves the application and forwards to the FCC.

Handicapped amateurs who were licensed as a Technician prior to March 21, 1991 need not be tested further, since they already have examination credit for General Class test Element 3(B). Applicants with written examination credit may forward their application along with the attachments directly to a VEC. (You may send them to us: W5YI-VEC, P.O. Box 565101, Dallas, TX 75356.)

Disabled applicants who must pass further written examinations will have their applications forwarded to the VEC by the examining team. Applicants who need the appropriate doctor's form may obtain them from any VEC (or from us).

Furthermore, the FCC has directed all volunteer examiners to implement additional telegraphy test provisions for disabled applicants at the 5 words-per-minute speed. These accommodations include pausing the telegraphy test message after each sentence, phrase, word, or character and waiting for a response from the examinee. Additionally, a Morse Code hand sending test may be substituted for receiving a telegraphy message.

Preserving Amateur Spectrum

In early 1991 Congressman Jim Cooper (D-TN) introduced H.R. 73, which looks toward safeguarding amateur spectrum. The legislation would require the Federal Communications Commission to provide equivalent replacement spectrum to the Amateur Radio Service for any frequencies reallocated to another service after January 1, 1991.

Cooper said "Under H.R. 73, the FCC won't be able to give away ham radio bands to some special business interest and leave ham radio operators in my district and across America high and dry. If the FCC sees the need to use ham radio frequencies for another purpose, my bill will require the FCC to transfer ham operators to other frequencies that are just as good.

"I have come to believe that amateur radio operators are a valuable national resource, and I hope to see that they keep the necessary radio spectrum to enable them to be around for many years to come." Since its introduction, H.R. 73 has obtained many co-sponsors.

Computer-to-Computer Violations

The FCC's Field Operations Bureau cited several amateurs for transmitting business communications over amateur radio. It seems an amateur (who later denied he sent the message) allegedly sent a message over the amateur packet network urging people to stop U.S. intervention in the Middle East. The "October 20 Coalition" asked amateurs to call a 900 number to vote their displeasure. There is a question as to whether the 900 number also provided income to its sponsors.

The FCC issued violation citations and some fines to those involved—including innocent intermediary packet stations who automatically relayed the message. Amateur packet technology is such that a station automatically retransmits a message if it is not intended for that station. It is in this manner that the network is able to deliver traffic to the addressee. Messages stop at your computer if it is for you; otherwise they are transmitted farther down the line.

Amateurs have long held that due to the electronics of automatic transmission control, only message originators should be responsible for traffic content. That is not the position of the FCC, however. The Commission does not want any station—intermediary or otherwise—retransmitting prohibited communications.

One amateur cited has retained a lawyer to fight the violation notice. Their belief is that it is impossible to review messages when operating under automatic control and that no violation took place since the message is actually protected under the First Amendment.

They also state that not all "900" telephone message providers split fees with the telephone company. Therefore, there was no way that an amateur station could determine that the message was indeed a prohibited business communication. "This is political speech in its purest form. It is entitled to the highest degree of protection." The ball is now in the FCC's court.

Listening to the Bands

The American Radio Relay League wants amateurs to be exempt from burdensome state and local laws that forbid citizens from having in their cars radios that can pick up police, fire, or other government transmissions. They asked the FCC to grant a blanket exemption along these

lines to licensed amateur radio operators.

The FCC Commissioners seem reluctant, however, to grant the pre-emption. In fact, the ARRL Request for Pre-emption seems to have back-fired! The FCC now wants to know why amateurs need to listen to frequencies that are not allocated to the Amateur Service, and are even considering requiring all existing ham transceivers and scanners to be modified to exclude public safety spectrum!

Amateur Radio User Fees

The Federal Communications Commission is having tough financial times and wants users of the spectrum to be assessed a fee for using the electromagnetic spectrum. Some three-million frequency users would be affected, including amateur radio operators.

The FCC has proposed that amateur radio operators would pay $30.00 for each 10-year term when they apply for or renew their operator license. It is unclear just who would collect the spectrum use fee.

The new proposed "user fees" are not the same as application fees (from which the Amateur Service is exempt) or testing fees (expense reimbursement to support the amateur testing program). The spectrum use fee would go directly to the FCC to help them pay their bills. About half of the Commission's 1992 budget would be provided by these charges. The FCC says the spectrum use fees are needed to make up for past inadequate funding by Congress.

FCC Inspects Amateur Stations

The FCC's Field Operations Bureau is the compliance arm of the Commission. Engineers from the FOB recently inspected over 200 amateur stations—most at random—to determine if amateurs were abiding by the radiated power restrictions outlined in Section 97.313(a). That rule requires amateurs to use the least amount of power necessary to carry out communications.

The FCC inspectors asked amateur operators to transmit and cut power 50%. Inspectors then made wattmeter measurements and obtained signal reports from amateurs on the other side of the QSO as to the effect of the reduced power.

The results of the study, which is now being called a "power audit," were interesting. Most stations experienced no degradation in communications capability when the power was reduced by 50%. The lower power resulted in reduced interference to home entertainment equipment in many cases, however.

The FCC concluded that most amateur stations are not operating at the minimum power as required by the rules. They said the purpose of the well-publicized study was to " . . . provide an awareness to the amateur community that amateurs need to pay attention to the minimum power rule."

Amateurs Must Vacate 220–222 MHz

The FCC has circulated a Public Notice advising amateurs that they must vacate the 220–222 MHz spectrum by August 28. The Commission separated the shared 220–222 MHz band into exclusive business and amateur spectrum nearly three years ago. At that time the amateur community was put on notice that they ultimately would have to give up use of the lower 2 megaHertz of the shared 1.25 meter band.

On March 14, 1991 the FCC approved new Land Mobile Service rules which provided for 400 five kiloHertz wide business channels between 220–222 MHz, paired to provide 200 narrow-band channels. Within 30 days nearly 50,000 applications were received from businessmen wanting to establish two-way narrow-band stations between 220–222 MHz.

The FCC Order called for amateurs to discontinue operation in the 220–222 MHz band 90 days following the effective date of the new regulations, which became effective May 29th. The recent Public Notice said, "Now that the effective date of these rule changes has become certain, amateur operators are hereby placed on notice that amateur stations may not transmit in the frequency band 220.000 to 222.000 MHz after 0000 hours UTC, August 28, 1991."

The Commission emphasized that Requests for Waiver of the rules to permit continued amateur station operation in this band will generally not be viewed favorably. "Any requests for continued amateur station operation in the 220–222 MHz frequency band, whether couched as requests for waiver, requests for special temporary authority, requests for experimental or developmental licenses, or in any other form, will be strictly scrutinized. . . ."

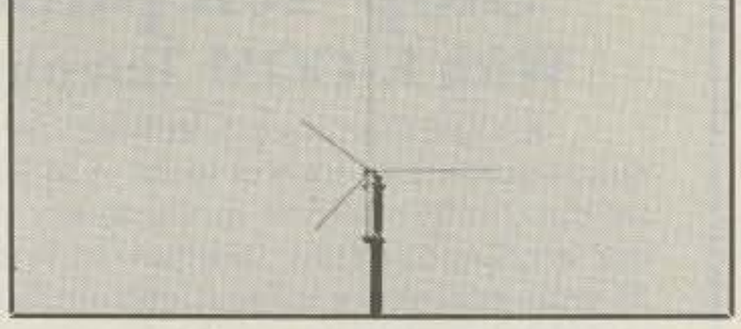
73, Fred, W5YI

CQ SHOWCASE

A/V Technology Antenna Arrays Software

This A/V Technology software enables the user to construct driven arrays configured as broadside and end-fire in graphic form and tabular form to maximize radiated signals. The user determines the best configuration for a particular application, while Antenna Arrays saves time and reduces trial-and-error attempts. The program computes up to 16 dipole elements. (Larger arrays are available as an additional option upon request.) Toggle to display from vertical to horizontal and then the user can try rotating the polarization of the combinations from horizontal to vertical. The radiation patterns in both the vertical and horizontal planes can then be viewed.

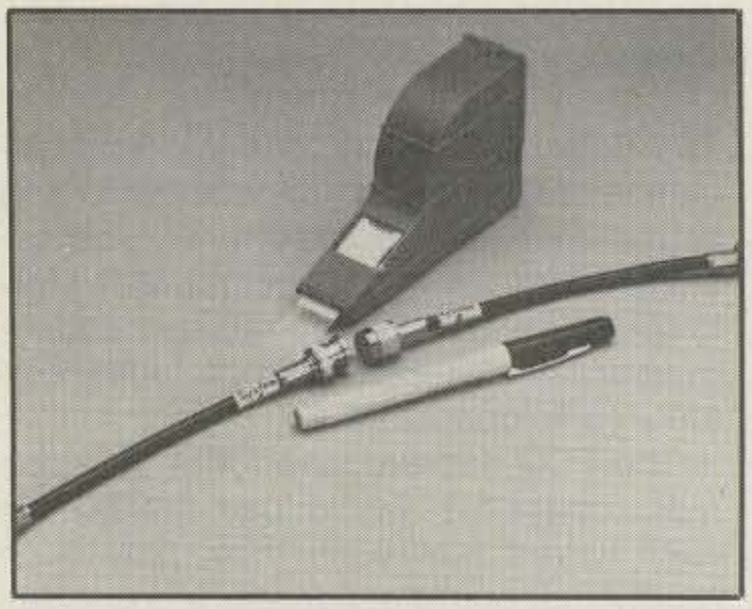
The software requires IBM PC compatible, EGA monitor, MS.DOS 3.0, and at least 512K RAM. Price is $59.95 plus 5% sales tax. For more information, contact A/V Technology International, Inc., P.O. Box 97, 432 Cherry Street, West Newton, MA 02165, or circle number 101 on the reader service card.



NCG COMET Dual-Band Base/Repeater Antenna

The COMET dual-band 2m/70cm base/repeater antenna is centered to the American amateur frequencies, 146/446 MHz. It incorporates the exclusive SLC (Super Linear Converter) system, which uses parallel elements instead of coiled elements to maintain a stable resonant frequency. A newly designed joint system is made of durable ABS plastic to screw the sections together. It has an overall length of 17 feet 8 inches, has a UHF (SO-239) connector, and reported gain figures of 8.5 dB on 2 meters and 11.5 dB on 70 cm. The radiation pattern is virtually flat.

For more information on the CA-2x4MAX, contact NCG Company, 1275 N. Grove Street, Anaheim, CA 92806 (800-962-2611, in CA 714-630-4541), or circle number 103 on the reader service card.



Jensen Tools Write-On Tape System

Jensen Tools' Write-On Tape System for labeling wire and cable is made by 3M and creates durable, self-laminated labels for system documentation and permanent future identification. The system includes a tape dispenser, pressure-sensitive tape, and a marking pen. As tape is dispensed, a label area appears in the dispenser window and provides a smooth, flat writing surface. The tape is resistant to dirt, oil, and heat, and the permanent marking pen has an extra-fine point and contains quick-drying water and ultraviolet resistant black ink.

Each roll of tape contains 250 labels, and tape replacements and pens are available. For more information, contact Jensen Tools Inc., 7815 S. 46th Street, Phoenix, AZ 85044 (602-968-6231), or circle number 105 on the reader service card.

Raltron Oven-Controlled Crystal Oscillator

Raltron Electronics has announced the availabilty of a new kind of oven-controlled crystal oscillator (OCXO) for use in advanced timing applications such as personal earth-station VSAT networks, TV test and broadcasting, navigation systems, instrumentation, syn-

thesizers, and cellular systems. The Model TF-65010-B OCXO is the world's smallest OCXO, maker says, because the resistance wire is wrapped directly around the crystal, eliminating the oven. The unit measures 35.3mm × 27.0mm × 25.4mm (1.38" × 1.06" × 1"). The Raltron unit also stabilizes in only 2 minutes.

The 65010-B features low power consumption (steady state power requirement 3 watts) and high thermal stability. The unit is available at any frequency from 1 MHz to 20 MHz. Output waveform is a TTL compatible square wave. Worst-case phase noise (at 10 kHz) is specified at −140 dBc. The oscillator is priced at $65 each in quantities of 10,000. The company also offers a variety of time, frequency, and resistive components for computer logic, radio, telecommunications, and consumer electronics, including quartz crystals and crystal-controlled oscillators, filters, ceramic resonators, and resistive networks for through-hole and surface-mount applications. For more information, contact Raltron Electronics Corp., 2315 NW 107th Ave., Miami, FL 33182 (telephone 305-593-6033), or circle number 102 on the reader service card.

Contester Headset From Telex/Hy-Gain

The Hy-Gain Radio products group of Telex Communications has introduced the Contester boom-mic headset. It features a noise-cancelling dynamic mic that favors the voice range (100–8000 Hz) for maximum intelligibility. The boom mic rotates so it can be worn on the left or right side of the head and automatically shuts off the mic when placed upright. The headset's dynamic headphone receivers have a 50–15,000 Hz frequency response and compatible impedance for amateur transceivers. Washable "socks" come with the headset and slip over the foam-filled ear cushions.

The headset carries a suggested list price of $102. For more information, contact Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, MN 55420 (612-884-4051), or circle number 104 on the reader service card.

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

In publishing 30 usually indicates the end of something. In this case 30 is just the beginning—30 MHz, that is. This month we bring back our coverage of the world above 30 MHz. We are both pleased and fortunate to have Joe Lynch, N6CL, take over the helm of our (yours and mine) column devoted to this world. Part of Joe's task will be to put the CQ WPX VHF Contest back on track so we all can enjoy it next year. —K2EEK

I would like to start this column by introducing myself. I am an Extra class licensee. I have been an amateur for over thirty years, having first been licensed as WV6PDE in Bonita, California. I am active on all amateur frequencies from 160 meters to 2 meters and soon will be active on 70 cm. I also hold an FCC general radio telephone license (the old first phone). I have a Master of Business Administration degree from Oklahoma City University, a Bachelor of Science degree in business administration from San Diego State University, and an Associate of Science degree in electronic communications technology from San Diego Community College. I work for Jordan de Laurentes, a firm that supplies instructors and other professional staff to government agencies on a contractual basis. Presently, I am assigned to the FAA in Oklahoma City, where I perform development work on courses being converted from classroom instruction to computer-based instruction. I am the Section Manager for the Oklahoma Section of the ARRL. As the Section Manager, I find myself at many hamfests and club meetings, where I keep my finger on the pulse of the living, breathing organism called the "amateur radio fraternity."

I would next like to establish some guidelines for this column. I look at it as a people-oriented column. I expect to report on your activities on VHF frequencies and above. I will look to your newsletters and your personal correspondence to supply material for the column. I want input not only from U.S. amateurs, but from amateurs worldwide. As information is provided to me (with enough lead time), I will publicize contests and DXpeditions that emphasize VHF and above activities. I will be a source for reminders of times of the year to concentrate on certain types of operating activity (such as the Perseids meteor showers that we will discuss later in this column). I will publicize your achievements as we discover together the enchantments of operating above 30 MHz.

One other thing about this column. Since I am relatively new to the world of VHF and above, I consider myself a novice. In this column I will learn from you what to expect from and how to play on these higher frequencies. I am looking to you, as contributors, to teach your fellow readers and me.

What about my background? My activity on VHF began in earnest only two years ago. However, my exposure to the higher bands goes back to my early days in amateur radio. I remember many nights hanging around the shack of Herb Adams, K6BTO, in Bonita, California. In it he had every imaginable piece of equipment from every surplus store in San Diego County. I remember it meant so much to him to be able to modify a piece of equipment so that he could talk clear across town. I remember the smell of that surplus equipment as the components would bake from the heat of those old tubes. I remember the constant hiss of the 1296 MHz receiver that had its gain kept wide open so as not to miss a call. I remember also Herb's hope of being able to talk just a little bit farther on those incredibly high frequencies.

I would ask him why he bothered operating at those high frequencies when anytime he wanted he could get on the low bands and talk anywhere. He would reply that it wasn't always the case. In the infancy of amateur radio, amateurs could not talk very far because they didn't know how. Eventually, they discovered how, and now it was up to him and other pioneers of his day to discover how to use these higher frequencies effectively. When I told him that it seemed that it was an incredible amount of work just to find out how to communicate across town and that maybe there just wasn't any way to do anything much farther, he wouldn't hear of my negative prognostications. Instead, he would mention things such as bouncing signals off the moon and talking to other stations on 2 meters meteor scatter. As a new amateur, I could never quite understand the intrigue he held for such etherial forms of amateur radio communication. Not until now.

I remember one other fascination some of my fellow amateurs had in those days. When a newcomer got his Technician license then, he would invariably get on 6 meters. Since, back then, the Technician did not have Novice privileges (unless he held a Novice license simultaneously), 6 meters represented the only band that provided long-distance communications with any regularity. I noticed something rather peculiar with these Technicians active on 6 meters. They actually enjoyed staying on 6. I noticed something else. Some of these Technicians who upgraded to General stayed on 6. It seemed that there was some mysti-

P.O. Box 73, Oklahoma City, OK 73101

Late-Breaking News

Two items of interest to readers of this column have occurred since this column was written.

ARRL Petitions for 216–220 MHz

In a petition filed with the FCC on June 1, 1991, the ARRL requested that the Amateur Service be granted 216–220 MHz on a shared basis. The petition requests that amateurs be given use of this spectrum for the establishment of fixed, low-power (50 watts maximum) stations. Repeater operation would be prohibited. While no particular modes were requested, it is the intent of the League to develop a band plan that would encourage the establishment of high-speed packet operation on these proposed new frequencies. More information on this petition will be found in next month's regular column.

HF's Loss is VHF's Gain From Sun's Disturbances

While operators of the HF spectrum found their communications wasted, operators of VHF and above found some excellent openings. Aurora-induced sporadic-E was found on 6 meters in the mid to upper latitudes on days surrounding the ARRL VHF Contest. During the contest many station operators reported pile-ups! Aurora and tropospheric scatter propagation created openings on 2 meters and as high as 1296 MHz (reported so far). More on the sun's effects on VHF communication will be found in next month's column. A full report of how the sun has affected the whole spectrum is planned for George Jacob's November "Propagation" column.

cal charm with communications on that band.

Finally, another fascination I observed was the 2 meter operators who would be amazed by Los Angeles and sometimes Santa Barbara stations being heard in San Diego very well on certain nights during particular times of the year. I would marvel to myself at my feelings of indifference toward such trivial forms of communications. Until now.

Indeed, there *is* something almost mystical about communications on those higher frequencies. There is something unique about being able to capture snatches of communications with distant stations on frequencies that normally are not conducive to long-distance propagation. I guess, for me, it is a form of momentairly cheating nature to lure that bit of a signal down my antenna and coax and into my receiver long enough to get the vital information and to reverse the process by sending my signal back into that finicky atmosphere with the hopes that the station on the other end would be equally fortuitous in being able to receive it and transcribe the necessary information to have a complete QSO.

Speaking of that finicky atmosphere, this month celebrates the annual return of the Perseids Meteors. Between August 10 and 14 (principally between August 12 and 13) the earth will pass through a belt of rocks called the Perseids Meteors. You have never had a QSO quite like one by way of a meteor shower. For a partial second to a few seconds, the atmosphere is ignited by the fire created by the meteor falling through it. This ignition is really ionization of the E-layer of the atmosphere that is sufficient enough to reflect signals back to earth on VHF frequencies. The 6 meter band is the largest recipient of the ionized atmosphere, with ionization lasting as long as 30 seconds or more. On 2 meters the ionization may last up to a few seconds. On 70 centimeters the ionization may last only a second. The most popular band for meteor-shower QSOs is 2 meters.

Most QSOs during the showers are made by prearranged schedules. Skeds are set up, sometimes months in advance, by way of the mail or the 2 meter net that is held informally on 3818 kHz during the evenings of the peak activity. There are computer programs available that will predict what path is the most favorable during certain times of the days of the showers. However, generally, between late hours at night and early hours in the morning, the path is southeast to northwest. During the later hours of early morning the path is northeast to southwest. There appears to be an enhanced period of ionization during local sunrise when more rocks appear to be falling. On the peak day of August 12 conditions are suitable for communications as late as 11 AM local time.

Due to the shortness of the bursts of ionization a protocol is set up for the QSO. Each station transmits for a 15 second period beginning at the top of a minute. Typically, the westward station transmits during the first and third 15 seconds of the minute. The eastward station transmits during the second and fourth 15 seconds.

The first station begins by calling the station to be QSOed and signing his callsign (i.e., "K5XYZ this is N6CL"). The other station responds by transmitting the first station's callsign followed by his callsign in the same manner (i.e., "N6CL this is K5XYZ"). Assuming the first station has heard the second station's complete exchange—that is, both callsigns in succession—the first station begins transmitting a signal report or that station's grid square. The signal report is the letter "S" and a number, the number indicative of the length of the burst. A typical report would be "K5XYZ this is N6CL, S-2." Assuming the second station has heard the complete exchange, the second station begins transmitting "Roger" followed by a signal report or that station's grid square (i.e., "Roger, S-2"). If the first station has heard the report, that station starts transmitting the word "Roger." If the second station has heard the "Roger," the QSO is considered complete. Oftentimes if a big burst is in pro-

gress, both stations will transmit "73" to each other.

All transmissions take place during the 15 second time frame. Sometimes, however, if one station has heard an exceptional burst from the other, that station, during the beginning of his 15 seconds, will break protocol by saying "Break" and briefly standing by for the other station. When protocol is broken, a QSO may be completed during that 15 second window.

A sked is usually set up to last for a half hour. If the stations do not make contact during that half hour, they may elect to continue for as long as each desires. The honor system developed by long-time users of this form of communications dictates that if HF or telephone communications are required after the half hour to reset the sked, then the sequence of the QSO is completely started over, no matter how close the QSO was to completion. Also, until each sequence is completed exactly as described above, the stations cannot move on to the next sequence. Again, the honor system dictates that you play by the rules (if only for your own peace of mind).

What kind of equipment does one need? Your columnist has worked meteor scatter with 150 watts and a 15-element beam up 30 feet in the air.

Sam Whitley, K5SW, reports that for the beginner, it is best to concentrate on making skeds within a range between 800 and 1000 miles. He states that distances under 600 miles can be accomplished some other time during tropospheric scatter and that distances over 1200 miles require more elaborately equipped stations than the average beginner may care to set up. Sam also reports that on August 12 (that annual peak day), he will often call "CQ Meteor" on the calling frequency (144.200 MHz). Invariably, he states that he will work eight to ten stations randomly. One other hint he passes along is for each station to offset its beam heading by six to ten degrees from the true heading between each station. He has found that although the signals are a bit weaker, the bursts last longer.

Assuming that most of you will receive this copy of *CQ* prior to the end of July, I want to mention the 25th annual Central States VHF Conference. This year it will be held at the Sheridan Inn in Cedar Rapids, Iowa from Friday, July 26 through Sunday, July 28. This is an ARRL-sanctioned event. Therefore, as always, proceedings will be published by the League and will be available at the door as part of your registration package. Additionally, League officials will be there to perform your VUCC application checking. Many seminars will be held and a swap area will be set up. Commercial and amateur antennas and preamps will be measured in an informal measuring contest. It is a time to see old friends and meet some of the people behind the mike or key whom you have worked. Invariably, it is always a place to brag about that special contact or cry about that almost complete QSO. You can expect to have a lot of fun with a great bunch of like-minded people.

As John Dorr, K1AR, stated in his column last month, the VHF WPX Contest for this year was cancelled. Next year, however, it will be back, bigger than ever. Tentatively, the dates will be around the weekend of July 11. Yours truly will be handling the contest results. I will have more details later, but I will say that I would like your logs submitted in an ASCII format on 5¼ inch, 360K IBM formatted disks as well as a hard copy. If a hard copy is all you have, that will do just fine.

Current contests: ARRL UHF and 10 GHz contests are scheduled for this month. See the "Contest Calendar" column for the particulars, and send to the ARRL (with appropriate SASEs) for logs and entry forms.

Finally, the end of this first column is reserved for the end of the bottom two megaHertz of 220. On August 28, at 0000 UTC, U.S. amateurs must forever vacate that portion of the band. The FCC has stated that it will not be favorably inclined to issue special temporary authority actions for this spectrum to amateurs after that date. Hopefully, by the time you read this a new band plan will be put into effect which will accommodate all interests in all parts of the country.

If you have an interest in protecting future infringements of our spectrum, then you should get behind HR-73. This bill was introduced by U.S. Congressman Jim Cooper (D-TN). It would, in effect, force the FCC to compensate the Amateur Radio Service for any encroachment by granting the Service comparable frequency spectrum. If you support the bill, then you should contact your Congressman and urge him or her to sign on as a co-sponsor.

I am looking forward to hearing from you. I have an easy address to remember: P.O. Box 73, Oklahoma City, OK 73101. I also have an easy phone number to remember: 405-528-N6CL (6625). If you can't remember the prefix, then think of "**J**oe's **A**lways **T**ransmitting N6CL." Then equate the initials J.A T. with the corresponding numbers on the telephone dial and you will see "528." I expect soon to write about you and your activities in this world-renowned magazine.

73, Joe, N6CL

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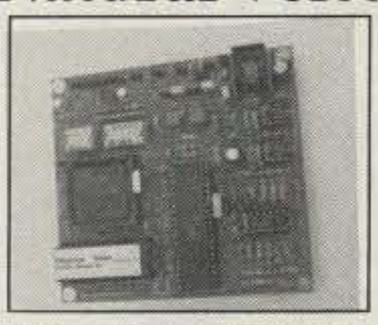

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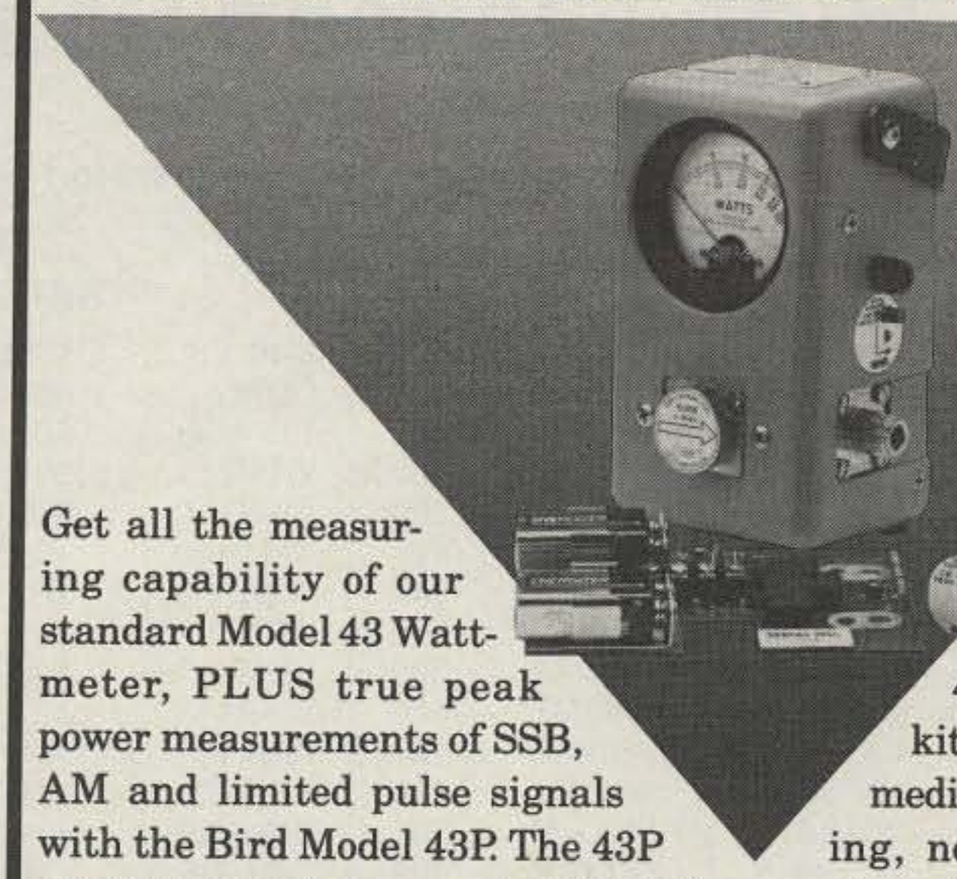

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RG-8X	95% Braid, premium quality	16¢
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CQ-RG-8XMM	95%, Solid Dielectric, " "	27¢
CQ-RG-213	Certified-Quality, 95%+++ braid	40¢
9086	International (like 9913, but better)	46¢
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R-4 Rotator	8 conductor (2x14, 6x18) up to 300' run	48¢
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#14 Stranded	Copper-clad (7x22) special antenna wire	9¢
#14 VariFlex	19 strand CuClad, flexible, tight strand	11¢
#13 Insulated	19 strand CuClad, jacket, flexible	15¢
450 Ohm	#18, Cu-Clad, poly, Windows	13¢
450 Ohm	New! #16 19 str, CuClad, Poly, Windows	Call
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VE3EJ	407,560	817
PA3DQW*	339,305	695
KP2A	333,700	589
WW2Y*	311,916	856
K1ZM	295,400	882
UZ2FWA*	273,103	590
AA1K	270,156	678
IT9ZGY	268,884	575
DK8ZB	256,487	556
W2GD*	251,844	878
K5NA	247,510	781
OK5TOP*	247,324	623
AB4RU*	238,560	790
OH0AM*	238,089	789
EA8RCT	235,368	330
W3BGN	229,047	668
WB9Z*	225,711	842
G0NAA	222,975	478
K3LR*	221,352	798
I4EAT	221,000	583
9L1US	207,685	287
KY1H*	200,724	726
YT2E*	195,968	531
HA6PX	194,820	604
VE3DO	189,852	468
GM3YOR	188,886	442
KN8Z	188,848	663
K9UWA	180,342	665
K3WW*	175,354	651
OL1BSP	172,445	485
Y21CW*	171,810	447
K4VX/0*	171,615	736
PA3BAS*	167,808	506
N8EA*	166,378	684
K3KG*	166,074	649
YV1OB	160,965	258
KD9SV*	159,080	642
AA4S	157,210	686
K5ZD	156,570	506
VE3KP	156,110	462
NX1G*	155,232	532
WA2SRQ	153,012	609
OK1KSO*	151,668	424
W0CD*	151,226	644
WD8LLD	150,612	532
UL8AWL	149,240	390
W3TS	148,687	626
PJ9JT	146,400	267
OK3KEE*	143,390	420
VE1ZZ	142,320	241
W3UM	141,017	469
N6DX*	137,781	556
DJ4SO	137,216	362
OK3KAP*	134,550	411
N6AR	133,578	457
K3TUP*	131,930	623
W0ZV	128,770	614
PA3EBT*	127,197	352
F6BEE	127,010	298
N2MM	122,924	577
KY0A*	114,537	590
SV1RP/SV2	114,317	435
Y22KK	113,940	423
DK2OY	112,867	356
DJ6TK	112,240	354
N6LL	109,224	477
VE3PN	108,636	325
OK3CTM	107,940	360
K1IK	107,091	487
NQ4I	107,068	549
WF2W	106,200	513
KE2PF*	101,175	421
YT3T	101,035	352
K3BSY	100,714	444
HI160M	100,452	285

SSB

Call	Score	QSOs
CG3EJ	368,060	980
UL7ACI	359,043	658
WB9Z*	224,814	1021
AA4GA*	205,020	916
KM4HH*	172,308	798
WW2Y	152,800	758
YT2R	149,156	571
KD9SV*	130,464	770
WY2X*	121,545	681
KC8EK	119,795	800
WB4ZNH	119,590	736
KD0FW*	119,126	783
WD9INF*	116,714	758
KE5FI	112,320	671
KN8Z*	102,432	680
AA4S	100,096	682
OK5TOP*	97,888	422
K4YT	95,225	649
W3TS	88,010	584
K4LLQ	87,296	603
KY1H*	84,612	542
G0KPW*	83,106	291
VE3PN	80,121	328
OK3TKW	77,070	380
AA4MM	76,212	442
NK7U*	76,006	538
N6DX	75,584	503
NE3F	74,406	502
A92BE	73,794	202
K2BU	71,781	312
KN2T	70,915	475
OY9JD	68,736	267
OK3PA	68,496	283
VE3MSN	67,620	303
W0ACT*	66,110	553
WF2W	65,640	478
YV1CP	64,925	139
WD4KXB	64,782	474
VE2ZP	62,376	282
OK3CQR	62,350	236
W7AWA	60,420	404
KD0OZ	60,200	473
KJ0B	60,003	450
KF4HK	59,220	477
CU2CE	59,218	140
K1IK	59,160	440
VE6JY	59,042	236
LZ1KWZ	58,860	314
N4IN	58,857	342
WB8J	58,621	419
CT3M	57,918	121
K8YSE	57,826	428
KA7AUH*	57,114	419
VE3NXA	56,717	271
HE7CXZ*	55,083	243
W3BGN	55,080	339
K3WW*	53,514	440
K4PI	51,480	302
N5NMX*	51,179	370
NX9T	50,400	375
I8UA	50,384	216
WA1UJU	49,396	433
KB2BF	49,305	375
K4JRB	48,000	317
NX3A	47,594	412
I3QJZ*	47,128	216
K8SVT	46,970	383
HK4BHA*	46,599	105
N9ITX	46,332	390
VE7ERY	46,107	208
VE7KD	45,308	208
KC4MJ*	45,045	365
XE1VIC	45,033	176
YU3QI	44,646	208
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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Why Fool Around With MININEC When You Can Have The Real Thing?

I remember building my first 3-element Yagi beam for 20 meters. It was in 1948. What a monster! A large, braced wood frame and 1½ inch diameter elements. It weighed a ton (almost)!

The crucial problem was to determine element length and spacing. No reliable information was at hand. I finally took some pre-war dimensions for a 10 meter beam and multiplied them by two. The monster worked once I struggled to get it up in the air, but I was always filled with nagging doubts that it wasn't working as well as it should.

A lot has changed since those perplexing days. Field-strength observations and a growing body of literature have taken a lot of the black magic out of Yagi design. Moreover, the introduction of the home computer into amateur radio has provided amateur use of complex computer-aided design programs that heretofore were only available on a large, mainframe computer. These programs permitted the user to evaluate his own beam. Front-to-back ratio, forward gain, and input impedance could be determined for a specific design in a few moments. That saved a lot of time otherwise spent going up and down the tower or scrambling through the bushes with a field-strength meter!

MININEC on the Scene

A few years ago an antenna evaluation program called MININEC became available for use on an IBM-type home computer. This is a stripped-down version of a more complex NEC program which is widely used for many engineering applications. The full NEC capability is not required for amateur antennas, and something more user-friendly was needed.

MININEC, designed to run on a home computer, seemed to be the answer. It was developed at the Naval Ocean Systems Center in San Diego, California by A. Julian, J. C. Logan (N6BRF), and J. W. Rockway in 1982 and updated in 1985. It has less capacity than NEC and fewer of the advanced features. However, it proved to be well suited for analysis of amateur antennas. Best of all, some versions are ready to go on a floppy disk and have keyboard input, files, text editors, graphics, and other goodies to warm the heart of the antenna enthusiast.

48 Campbell Lane, Menlo Park, CA 94025

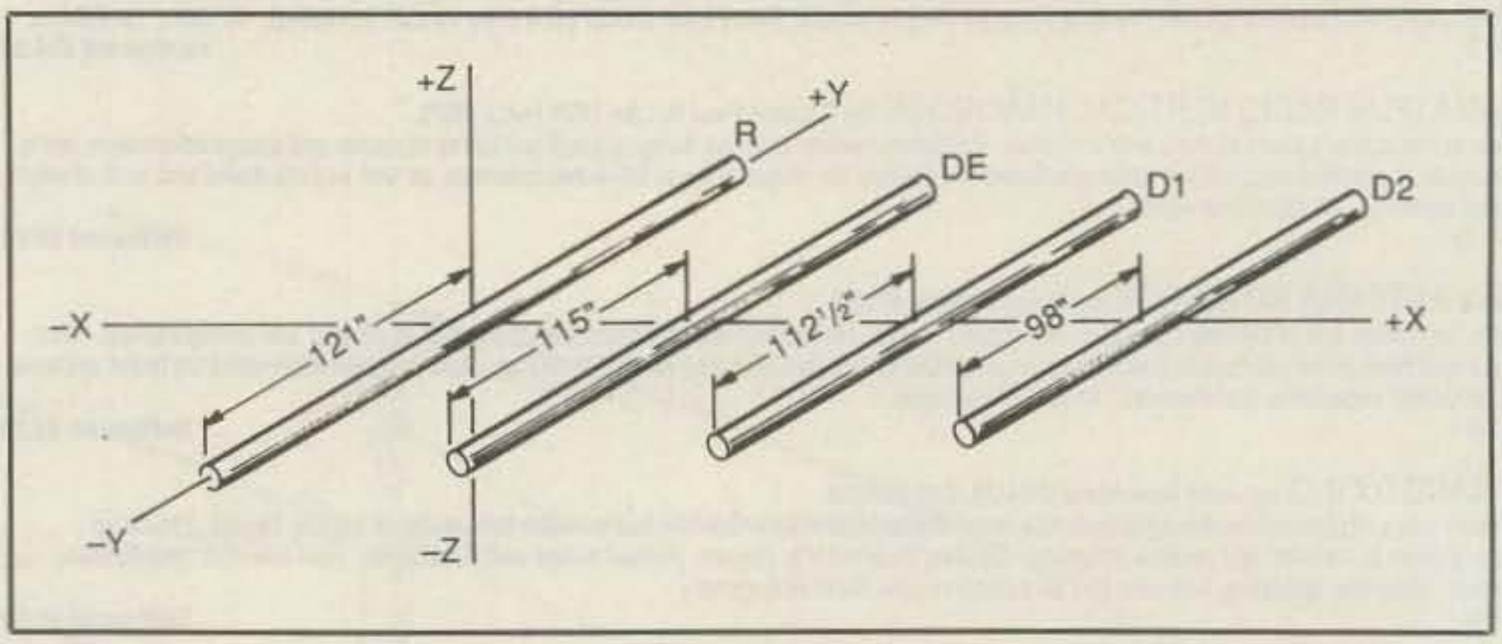


Fig. 1– The W6SAI 4-element 24 MHz beam in X-Y-Z coordinates. Element spacings are measured from the reflector, and half-element lengths are used.

As helpful as MININEC is, it is full of traps for the unwary.[1] An unexpected frequency offset in the program soon became obvious. MININEC-designed beams often measured lower in frequency than predicted by the program. Large-diameter elements also seemed to confuse MININEC. This gave rise to the thought that stripping down NEC to produce the user-friendly MININEC may have added built-in problems unknown to the majority of users. The offset could be corrected with a hacksaw—not a very scientific way of solving the problem!

NEC for Yagis

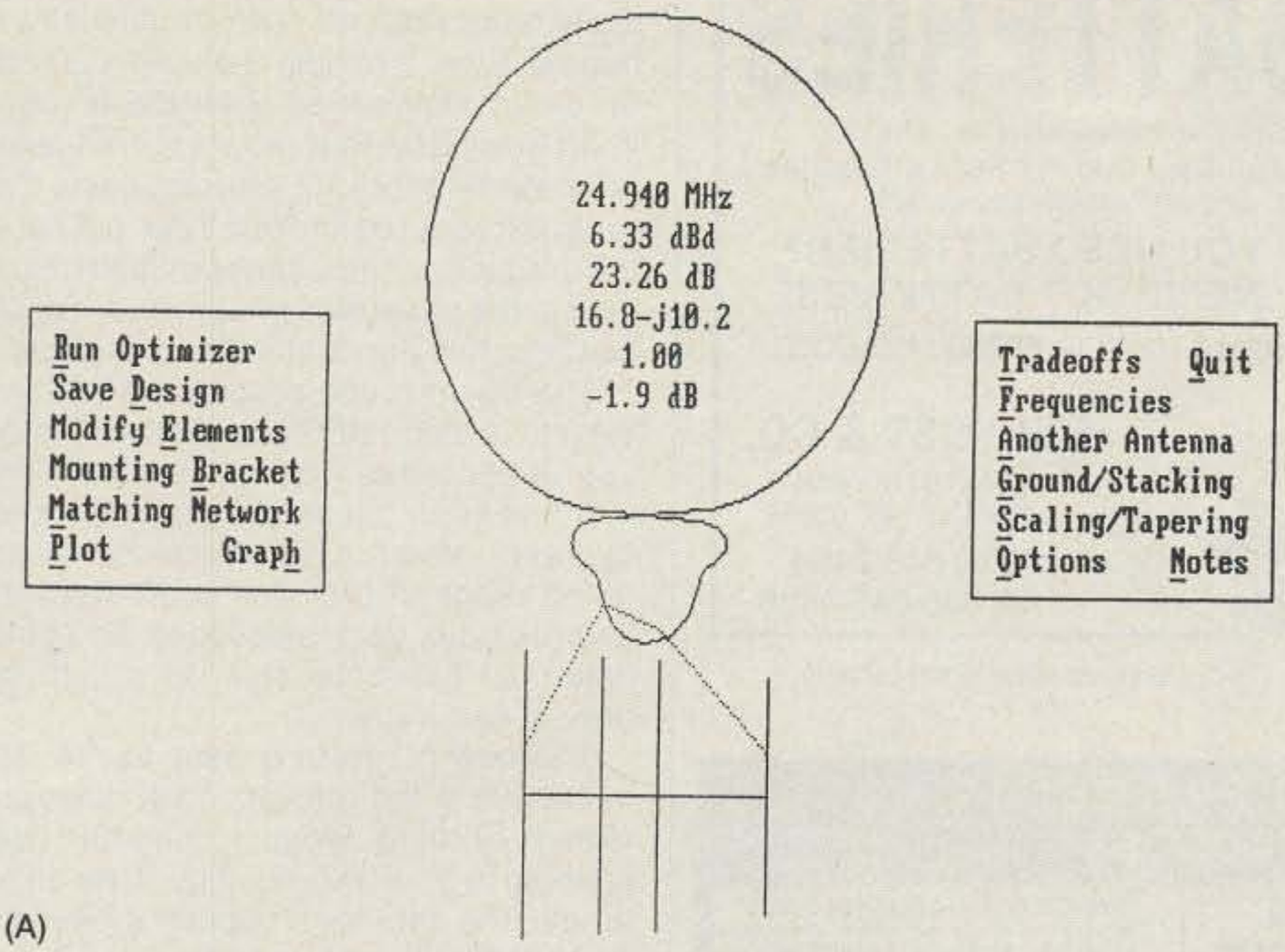
Back to the old drawing board! NEC is the program professionals use, and it is widely regarded as the reference program for antenna analysis. It is a great program if you have an IBM, UNIVAC, CDC, or Cray mainframe computer! You also have a complicated input file. And the output file tells you more than you want to know!

Recently attempts were made to adapt NEC for use on a home computer, to make it more user-friendly and to compensate for the seeming inability of NEC to deal accurately with tapered elements.[2] One solution to these problems was recently developed by Brian Beezley, K6STI. He derived a Yagi Optimization program calibrated to NEC for high accuracy, which included a program for tapered elements based upon a modification of the classic W2PV tapering method.[3] The resulting program takes advantage of the attributes of NEC and MININEC while avoiding the shortcomings of both programs. As far as I know, it is the most accurate tool for Yagi design presently available.

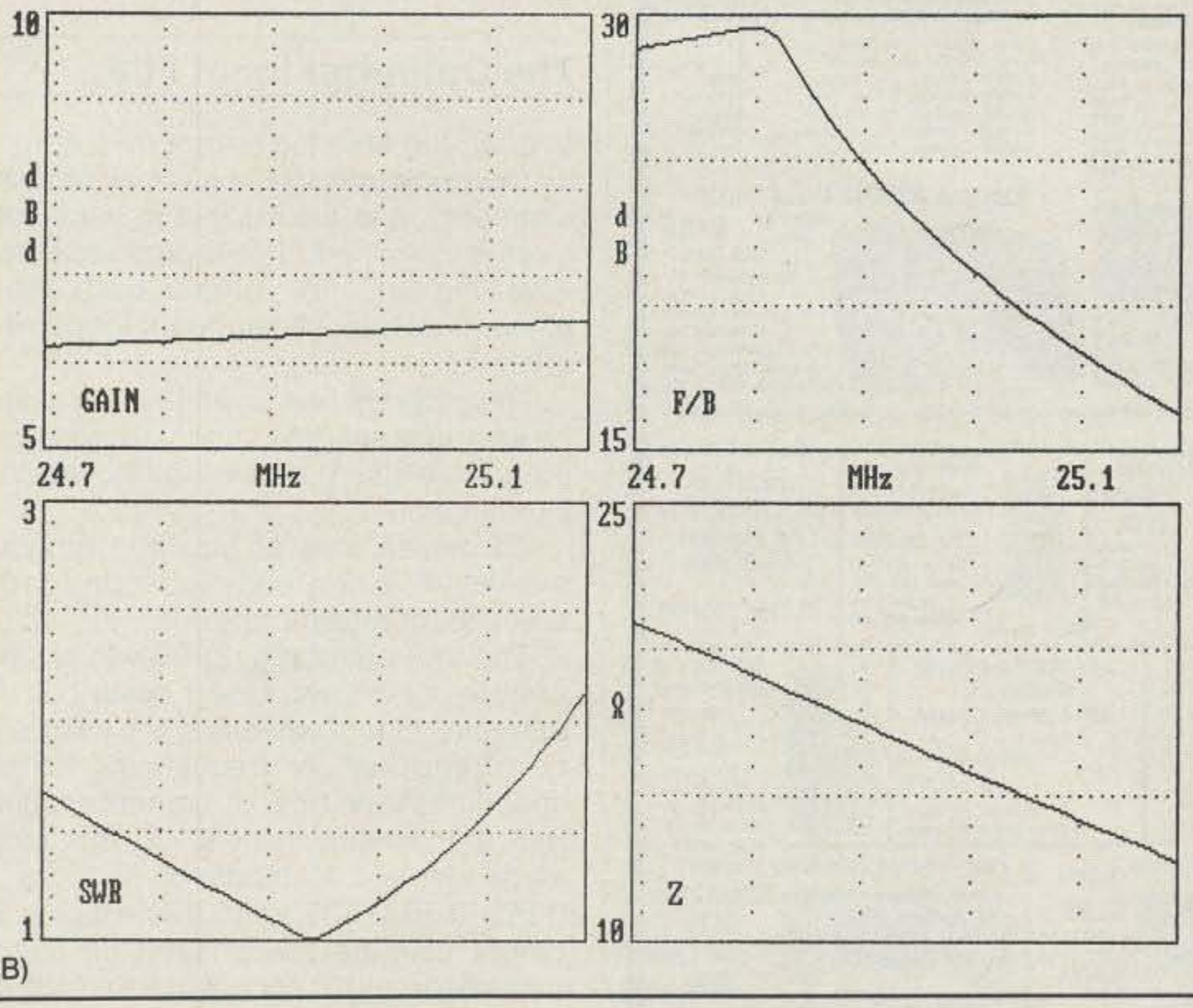
In brief, the user enters a set of Yagi dimensions. The computer provides basic information about the array (gain, front-

(1)	W6SAI Beam				
(2)	24.94 MHz				
(3)	4 elements, inches				
(4)		.875	.75	.625	.5
(5)	0	25	45	45	6
(6)	67.625	25	45	45	
(7)	115	25	45	42.5	
(8)	210	25	29	44	

Fig. 2– The input file for the W6SAI beam. First vertical column lists element spacing, measured from reflector. Line 4 lists tubing diameters of element sections. Note that the reflector has a 6 inch tip, ½ inch in diameter. (Numbers shown to the left of the box are for reference only (see text) and do not appear.



(A)



(B)

Fig. 3–(A) Initial look at the W6SAI beam. Gain is 6.33 dBd; front-to-back is 23.26 dB; input impedance is about 16.8 ohms, reactive. SWR when matched is 1.00. Gain, referenced to the Figure of Merit, is –1.9 dB. Sketch of beam is shown below the polar plot. Currents in each element are indicated by dotted line seen at top of sketch. Note that currents in the driven element and first director are nearly equal. User-choices are summarized in boxes at sides of polar plot. (B) Graphs of beam parameters provided by YO 4.0. Gain is nearly constant across the band, but maximum front-to-back ratio occurs outside low end of band.

to-back, etc.). The user then has the option of having the computer optimize the array according to the parameters selected by the user. Go for the maximum gain? Go for the best front-to-back? Go for suitable input impedance? Go for maximum bandwidth? Or perhaps some combination of these? How about stacking two arrays? The possibilities are endless.

The YO 4.0 Yagi Optimizer

A Yagi optimization program has been available for some time now. It is a derivative of MININEC and performs well, ex-

cept for a frequency offset that is especially annoying on VHF multi-element beams. Even a simple 3-element 20 meter beam designed by MININEC resulted in an array having a resonant frequency of some tens of kHz off-frequency. The program could optimize a Yagi, but not at the frequency the user specified! However, if the offset was recognized, it could be taken into account in the final design.

The optimization program is an ideal vehicle to blend NEC and MININEC into a user-friendly tool. The new program (YO 4.0) has been checked against frequency-swept data run on a professional antenna range. It provides accurate front-to-back ratio, gain, side lobes, and other electrical characteristics to a high degree of accuracy.

The new program is easy to run. The user keys in the relevant Yagi data, providing element length, diameter, and spacing in an X-Y-Z plot (fig. 1). As an example, the data for a popular 4-element, 24 MHz Yagi is shown in fig. 2.

The Optimizer Input File

In brief, the antenna structure is divided by the computer into a number of small segments, and the current in each segment is examined. Unless directed otherwise, the Optimizer breaks each beam element up into 24 segments for current analysis.

The program user specified the antenna environment (free space, real ground, etc.). Free space is used for this sample examination.

To get an idea of how the program evolves, let's be greedy and redesign the antenna for maximum gain!

The input data (fig. 2) follows a strict pattern, as follows. Line 1 describes the antenna. Line 2 specifies the examination frequency, or frequencies. Line 3 specifies the number of element sections and the dimension units. In this case, each element is made of sections of 0.875, 0.75, 0.625, and 0.5 inch tubing. Element diameters are listed on line 4. Lines 5 through 8 are devoted to element section lengths. Only half-lengths are entered, starting with the reflector, followed by the driven element and the directors.

The information is placed in the computer, starting with the reflector element. All spacings are measured from the reflector. The driven element (line 6), for example, is 67.625 inches ahead of the reflector. Director 1 is 115 inches ahead of the reflector, and director 2 is 210 inches ahead of the reflector.

Everything is ready to go! The program is entered as W6SAI.YAG, and the design is brought up on the screen (fig. 3[A] and [B]). The user now has many options at hand. He can optimize gain, front-to-back ratio, input impedance, or bandwidth. These options are selected in the "Trade-

off'' mode. The temptation is to go for maximum gain. Let's try that. The Optimizer runs quickly. My computer has a 286 chip and a microprocessor. The Optimizer runs through 1623 combinations of element length and spacing in less than 2 minutes and comes up with the design of fig. 4. Alas, a maximum gain Yagi results in a large backlobe (poor front-to-back ratio), low input impedance, small SWR bandwidth, and grotesque element spacings! It is better to be less greedy and settle for a better combination of these parameters.

A good place to start is to apportion gain, input impedance, and front-to-back ratio equally. This trade-off is the default value and usually results in a reasonable, balanced Yagi design. The percentages can be varied according to the importance you place on each design parameter. The values themselves are not important. It is their effect that counts.

As it happens, this trade-off is very close to the original Yagi design. The computer results agree with the original input data. So let's try something else.

How about going for maximum front-to-back ratio? No sooner said than done. After a few moments the computer shows a new design. Maximum gain at the design frequency has risen 0.12 dB, front-to-back ratio has gone from about 23 dB to about 38 dB, and the SWR curve remains virtually unchanged. If it is desired to change the beam to the new design, the Optimizer will happily provide a new set of dimensions for the antenna.

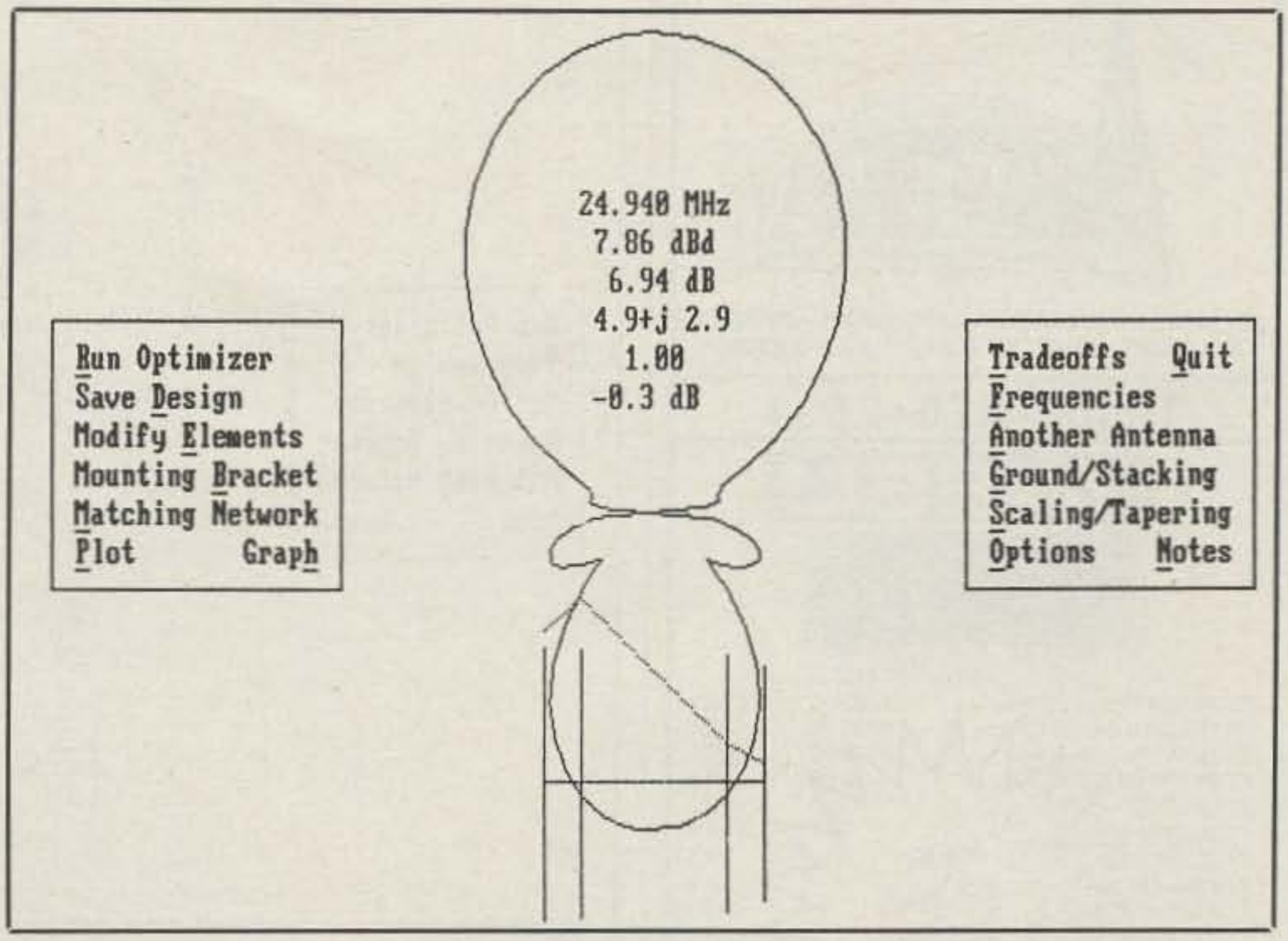


Fig. 4– Maximum gain Yagi provides 7.86 dB (only 0.3 dB below maximum Figure of Merit gain). Front-to-back is 6.94 dB. Input impedance is 4.9 ohms, reactive. Note in current plot that directors have very small currents.

The new beam parameters are shown in fig. 5(A) and (B). Note that gain is marginally better across the band. There is a big improvement in the front-to-back ratio curve, the old design having a maximum falling outside the low-frequency end of the band. While the old and new input im-

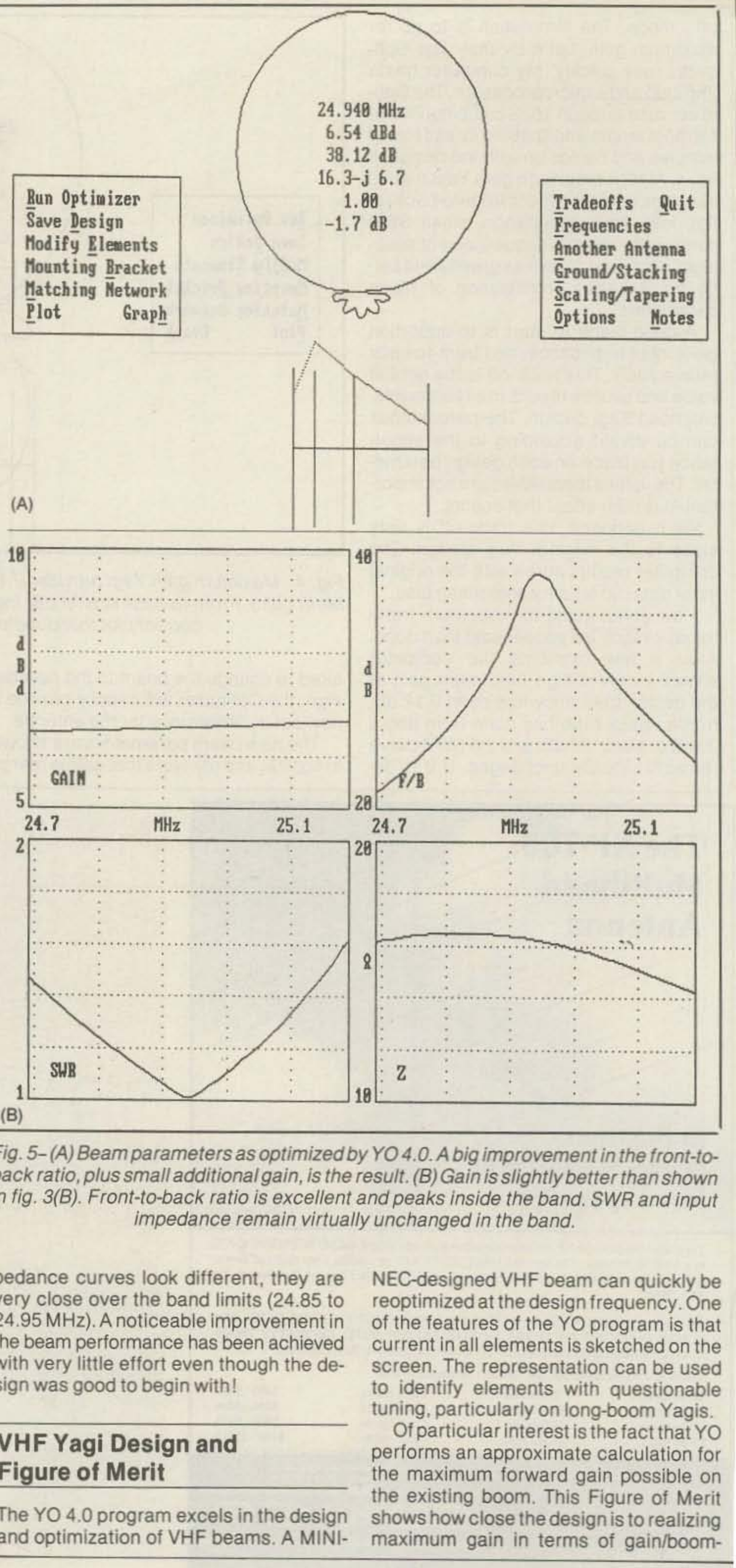


Fig. 5–(A) Beam parameters as optimized by YO 4.0. A big improvement in the front-to-back ratio, plus small additional gain, is the result. (B) Gain is slightly better than shown in fig. 3(B). Front-to-back ratio is excellent and peaks inside the band. SWR and input impedance remain virtually unchanged in the band.

pedance curves look different, they are very close over the band limits (24.85 to 24.95 MHz). A noticeable improvement in the beam performance has been achieved with very little effort even though the design was good to begin with!

VHF Yagi Design and Figure of Merit

The YO 4.0 program excels in the design and optimization of VHF beams. A MINI-NEC-designed VHF beam can quickly be reoptimized at the design frequency. One of the features of the YO program is that current in all elements is sketched on the screen. The representation can be used to identify elements with questionable tuning, particularly on long-boom Yagis.

Of particular interest is the fact that YO performs an approximate calculation for the maximum forward gain possible on the existing boom. This Figure of Merit shows how close the design is to realizing maximum gain in terms of gain/boom-

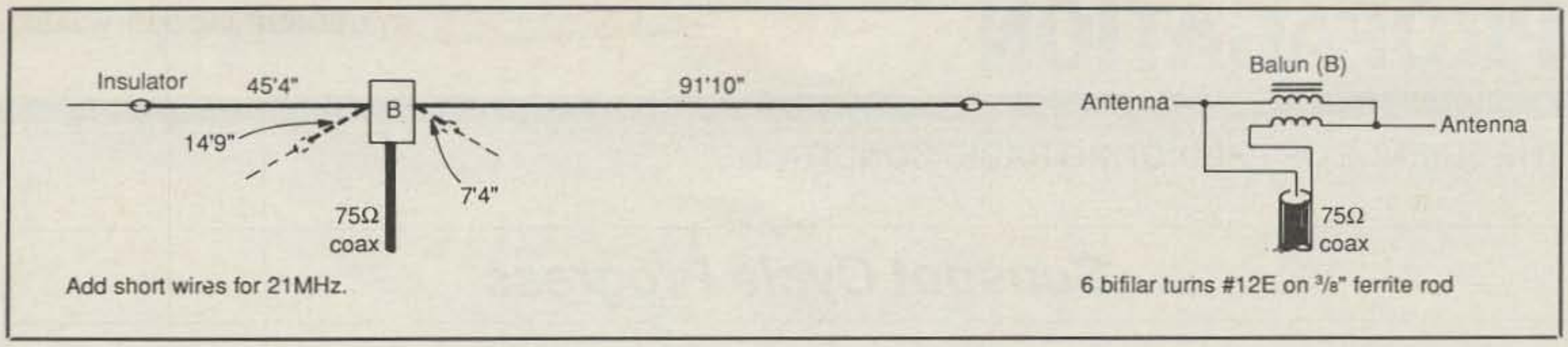


Fig. 6– The GM3MXN version of the DJ2KY double-windom dipole. A simple 4-to-1 balun wound on a ferrite rod is shown. Extra wires provide 21 MHz operation.

length efficiency.

More information? The Optimizer comes with a 36-page manual on disk that will introduce you to this fascinating program.

No doubt more and better Yagi design programs will appear in the future, but today's Yagi Optimizer is ready to perform and a big step in the right direction.

The Off-Center Fed Multi-band Antenna

Amateurs continue to hunt for the ideal multi-band antenna. Compact and showing good gain, it will have a low SWR on all HF amateur bands. Such a wonderful antenna doesn't exist, but some designs come close to achieving these attributes. One of the designs briefly mentioned[4] is a version of the off-center fed antenna. Variations on this 1929 design first publicized by W8GZ (Windom) seem to offer the greatest room for experimentation. An interesting mutation was described by DJ2KY in 1971. In 1990 GM3MXN modified the DJ2KY antenna to use coaxial cable to match modern transceivers without the use of an antenna tuning unit. The solution was to place a 4-to-1 balun at the antenna and use 75 ohm coax for the transmission line (RG-59/U). It was found that the 75 ohm line worked well, as the majority of transceivers are designed for either 50 or 75 ohm feedline impedance. If the purist wishes to use a 50 ohm line, a 6-to-1 balun is required at the antenna.

In either case, the antenna design (fig. 6) works with low SWR on the 80, 40, 20, and 10 meter bands. If operation is desired on 15 meters, two extra wires must be added, as shown. Complete information on this interesting antenna is given by Pat Hawker, G3VA, in the December 1990 issue of *Radio Communication*, a publication of the Radio Society of Great Britain.

The DX-100 Lives Again!

Old timers fondly remember the Heathkit DX-100. What a beautiful 100 watt AM-CW transmitter that little rig was! Well, the DX-100 lives again! Recent ads in broadcast journals have introduced the Harris Allied International DX-100 for medium-wave broadcast service. Interested? The new DX-100 is a solid-state 100 kilowatt job utilizing FET output amplifiers. It is capable of 135% positive peak modulation.

While this may be of little interest to most amateurs, be assured that Harris Allied has solid-state transmitters at lower power levels more suited to amateur radio: 10, 25, and 50 kilowatts. As the Society for Preservation of AM (SPAM) says, AM is here to stay!

Here's Looking at You, Kid

Letters are still coming in concerning my Dead Band Quiz about the movie *Casablanca*. Thanks to Joel, KC4SZJ; Jim, WA8FGR; and Charles, WB6IYM, who pointed out that my quotation was not complete! Jim, I'll meet you, Rick, and Louie in Brazzaville!

On another subject, Phil Elrod, K4COF, points out that 2 inch wide aluminum-foil tape used to seal ducts makes a good material for making ground planes in the attic. He placed 4 × 8 sheets of foil-covered sheathing on the underside of the rafters and connected them together with the foil tape. He ended up with an area of about 1200 square feet covered with foil which he used as a ground plane. He feels that the adhesive on the tape probably isn't a good conductor, but the distributed capacity to the foil is large. He uses a Butternut HF6V vertical on the peak of the roof and connected the antenna base to the foil. This is a great improvement over the previous ground mount, which had 40 radials from 30 to 80 feet long. Phil has plenty of DX on 75 meters and also 20 meters. I think this suggestion is worth a try if you are able to mount your vertical on the roof of the house.

73, Bill, W6SAI

Footnotes

1. Orr, "Yagi Optimization and Observations on Frequency Offset and Element Taper Problems," *Communications Quarterly*, Summer 1991.

2. Naval Postgraduate School (Monterey, CA) Thesis, "An Experimental and Computer Modeling Study of Stepped Radius Monopole Antennas," Jae Yong Yim, December 1988.

3. Lawson, J., "Yagi Antenna Design," Chapter 7, American Radio Relay League.

4. Belrose and Boulaine, "Offcenter-fed Dipole Revisited," *QST*, August 1990, p. 28.

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Progress

There is continuing evidence that the sunspot cycle has entered a plateau stage and is stalled near the 140 level!

The Royal Observatory of Belgium reports a mean sunspot number of 140 for April 1991. There was considerable variation reported day to day during April, with a high of 227 recorded on April 12 and 15 and a low of 33 observed on April 24.

The mean value for April results in a 12-month running smoothed sunspot number of 142 centered on October 1990. This is exactly the same as the September level, and the cycle has remained at the 141/142 level for four months in a row. There is no way of telling how long Cycle 22 will remain at this level, but this is a good turn for shortwave propagation. The level at which the cycle seems to have stalled is extremely high, and this should prolong the period of exceptionally good conditions that have been observed for the past several years. A smoothed sunspot number of approximately 125 is predicted for August 1991.

A corresponding increase was reported in the 10.7 cm solar flux level. The Algonquin Radio Observatory, Ottawa, Canada reports a monthly mean of 201 for April 1991. This results in a smoothed value of 200 centered on October 1990, a slight increase over the previous month.

A bit of sunspot cycle trivia: The final daily sunspot observations for 1990 have been released by the Royal Observatory of Belgium, the world's official keeper of such records. The highest daily value observed during 1990 was 295 on August 20th; the lowest value was 57, which was recorded on June 21st and July 18th. The highest daily count on record occurred December 24–25, 1957. On each of these days the sunspot number totaled 335!

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1991

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2-3, 9, 23, 26, 29	A	A	B	C
High Normal: 1, 8, 10, 12, 14, 22, 24-25	A	B	C	C-D
Low Normal: 4, 6-7, 11, 13, 18-21, 28	B	C	D	D-E
Below Normal: 5, 15, 17, 27, 31	C	C-D	D-E	E
Disturbed: 16, 30	C-D	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

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 day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on August 1, excellent (A) on the 2nd and 3rd, good-to-fair (B-C) on the 4th, fair-to-poor (C-D) on the 5th, etc.**

August Propagation

Late August and early September are days when propagation forecasters usually like to hide! This is a most difficult period for which to make accurate predictions because conditions can change drastically from day to day. On many days typical summertime conditions on the HF bands will continue much as they were during June and July. On other days they will sound typically fall-like, with somewhat higher daytime frequencies and somewhat lower nighttime usable frequencies. Add to this *equinoctial* conditions, which can begin as early as late August and which often result in optimum openings between the northern and southern hemispheres on the one hand, but periods of severe radio storminess on the other.

Since this is period of transition, this month's DX Propagation Charts cover only the one-month period from August 15th through September 15th, rather than the usual two-month period. Short-Skip Charts for use during this period appeared in last month's column.

During the daylight hours good DX conditions should be possible on five bands: *10*, *12*, *15*, *17*, and *20* meters. Of the five, conditions should be best on *15* meters, with peak conditions expected to most areas of the world during the afternoon hours. While the *17* and *20* meter bands should be open for DX throughout the daylight hours, peak signals are expected during an approximate two hour window immediately following sunrise and again during the late afternoon. Some fairly good DX openings should also be possible on *10* and *12* meters during the hours of daylight, particularly along an arc extending across central Africa, Latin America, and into the far Pacific area. Peak conditions should occur during the afternoon hours, but an increasing number of earlier openings should be possible by early September.

Between sundown and sunrise *20* meters is expected to be the best DX band. Openings should be possible to almost all areas of the world, often with exceptionally strong signal levels. Until midnight good DX conditions should also be found on *15* and *17* meters for openings toward Latin America, the far Pacific, and into Asia. Fairly good nighttime DX conditions are also expected on *30*, *40*, and *80* meters despite high static levels at times. Openings should be possible before midnight along an arc extending from northern Europe, through Africa, and into Latin America, the far Pacific, and Asia after midnight.

By late August it should be possible to work some DX on *160* meters during the hours of darkness. Conditions on this band, as well as on *40* and *80* meters, will tend to peak just as the sun begins to *rise* on the *light*, or easternmost, terminal of a path.

For *short-skip* openings during August and early September, try *80* meters during the day for distances less than *250* miles, with *40* meters also usable. During the hours of darkness both *80* and *160* meters should provide excellent communications over this distance. For openings between *250* and *750* miles use *30* and *40* meters during the day for distances up to *500* miles, and *20* and *17* meters between *500* and *750* miles. At night *40* and *30* meters should be the best bands for this distance until midnight, with *80* meters optimum from midnight to

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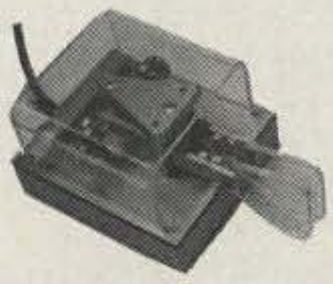

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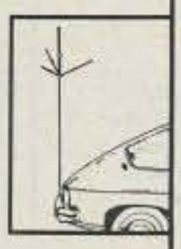

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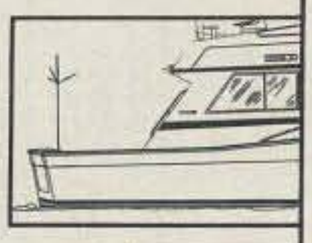

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HOW TO USE THE DX PROPAGATION CHARTS

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.

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. wetc. Appropriate *daylight* time is used, *not* GMT. T 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 c.w., or 1 kw, p.e.p. 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 10dB 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.

August 15 to September 15, 1991 Time Zone: EDT (24-Hour Time) EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-15 (1)	08-10 (1) 10-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	09-15 (1) 15-16 (2) 16-18 (3) 18-23 (4) 23-03 (3) 03-05 (2) 05-07 (3) 07-09 (2)	19-20 (1) 20-21 (2) 21-22 (3) 22-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-03 (1)*
Northern Europe & European USSR	12-15 (1)	08-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	09-14 (1) 14-16 (2) 16-19 (3) 19-20 (2) 20-22 (1) 22-01 (2) 01-06 (1) 06-09 (2)	20-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-03 (1) 21-02 (1)*
Eastern Mediter-ranean & Middle East	12-16 (1)	08-10 (1) 10-13 (2) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	07-09 (2) 09-16 (1) 16-17 (2) 17-20 (3) 20-23 (4) 23-00 (3) 00-02 (2) 02-07 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	12-17 (1) 17-19 (2) 19-20 (1) 11-16 (1)**	08-10 (1) 10-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-04 (3) 04-06 (2) 06-09 (1)	19-21 (1) 21-02 (2) 02-03 (1) 22-01 (1)*
Eastern & Central Africa	16-17 (1) 17-19 (2) 19-20 (1)	09-12 (1) 12-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-00 (3) 00-02 (2) 02-05 (1)	21-01 (1)
Southern Africa	09-11 (1) 11-15 (2) 15-17 (1) 10-15 (1)**	08-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-08 (2) 08-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-00 (1) 00-03 (3) 03-04 (2) 04-06 (1)	21-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	10-12 (1) 20-22 (1)	09-10 (1) 10-12 (2) 12-13 (1) 18-20 (1) 20-22 (2) 22-23 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-02 (1)	06-08 (1) 20-22 (1)
Southeast Asia	18-21 (1)	09-12 (1) 12-16 (2) 16-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-21 (1) 21-23 (2) 23-02 (1)	06-08 (1)
Far East	18-20 (1)	09-11 (2) 16-18 (1) 18-20 (2) 20-22 (1)	17-20 (1) 20-22 (3) 22-00 (2) 00-05 (1) 05-06 (2) 06-08 (3) 08-10 (2) 10-12 (1)	05-08 (1)
South Pacific & New Zealand	09-14 (1) 14-18 (2) 18-20 (3) 20-21 (2) 21-22 (1) 15-18 (1)**	09-10 (1) 10-12 (2) 12-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	14-20 (1) 20-22 (2) 22-01 (3) 01-04 (4) 04-05 (3) 05-06 (2) 06-09 (3) 09-10 (2) 10-12 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	09-10 (1) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	05-08 (2) 08-10 (3) 10-12 (2) 12-17 (1) 17-19 (2) 19-22 (1) 22-01 (2) 01-05 (4)	03-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (2) 19-21 (1) 11-14 (1)** 15-17 (1)**	07-08 (1) 08-09 (2) 09-12 (4) 12-14 (3) 14-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	06-07 (3) 07-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-03 (4) 03-05 (3) 05-06 (2)	19-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 22-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile Argentina & Uruguay	08-10 (1) 10-12 (2) 12-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-01 (2) 01-02 (1)	10-16 (1) 16-18 (2) 18-19 (3) 19-02 (4) 02-04 (3) 04-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 22-00 (1)* 00-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	11-14 (1)** 16-18 (1)** 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	16-19 (1) 19-22 (2) 22-02 (3) 02-05 (2) 05-08 (1) 07-09 (1)	01-05 (1)

Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	10-13 (1)	09-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	08-13 (1) 13-16 (2) 16-17 (3) 17-21 (4) 21-23 (2) 23-01 (1) 04-06 (1) 06-08 (2)	19-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-02 (1)*
Northern & Central Euorpe & European USSR	11-13 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	01-06 (1) 06-09 (2) 09-12 (1) 12-15 (2) 15-18 (3) 18-19 (2) 19-22 (1) 22-01 (2)	19-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)*
Eastern Mediter-ranean & Middle East	11-13 (1) 15-17 (1)	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-16 (1) 16-18 (2) 18-22 (3) 22-00 (2) 00-02 (1)	20-23 (1) 21-22 (1)*
Western Africa	10-14 (1) 14-17 (2) 17-18 (1) 10-15 (1)**	07-10 (1) 10-13 (2) 13-15 (3) 15-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Eastern & Central Africa	14-16 (1) 16-18 (2) 18-19 (1)	10-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1)
Southeast Africa	09-11 (1) 11-13 (2)	08-09 (1) 09-11 (2)	06-08 (2) 08-15 (1)	20-21 (1) 21-23 (2)
Central & South Asia	13-15 (1) 11-13 (1)**	11-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-18 (1)	15-16 (2) 16-19 (3) 19-21 (2) 21-23 (1) 23-03 (2) 03-06 (1)	23-00 (1) 21-00 (1)*
Southeast Asia	09-11 (1) 19-21 (1)	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-23 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 19-22 (2) 22-02 (1)	05-08 (1) 19-21 (1)
Far East	12-14 (1) 17-19 (1)	08-09 (1) 09-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-13 (1) 18-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1)	05-08 (1)
South Pacific & New Zealand	16-20 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	19-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-06 (1) 06-07 (2) 06-09 (3) 09-11 (2) 11-13 (1)	03-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
Australasia	10-12 (1) 12-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 14-18 (1)**	07-11 (1) 11-17 (2) 17-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-02 (1)	07-09 (4) 09-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-02 (4) 02-04 (3) 04-07 (2)	23-00 (1) 00-01 (2) 01-04 (3) 04-06 (4) 06-07 (2) 07-08 (1) 23-01 (1)* 01-05 (2)* 05-06 (3)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1) 11-16 (1)**	07-08 (1) 08-09 (2) 09-12 (4) 12-14 (3) 14-20 (4) 20-22 (3) 22-23 (2) 23-01 (1)	07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-01 (4) 01-03 (3) 03-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-23 (3) 23-02 (4) 02-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile Argentina & Uruguay	07-08 (1) 08-13 (2) 13-15 (3) 15-18 (4) 18-19)2) 19-20 (1) 11-16 (1)**	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-21)4) 21-23 (3) 23-00 (2) 00-01 (1)	10-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-03 (3) 03-06 (2) 06-08 (3) 08-10 (2)	19-20 (1) 20-21 (2) 21-02 (3) 02-03 (2) 03-05 (1) 20-22 (1)* 22-02 (2)* 02-03 (1)*
McMurdo Sound, Antarctica	11-15 (1) 15-18 (2) 18-19 (1)	10-15 (1) 15-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	00-04 (1) 04-06 (2) 06-07 (1)

Time Zone: PDT (24-Hour Time) WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	11-13 (1)	08-09 (1) 09-12 (2) 12-14 (1) 14-15 (2) 15-16 (1) 22-00 (1)	00-07 (1) 07-09 (2) 09-13)1) 13-15 (2) 15-19 (3) 19-22 (2) 22-00 (3)	19-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central & Northern Europe & European USSR	*Nil*	07-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-16 (1) 22-00 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-23 (2) 23-01 (1) 06-08 (2) 08-09 (1)	19-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (1) 22-00 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-23 (2) 23-01 (1) 06-08 (1)	20-22 (1)
Western & Central Africa	10-13 (1) 13-16 (2) 16-17 (1)	08-11 (1) 11-13 (2) 13-17 (3) 17-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-03 (2) 03-08 (1)	21-23 (1)

Eastern Africa	13-16 (1)	09-13 (1) 13-15 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-02 (1)	13-16 (1) 16-18 (2) 18-21 (3) 21-23 (2) 23-00 (1)	*Nil*
Southern Africa	09-11 (1) 11-13 (2) 13-15 (1)	08-10)1) 10-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (2) 22-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-10 (1)	19-21 (1) 21-22 (2) 22-23 (1) 21-22 (1)*
Central & South Asia	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 16-18 (1) 18-21 (2) 21-23 (1)	06-07 (1) 07-09 (3) 09-11 (1) 19-21 (1) 21-23 (2) 23-01 (1)	05-07 (1) 17-19 (1)
Southeast Asia	16-19 (1)	09-10 (1) 10-12 (3) 12-13 (2) 13-16 (1) 16-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	23-01 (1) 01-02 (2) 02-04 (3) 04-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	03-07 (1)
Far East	12-14 (1) 14-16 (2) 16-18 (1) 14-16 (1)**	09-10 (1) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-04 (4) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (3) 10-12 (2) 12-14 (1)	01-02 (1) 02-03 (2) 03-05 (3) 05-06 (2) 06-07 (1) 03-06 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-18 (3) 18-20 (4) 20-21 (2) 21-22 (1) 12-18 (1)**	08-10 (1) 10-12 (3) 12-15 (2) 15-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-03 (1)	07-09 (4) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-21 (3) 21-03 (4) 03-05 (3) 05-07 (2)	22-23 (1) 23-00 (2) 00-03 (3) 03-06 (4) 06-07 (3) 07-08 (1) 23-01 (1)* 01-06 (2)* 06-07 (1)*
Australasia	13-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-22 (1) 14-18 (1)**	07-08 (1) 08-10 (2) 10-17 (1) 17-19 (2) 19-21 (3) 21-23 (4) 23-00 (3) 00-03 (1)	12-20 (1) 20-22 (2) 22-23 (3) 23-04 (4) 04-06 (3) 06-08 (2) 08-10 (3) 10-12 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-05 (2)* 05-06 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	06-08 (4) 08-11 (3) 11-15 (2) 15-18 (3) 18-04 (4) 04-06 (3)	19-21 (1) 21-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay,, Brazil, Chile, Argentina & Uruguay	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 11-15 (1)**	06-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	09-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-02 (3) 02-06 (2) 06-08 (3) 08-09 (2)	20-21 (1) 21-00 (2) 00-02 (1) 02-04 (3) 04-05 (2) 05-06 (1) 22-01 (1)* 01-03 (2)* 03-05 (1)*
McMurdo Sound, Antarctica	13-15 (1) 15-17 (2) 17-19 (1)	12-16 (1) 16-18)2) 18-20 (3) 20-22 (2) 22-00 (1)	09-11 (1) 17-19 (1) 19-20 (2) 20-01 (3) 01-03 (2) 03-04 (1) 06-08 (2)	22-23 (1) 23-01 (2) 01-04 (1) 04-06 (2) 06-07 (1)

*Indicates best times to listen 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.

**Indicates best times to listen for F-2 layer openings on 6 meters.

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.

sunrise. *Twenty* and *17* meters should provide optimum propagation during the hours of daylight for openings between *750* and *1300* miles. Optimum conditions should continue on these bands for this distance range after sundown and until midnight. Between midnight and sunrise the best band should be *40* meters. For openings between *1300* miles and the one-hop short-skip limit of approximately *2300* miles try *20* and *17* meters during the day, with *15* meters also usable. After sundown try *30* and *40* meters, with *80* meters also providing good propagation conditions for this distance range.

Frequent short-skip openings between approximately *400* and *1300* miles should also be on *10* and *12* meters, particularly during the daylight hours. Longer skip, up to *2300* miles, should often be possible during the late afternoon and early evening hours.

VHF Ionospheric Openings

August should be a very active month for meteor showers, with at least five different ones expected to peak during the first three weeks of the month. At least one of these, the *Perseids*, should be an intense shower with a great deal of activity. It is expected to last for five days, with maximum intensity likely to occur during the afternoon of August 12th. Maximum periods for other meteor showers expected during the month are August 5, 12, 18, and 20.

Ionization produced by the thousands of meteors expected to enter the earth's atmosphere during these showers, particularly during periods of maximum intensity, is expected to make possible numerous meteor-scatter-type openings over several hundreds of miles on the *10, 6,* and *2* meter bands.

Although on the decrease, fairly frequent sporadic-E ionization is expected to continue during August, resulting in some good short-skip openings on *10* and *6* meters over distances of approximately 600 to 1300 miles. During periods of very intense and widespread sporadic-E ionization, two-hop openings may also be possible up to distances of about 2600 miles. An occasional opening on the *2* meter band may also occur during August over distances ranging between approximately 100 and 1400 miles. While this type of short-skip propagation may occur at any time of the day or night during August, there is a tendency for sporadic-E ionization to peak between 6 and 9 PM local daylight time.

Auroral displays produce ionization in the earth's atmosphere which is often capable of reflecting VHF radio signals over distances upwards to 1000 miles or so. Auroral displays and associated auroral-scatter propagation are most likely to occur during August when HF conditions are Below Normal or Disturbed. Check the Last Minute Forecast appearing at the beginning of this column for those days that are expected to be in these categories during the month.

There is a fairly good chance for some *6* meter transequatorial (TE) openings during late August, with conditions expected to improve considerably by mid-September. The optimum times for TE openings between the U.S. and Latin America should be the early evening hours, shortly before and just after sundown. TE openings favor locations in the southern tier states, although some may be possible to states farther north.

73, George, W3ASK

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The 48-Hour Contest—Has it Outlived Its Time?

There was a stretch during an especially boring presentation at a recent local convention forum I was attending when I tried to approximate my cumulative operating time in contests over the years. In rough terms, the answer came to 6000 hours, or 250 days. In other words, if I started a contest on January 1st, I would need to operate continuously until August 6th!

Needless to say, we have invested significant time in both preparing our stations and actual operating. The majority of this operating-time investment has come from the traditional 48-hour weekend contest. The concept of 48-hour DX contests has been around for decades. The very first CQ WW, for example, specified: "The contest period is 0200 GMT October 30 to 0200 GMT November 1 for Phone, and 0200 GMT November 6 to 0200 GMT November 8 for CW." I'm sure many of you remember the "two-weekend" ARRL DX Contests, where commitment was defined as giving up four out of seven weekends every February and March.

The operating time habits of major single operator winners in the major DX contests have truly been an exercise resulting from necessity rather than desire in many cases with a trend towards more operating rather than less in recent years (see Table I). Although we may not universally support it as a group, we have historically accepted it as a cost of obtaining victory. The debate over this matter has continued to increase. What follows are some views for you to consider.

Calendar of Events

July	27-28	Venezuela CW DX Contest
Aug.	3-4	YO DX Contest
Aug.	3-4	ARRL UHF Contest
Aug.	3-4	Pan American Games Contest
Aug.	3-4	North American QSO CW Pty
Aug.	6	YLRL YL Sprint
Aug.	10-11	Worked All Europe CW
Aug.	17-18	SARTG RTTY Contest
Aug.	17-18	Maryland–D.C. QSO Party
Aug.	17-18	New Jersey QSO Party
Aug.	17-18	SEANET SSB Contest
Aug.	17-18	North American SSB QSO Pty
Aug.	17-18	Keyman's Club CW Contest
Aug.	24-25	Empire State QSO Party
Sept.	7-8	Bulgarian DX Contest
Sept.	8	North American CW Sprint
Sept.	14-15	Worked All Europe SSB
Sept.	14-15	All Asian SSB Contest
Sept.	15	North American SSB Sprint
Sept.	21-22	Washington State QSO Party
Sept.	21-22	Scandinavian CW Contest
Sept.	27-29	Europe for QRP Weekend
Sept.	28-29	Scandinavian SSB Contest
Sept.	**28-29**	**CQ WW RTTY Contest**
Oct.	13-14	Illinois QSO Party
Oct.	19-20	Worked All Germany Contest
Oct.	**26-27**	**CQ WW SSB DX Contest**
Nov.	2-4	ARRL CW Sweepstakes
Nov.	16-18	ARRL SSB Sweepstakes
Nov.	**23-24**	**CQ WW CW DX Contest**

48-Hour Contest Pros

Supporters of the 48-hour contest tend to be traditionalists. What has worked in the past should continue in the future. The 48-hour contest allows for more opportunity to avoid brief declines in propagation. Contest weekends beginning at the end of a solar storm period can frequently recover by Sunday. Often considered both a pro and con, the full contest weekend (e.g., no required off times) eliminates the "good luck" variables created by one operator selecting a better choice of operating times than another. To be fair, many call this *operating strategy* and are of the opinion that it differs very little from simply choosing appropriate sleep times.

As if this is not enough, there is the matter of contest records. Existing major contest records are based on an 48-hour operating period. If changes were made to a different operating period, it is likely that many of these records would never be broken.

Fundamentally, organizers of change in operating times tend to support the concept of a 36- or 24-hour contest standard. Unfortunately, contest administrators have never really been able to enforce the use of off times. Although there are relatively easy ways to verify on-air operating time, there are few checking techniques to prevent the unauthorized use of off times (e.g., to line up needed multipliers while listening). This could be particularly important in a closely contested DX contest where multipliers are so important to the final result. The example of the mysterious appearance of a VE8 in an ARRL Sweepstakes log within minutes of beginning a new operating period also comes to mind.

The negativism that comes from 48 hours of operating is essentially limited to the Single-Operator, All-Band category. Proponents of the full 48-hour period suggest that this operating class is not for everyone, as is the case with QRP or Packet/Unlimited categories. Instead, 48-hour contests offer other categories for competitors to compete such as Multi-Ops or Single Band entries that usually require less operating time.

48-Hour Contest Cons

The list of opposing support for the 48-hour concept is equally as compelling. For starters, opponents question the fundamental reason for "torturing" our-

Call	'88 SSB	'88 CW	'89 SSB	'89 CW	'90 SSB	'90 CW	Average
W9RE	44	—	42	—	44	—	43
K1DG	—	38	42	41	—	—	40
K3ZO	—	42	42	41	43	44	42
W2GD	—	—	39	38	38	44	40
KRØY	—	—	—	—	45	—	45
K1CC	41	42	—	41	—	45	42
K3OO	—	—	42	—	44	43	43
KC1F	45	—	—	—	43	47	45
N2NT	—	—	—	—	47	47	47
K5ZD	43	45	40	48	44	—	44
K1TO	—	44	—	47	—	45	45

Average: 43 hours

Table I– Selected single-op operating times (rounded to nearest hour) for CQ WW Contest 1988–90.

2 Baldwin Street, Windham, NH 03087

Call	'88 SSB	'88 CW	'89 SSB	'89 CW	'90 SSB	'90 CW	'91 SSB	'91 CW	Aver.
W9RE	—	—	45	42	—	44	44	44	44
K1AR	—	—	—	—	43	43	42	—	43
K1DG	—	—	—	—	41	—	—	—	41
K3ZO	—	43	42	42	41	43	43	44	43
W2GD	—	43	—	42	—	39	36	36	39
KRØY	—	—	—	40	43	42	45	—	43
K1CC	—	—	—	—	—	41	—	—	41
K3OO	—	—	—	—	44	—	45	44	44
KC1F	45	46	—	—	43	43	47	—	45
N2NT	—	—	—	42	—	42	42	48	44
K5ZD	—	46	—	—	—	—	—	46	46
K1TO	—	45	—	—	—	43	—	46	45

Average: 43 hours

Table II- Selected single-op operating times (rounded to nearest hour) for ARRL DX Contest 1988-91.

selves into the way a runner feels with one mile to go in a marathon race. A contest, they say, should be fun and not result in the drudgery that comes from sitting in front of the radio for an entire weekend. While on that point, a reduced operating period may also allow participants to enjoy other aspects of their weekend, while simultaneously maintaining the ability to be competitive.

The experiences we have gained from other "non 48-hour" operating events seem to further support the sanity of less operating time for major contests. The CQ WW WPX Contest, for example, has grown tremendously in popularity even though it only permits 36 hours of operating for single operators. There are other contests that illustrate this point as well, including the Worked All Europe, ARRL Sweepstakes, CQ-M, etc. One of the frequent observations in the soapbox comments from the recently reported WRTC contest results was the popularity of the short, 10-hour format.

A recurrent circle of advocates for shorter contest operating periods is the older and busier of our contesting clan. For me, contesting is harder both mentally and physically than it was when I was in my twenties. Furthermore, as I become more involved with family and business commitments, the ability to devote an entire weekend to contesting becomes an ever greater challenge. I suspect that I'm not alone on this point.

The Bottom Line

I suspect you are wondering where I stand on this issue. Even as I write this month I find myself waffling from one side to the other. I think of the feelings I have about contesting as the alarm sounds on Saturday night after only 1 or 2 hours of sleep. On the other hand, I think about the excitement I've experienced from a full 48-hour contest as the bands percolated around the clock with fast runs to Europe and Asia. In those conditions, the issue becomes the identification of the few precious hours I can miss which will produce minimal impact to my score.

When all the dust settles, I believe that contesting is ultimately a personal challenge. There are few competitors who will ever get the coveted winning prize, and that is true even if the contest were only 10 hours long. The beauty of contesting is its diversity of operating events (take a look at this month's calendar). In a similar way, it's impossible to design contests that provide the best fit for everyone's preferences and personal situations. That is, perhaps, one of the principal reasons why we have so many contests.

I like the challenge of the 48-hour event. It is a challenge that demands the highest physical and mental preparation our hobby can offer. Major-league 48-hour DX contesting boils down to four weekends a year (CQ WW and ARRL DX) for the serious competitor. While my intellect tells me that reduced operating times might make sense, my gut tells me we should do it no other way. The sponsorship of 48-hour DX contest weekends should continue!

Contesting and QSLs

While it may seem to be a sickness to some, I actually enjoy receiving QSL cards. When considering the subject, it's fair to say that I probably don't fit the definition of the fanatic on this subject. After all, my collection is not in alphabetical order in $300 Steelcase cabinets. I don't even have one of those nice binders to display my DXCC accomplishments. Rather, my collection is in boxes, boxes, and more boxes. It's an ever-growing collection that is gradually taking over my house. My XYL constantly reminds me of the QSLs that seem to occupy every corner of our home.

Nevertheless, I love QSL cards. There is the excitement that still comes from opening that big shipment from the bureau and looking for the "good ones." And of course, who can turn down the opportunity to spot the 152nd QSL you've received from some rabid overseas QSLer.

For some unknown reason, I actually answer my cards. Of course the computer has helped immensely in recent years with this chore. I used to be one of those old-fashioned holdouts who claimed a QSL lacked personal touch when it became nothing more than a piece of paper with a computer label slapped on it. In fact, a card without a signature seemed invalid to me. Needless to say, my philosophy has changed 100,000 contest QSOs later.

One of the benefits of computer automation in contesting is that you have numerous opportunities for analysis. I thought it would be fun this month to analyze my contest QSLing. Although I am still receiving QSLs for the more recent contests, Table III gives you a picture the results I've experienced. How's your mailbox doing?

Contest	Mode	Total Number QSLs Received	Total QSOs	Total QSOs
CQ WW '88	SSB	454	2797	16.2
CQ WW '88	CW	407	3335	12.2
ARRL DX '89	CW	562	5186	10.8
CQ WW '89	CW	464	4102	11.3
ARRL DX '90	SSB	328	2685	12.2
ARRL DX '90	CW	209	2636	7.9
Totals		2424	20741	11.7

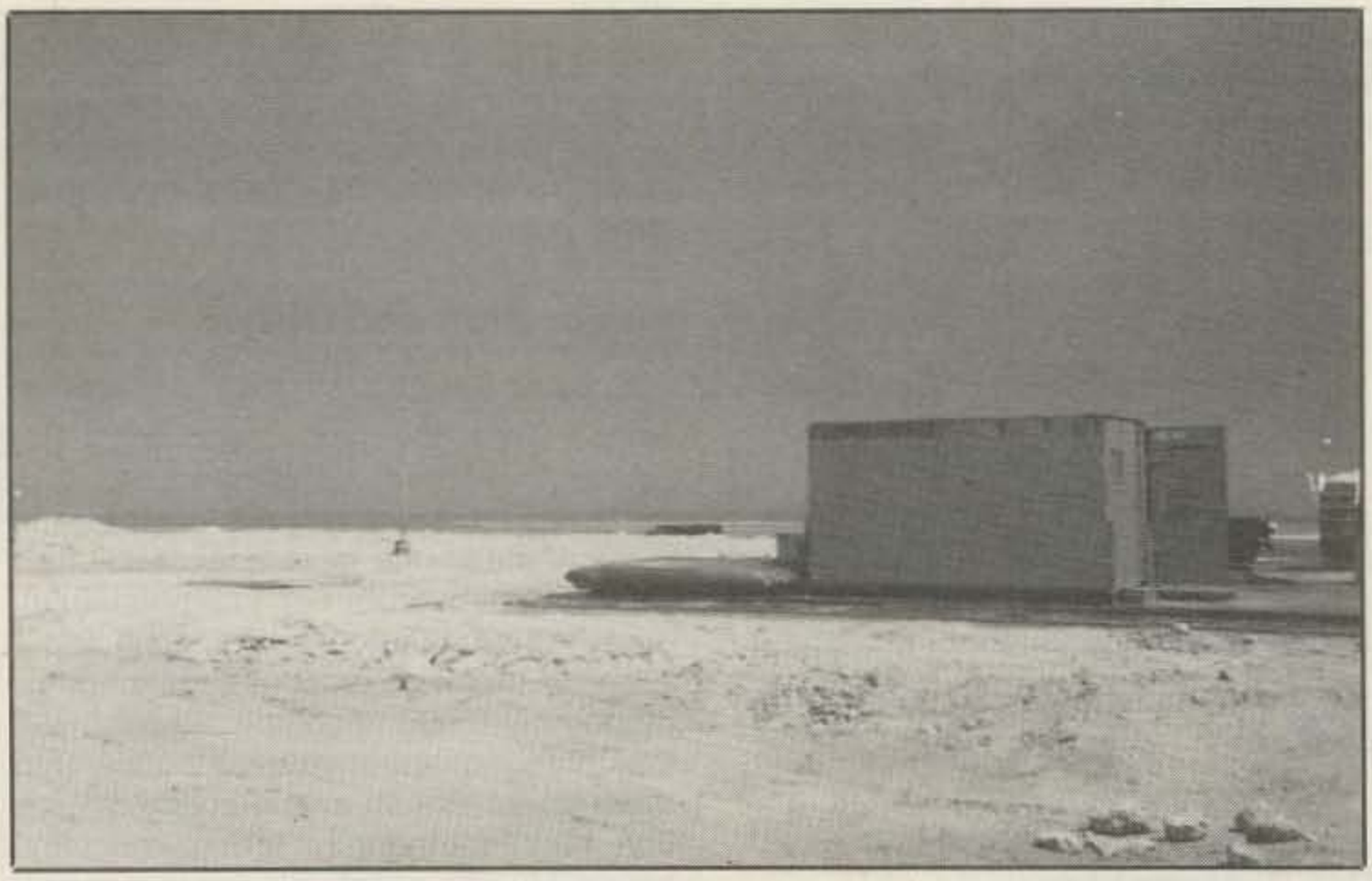
Table III- Received bureau QSL analysis from K1AR contest operations.

Contesting, Desert Storm Style

by Rich Hallman, KI3V/A92FN

Needless to say, operating in the Persian Gulf has always had a certain uniqueness about it, especially if you happen to have been there during Operation Desert Storm. After waiting three months for my license from Bahrain, it was finally approved on March 16, 1991. In the 17 days that followed, I had to make up for lost time, working nearly 9000 QSOs!

As you might imagine, the stories are endless about my experiences, but one that stands out is during the CQ WW WPX SSB Contest. Three hours into the con-



The pleasant (?) operating surroundings of Rich, KI3V, at A92FN.

It's possible to smile a little, even at war. Way to go, Rich!

test we had an emergency reconnaissance mission into Iraq. After they were airborne I went back to my operating shack to continue the contest. Fifteen minutes later I was informed that one of the aircraft had plunged into the Gulf due to an engine fire. Both of the airmen ejected safely with only minor injuries. The rest of my weekend was spent being interviewed on and off by inspectors investigating the crash.

Despite all the distractions, I managed to squeeze in 23 hours of operating with a total of 2600 QSOs and 4.8 million points. What an experience! By the way, my equipment was an ICOM IC-735, Dentron Clipperton-L, Hustler 4BTV stuck in a sand dune, and 20 meter inverted-Vee at 35 feet.

I want to thank all of you for your great support for us in the Persian Gulf during Operations Desert Shield and Storm. We could not have done it without you!

Closing Comments

This month is the beginning of a very busy season of fall contesting. Please take particular note of the change of dates for the All Asian Contest, which is now running its SSB version this year on September 14–15.

As always, the deadline for the November issue is September 1st.

73, John, K1AR

YO DX Contest

2000Z Sat. to 1600Z Sun., Aug. 3–4

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur Radio Federation. This is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single Operator—All Bands/Single Band, Multi-Operator/Single Transmitter.

Frequencies: CW: 3510–60, 7010–40, 14010–60, 21010–60, 28010–60. SSB: 3700–75, 7040–90, 14150–250, 21200–300, 28400–600.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter county abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band.

Deadline for logs is September 3, 1991 and they should be mailed to: RARF, P.O. Box 05-50, R-76100 Bucharest, Romania.

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 3–4

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Three for 220 or 432 MHz contacts. Six for 902 or 1296 MHz. And 12 for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band.

Final Score: Total QSO points from all bands times the sum of the grid-square multiplier from each band.

Detailed rules were published in the July issue of *QST*. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

Pan American Games Contest

0000Z Sat., Aug. 3 to 0000Z Sun., Aug. 4

This worldwide contest has been organized to celebrate the XI Pan American Games to be held in Cuba in August 1991. Sponsored by the Federacion de Radioficionados de Cuba, Inder-National Institute of Sport (FRC), the contest is open to all amateurs around the world.

Classes: Single Operator only on SSB.

Exchange: Signal Report (RS) and serial number (59001). Contacts are not valid within your own country.

Scoring: Contacts with North/South/Central America and Caribbean are

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The answer: a super heavy duty power supply that loafs at full legal power - it can deliver power for more than 2500 watts PEP two tone output for a half hour!

The heart of the AL-1200 power supply is a highly efficent Peter Dahl tape wound hypersil® transformer weighing 32 pounds. — it's equivalent to a 45 pound transformer using standard E-I laminations.

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The AL-1200 rectifier board uses diodes rated for a massive surge current of *200 amps* — you can accidentally short the high voltage supply and the diodes won't blow!

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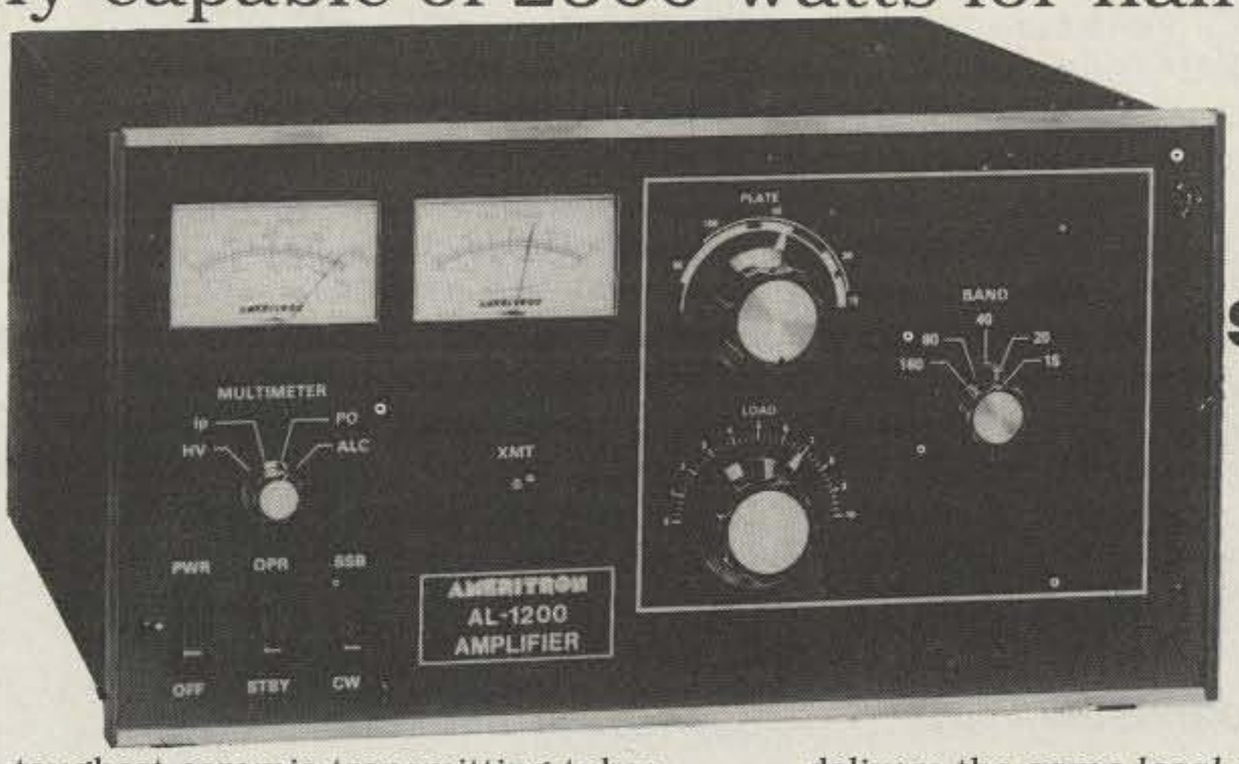
The AL-1200 uses one of Eimac® 's toughest ceramic transmitting tubes — the high gain 3CX1200A7. It has the durability of glass tubes and the power dissipation of ceramic tubes.



AL-1200
$2045
Suggested Retail

3CX1200A7: 12 times tougher than the 3CX800A7

A 3CX1200A7 has a 50 watt control grid dissipation — that's more than 12 times tougher than the delicate 4 watts grid dissipation of a 3CX800A7.

If you accidentally drive a 3CX1200A7 with your 100 watt exciter when your amplifier is off, you won't fry your control grid. But don't make that mistake if you have a pair of 3CX800A7s — unless you're ready to buy another pair.

Full legal power at half the price

A *single* 3CX1200A7 in the AL-1200 delivers the *same legal limit* as a *pair* of 3CX800A7s that cost nearly twice as much. What do you get for paying twice as much? Twice as many parts to fail.

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Want a pair of tough 3-500Z workhorses?

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That's why the AL-82 costs a little more -- and why it's well worth it. Call for your best price today!

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worth 5 points. Credit 10 points for QSOs with Cuban stations. There is a bonus of 20 points/QSO for contacts with special event Pan American stations. Multipliers are defined as DXCC countries per band. Final score is total QSO points times multiplier.

Frequencies: All amateur bands 160–10 (excluding WARC bands).

Awards: Trophies will be awarded to the top three scoring stations. In addition, certificates with be sent to any station working at least 20 countries in the Americas.

The mailing deadline for logs is September 15, 1991. Logs can be sent to: XI Pan American Games, F.R.C., Box 1, Habana, 10100, Habana, Cuba. Use separate logs for each band and be sure to include the usual signed declaration statement and summary sheet.

North American QSO Party

CW: 1800Z Sat., Aug. 3 to 0600Z Sun., Aug. 4
SSB: 1800Z Sat., Aug. 17 to 0600Z Sun., Aug. 18

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Multi-operator stations may operate for the entire 12 hour period. Single operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are 1815, 3535, 7035, 14035, 21035, and 28.035 (20 kHz up from band edge for Novice) on CW, and 1865, 3850, 7225, 14250, 21300, and 28.600 (28.450 Novice) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters at 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1–VE8, VO1, VO2, VY1, and VY2) and other North American countries. (Do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of 5 single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., N4RJ op by KM9P) must be registered with K8CC. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five trophies will be awarded for the high score for the Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each State, Province, and North American Country. T-shirts will be awarded to each member of winning teams. Contest logs must be sent to Dave Pruett, K8CC, 2727 Haris Rd., Ypsilanti, MI 48198. Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted on disk in the form of files generated by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

European DX Contest

CW: Aug. 10–11 SSB: Sept. 14–15
1200Z Saturday to 2400Z Sunday

This is the 36th annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5–28 MHz. (IARU Region I regulation of frequencies for contest operation.) This year's event features important rule changes.

Only 30 hours of operating time out of the 36-hour contest period are permitted for single operator stations. The 6-hour off times may be taken in one, but not more than three, periods any time during the contest and must be indicated in the log. The minimum operating time on a band is 15 minutes. This rule does not apply to new multipliers.

Classes: (a) Single operator, all band. (b) Multi-operator, single transmitter. Only one signal on any band at the same time. (c) Multi-operator, multi-transmitter. All transmitters must be located within a 500 meter diameter and within the property limits of the station licensee's address. (d) SWL. *Note:* DX packet cluster spotting is allowed for *all* classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and 1 point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked on each band (see WAE country list).

Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only (a) single operator, all-band class may be used. The same call sign, European or non-European, may only be logged once per band. The log must contain both call signs and at least one of the control numbers. Each QSO logged counts 1 point, each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional, one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (i.e., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station.

A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates to the top scorers in each class in each country. Each participant with at least half the score of

the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Disqualification: Violation of the rules of the contest, or taking credit for excessive duplicate contacts, will be deemed cause for disqualification. Each duplicate QSO or QTC will result in a penalty of 3 QSO/QTC points.

Logs: It is suggested that you use the official DARC or equivalent log form. Figure 40 contacts to the page and use a separate sheet for each band. Submit a dupe sheet for each band with 200 or more contacts. A summary sheet showing the scoring and a signed declaration are also required. (Sample log forms are available—SASE or IRCs.)

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HB0, HV, I, IS, IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OH0, OJ0, OK, ON, OY, OZ, PA, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, TA1, TF, TK, UA1346, UA2/UZ2F, UA1 Franz-Josef-Land, UB, UC, UN/UA1N/UZ1N, UO, UP, UQ, UR, YO, YU, ZA, ZB2, 1A0, 3A, 4J1M–V, 4U1 Geneva, 4U1 Vienna, 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, P.O. Box 1328, D-8950 Kaufbeuren, Fed. Rep. of Germany.

SARTG RTTY Contest

Three Periods GMT
0000–0800 & 1600–2400 Sat., Aug. 17
0800–1600 Sun., Aug. 18

This is the 21st annual contest sponsored by the Scandinavian Amateur Radio Teleprinter Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band for QSO and multiplier credit.

Classes: Single operator all band, single operator single band, multi-operator single transmitter, and SWL.

Exchange: RST and QSO no.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

SWLs use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: SARTG Contest Manager, Bo Ohlsson, SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

Keymen's Club of Japan CW Contest

1200Z Sat. to 1200Z Sun., Aug. 17–18

The Keymen's Club is a Japanese organization the members of which are exclusively interested in CW communications. The object of the KCJ contest is to work as many amateurs in Japanese prefectures/districts as possible using JA CW-band allocations. Eligibility is limited to single operators only, with non-JAs participating in an all-band category (JAs can submit single-band/SWL logs).

Frequencies: 1908–1912, 3510–3525, 7010–7030, 14050–14090, 21050-21090, 28050-28090, 50050–50090, 144050–144090, 430050–430090, and 1294050–1294090 kHz.

Exchange: RST plus plus continent for

non-JAs. JA stations send RST plus Prefecture/District Code.

Scoring: One point for each completed QSO per band. Count the first 60 Japanese districts you work for multipliers. Final score is total QSO points times multiplier.

There are various certificates available to the top three world-wide scorers and the winners from each country and U.S. call area. All entries must be postmarked by September 18, 1991 and be mailed to: Yasuo Taneda, JA1DD, 3-9-2-102 Gyoda-cho, Funabashi, Chiba 273, Japan.

Maryland-DC QSO Party

1600Z Sat. to 0400Z Sun., Aug. 17–18
1600Z to 2359Z Sun., Aug. 18

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC stations may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

Exchange: RS(T) and QTH (county for MD stations, state/province/DXCC country for others), and operating category (Club, QRP, Mobile, Novice, Technician, and Standard).

Frequencies: SSB: 1.86, 3.92, 7.28, 14.28, 21.37, 28.37, 50.15, 144.55 MHz. CW: 3.643, 7.130, 14.04, 21.115, 28.06 MHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers. Score 10 points for club station QSOs, 5 points for mobiles, 2 points for a CW MD QSO, and 1 point for any other valid contact. Note that points are cumulative (e.g., mobile MD stations count 5 points). Final score is total QSO points times multiplier (25 maximum).

Awards: Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be awards to the high score from a MD club station, MD mobile, top three MD logs, Novice, Technician, DX station, and MD YL. Certificate to each station with at least 100 QSO points in entry.

Logs are to be postmarked by September 10, 1991 and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun. Aug. 17–18
1300Z Sun. to 0200Z Mon. Aug. 18–19

This is the 32nd annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest, the same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO no., RS(T), and QTH. County for NJ, ARRL section or country for others.

Scoring: NJ stations score 1 point for W/K and VE/VO contacts, and 3 points for DX. Multiply total by ARRL sections worked. KP4, KL7, KH6, etc., are 3-point contacts and section multipliers.

Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50–50.5, and 144–146. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or more logs are received from that section. Also Novice/Tech. and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time, indicate the multiplier only the first time it is worked, include a QSO check sheet, and include a summary sheet showing the scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage of all counties may be planned.

Logs must be received no later than Sept. 14th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

All Asian SSB Contest

0000Z Sat. to 2400Z Sun., Sept. 14–15

The same rules as for the CW Contest on June 15–16 apply here. See June Contest Calendar for complete rules. Logs for this one must be in the hands of the committee no later than October 15th. They go to: JARL, P.O. Box 377, Tokyo Central, Japan.

Announcing

(from page 9)

W0LB, from 40th anniversary of Jayhawk ARS, Kansas City, KS; 2300Z Aug. 2 to 0300Z Aug. 4; SSB 14.325, 28.325 MHz, some CW during later hours, around 14.050 and 7.040 MHz. For QSL send QSL and SASE to Jayhawk ARS, P.O. Box 4282, Kansas City, KS 66104.

VI4HBW, from Festival of Whales, Hervey Bay, Australia; Hervey Bay ARC; Aug. 1–31 (no frequencies or times given). For award and QSL send to Hervey Bay ARC, P.O. Box 829, Hervey Bay, QLD 4655, Australia.

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

Aug. 3, Reno, Nevada Hamfest, Stead Air Force Base, 10 miles north of Reno, NV. Contact Curly Silva, K7HRW, 3780 Hummingbird Dr., Reno, NV 89506 (702-972-3933 evenings). (Exams at 12 PM, preregistration preferred and given preference.)

Aug. 3, **1991 Upper Peninsula Hamfest,** Houghton County Arena, Hancock, MI. Contact Howard D. Junkin, N8FHF, Publicity Coordinator, Copper Country RAA, P.O. Box 217, Dollar Bay, MI 49922.

Aug. 3–4, **18th Annual Greater Jacksonville Amateur Radio & Computer Show,** Prime Osborn Convention Center, Jacksonville, FL. Contact The Greater Jacksonville Amateur radio & Computer Show, P.O. Box 9673, Jacksonville, FL 32208 (904-765-3230). (Exams Sunday.)

Aug. 4, **Portage ARC Hamfair,** Portage County Fairgrounds, between Akron & Youngstown, OH. Contact Joanne Solak, KJ3O/8, Portage ARC, 9971 Diagonal Road, Mantua, OH 44255 (216-274-8240).

Aug. 4, **Hamfesters Radio Club Hamfest & Computer Festival,** Will County Fairgrounds, Peotone, IL. Contact Dave Brasel, NF9N, 7528 W. 109th Place, Worth, IL 60482 (708-448-9432).

Aug. 10, **12th Annual Rhinelander Swapfest,** Sugar Camp Town Hall, 12 miles north of Rhinelander, WI. Contact Bob Berger, WC9O, 367 Lois St., Rhinelander, WI (715-369-3267). (Exam registration at 8:30 AM, testing at 9 AM.)

Aug. 10–11, **PARC Golden Spread Hamfest,** Amarillo, TX. Contact Panhandle ARC, P.O. Box 1524, Amarillo, TX 79105, or call Troy Reno, 806-358-5906. (Exams both days.)

Aug. 11, **Porter County ARC Hamfest,** Porter County Fairgrounds, Valparaiso, IN. Contact Art Cushman, N9FB, 944N 200W, Valparaiso, IN 46383 (219-762-1252).

Aug. 11, **St. Cloud ARC Hamfest,** Whitney Senior Center, St. Cloud, MN. Contact SCARC, Box 141, St. Cloud, MN 56302.

Aug. 11, **Hancock ARC Summerfest '91,** Hancock County 4H Fairgrounds, Greenfield, IN. Contact Keith Dalrymple, N9GWK, P.O. Box 7033, Greenfield, IN 46140 (317-462-0023, or 317-328-4028).

Aug. 11, **Paulding, Ohio Hamfest,** Paulding County Fairgrounds, Paulding, OH. Contact Paulding County AR Group, RR2 Box 1582, Paulding, OH 45879 (419-399-3641, or 399-5690). (Exams on preregistration. Send SASE and $5.25 check to Bob High, 12838 Tomlimson Rd., Rockford, OH 45882 (795-5763).

Aug. 11, **NOBARC/Dalton Fleamarket,** Dalton American Legion, Dalton, MA. Call 413-458-8452.

Aug. 11, **Mid-Atlantic ARC Hamfest '91,** Bucks County Drive-In Theatre, Warrington, PA. Contact Al Maslin, W3DZI, 215-446-4936.

Aug. 11, **Cedar Rapids Summerfest,** Teamsters Hall, Cedar Rapids, IA. Contact Mike Golden, N0BJK, 319-395-1473. (Exams; handicapped accessible.)

Aug. 17, **Finger Lakes Hamfest & Computerfest,** New York State Armory, Ithaca, NY. Contact Ross Boyer, N2ISU, TCARC, P.O. Box 4144, Ithaca, NY 14852-4144. (Exams by preregistration, send 610 form to NK2V, P.O. Box 4704, Ithaca, NY 14852.)

Aug. 17, **PEARLFEST,** John F. Kennedy Elementary School, Brewster, NY. Contact Joel Rappaport, WA2AWG, Box 216, RR2, No. White Rock Rd., Holmes, NY 12531 (914-855-1672). (Exams.)

Aug. 17–18, **Delmarva Hamfest,** Delaware Technical and Community College, Georgetown, DE. Contact John Low, K3JL, Rt. 2 Box 244G, Georgetown, DE 19947 (302-856-2307 days, 302-856-2307 evenings).

Aug. 18, **Warren ARA 1991 Hamfest,** Trumbull Branch Campus Kent State University, Warren, OH. Contact Frank Fitzhugh, KD8KJ, Warren ARA Hamfest, P.O. Box 809, Warren, OH 44482 (216-652-0452). (Exams 9 AM.)

Aug. 18, **Tri-States Swapfest,** 3737 N. Fifth St., Quincy, IL. Contact Jim Funk, N9JF, c/o WIARC, P.O. Box 3132, Quincy, IL 62301 (217-336-4191). (Exams.)

Aug. 18, **Tri-County Radio Group Hamfest,** Elgin VFW Post #1307, Elgin, IL. Call Ken Whitmire, N9KSP, 708-658-3411 (ask for Ken, Mon.–Sat. 10 AM to 7 PM CST).

Aug. 25, **St. Charles ARC Hamfest '91,** Blanchette Park, St. Charles, MO. Contact John Lehnhoff, N0HMZ, 155 Bentwood, St. Charles, MO 63303 (314-928-2510 after 5 PM).

Aug. 25, **Summit City Hamfest,** 4-H Fairgrounds, Fort Wayne, IN. Contact Frank Jaworski, P.O. Box 15127, Fort Wayne, IN 46815 (219-485-2634).

Aug. 25, **Short Mountain Repeater Club Hamfest,** Cedars of Lebanon State Park, Lebanon, TN. Contact Mary Alice Fanning, KA4GSB, 4936 Danby Drive, Nashville, TN 37211 (615-832-3215).

Aug. 31–Sept. 1, **Alamogordo ARC Hamfest,** Otero County Fairgrounds, Alamogordo, NM. Contact Larry Moore, WA5UNO, 1830 Corte del Ranchero, Alamogordo, NM 88310-4717 (505-437-0145). (Exams both days.)

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Two Modest Proposals

Among the many letters I receive about DX and DX-related subjects are a few suggestions for improvements in the DX Century Club. Most are impractical or have already been considered and rejected for good reason, but occasionally a simple, easy-to-administer change surfaces. Here are a couple such changes.

The first is a "temporary" DXCC credit for first-time DXpeditioners to a new country. Let's take the case of Peter I Island 3Y. Who are the only two DXers in the world who can't possibly have DXCC credit for Peter I under their home calls? The only two amateurs who have operated from Peter I—Einar, LA1EE, and Kare, LA2GV. There has been exactly one operation from this frigid Antarctic spot. Thus, Einar and Kare have not had even a remote chance to make a contact with Peter I. And what if that was the one country keeping one (or both) off the DXCC Honor Roll? Is that fair to these courageous DXpeditioners who gave freely of their time, money, and effort to put the DXCC country on for thousands of other DXers? Wouldn't it be a nice gesture if they could get credit for Peter I under their home calls?

Here's the idea: Any DXpeditioner who puts a new DXCC country on the air for the first time gets "temporary" DXCC credit for that country, in recognition of the effort to put the country on the air. That credit is valid only until another amateur makes even a single contact from that country. If Einar doesn't make a QSO with the *second* Peter I DXpedition (should there be one), he would lose his "temporary" Peter I credit.

This proposal should not unduly tax the DXCC desk, as we are only talking about a handful of exceptional cases. And perhaps none of the DXers involved would even request such a "temporary" DXCC credit. Their DXCC record could be marked so that the credit would be eliminated when the next operation occurred. The ARRL could even make a small ceremony out of this—presenting an award conferring "honorary" (and temporary) DXCC credit to the DXpeditioners.

The second proposal is more radical: DXCC accreditation for long-term operations *without* written permission. There are several very active amateurs from rare countries who have "operating permission" verbally, but cannot get any official to put his or her job (and perhaps life) on the line by signing a piece of paper authorizing an amateur operation. 3X1SG in Guinea is one example that comes immediately to mind, as is 5R8JD in Madagascar. Both stations have been active for years, without sufficient paperwork to satisfy the DXCC desk.

Although the CQ 5-Band Worked All Zones award is not endorsed for mode, award manager K1MEM does note those amateurs who manage to earn this most difficult of the major awards on both modes. Ossi Lehvas, OH3YI, is one of the select few. He's confirmed more than 300 current DXCC countries on all bands, 80–10 meters!

Could the ARRL relax the requirement for written documentation without opening the floodgates of illegal operations, flaunting of local rules, and subsequent negative impact of amateur radio worldwide? The reason for the accreditation procedure in the DXCC rules is to avoid encouraging DXers to operate without official knowledge. We don't want operators sneaking into a country, operating clandestinely, and slipping away without appropriate officials sanctioning the operation. The potential for abuse is too great.

But this proposal would retain the prohibition against unauthorized operation; it would only relax the form of authorization, from written to verbal. Proposed: An amateur who operates for six months or longer, with tacit approval of the country (i.e., they know about the operation, and have not ordered the station off the air), is accepted for DXCC credit. The six-month rule eliminates the quickie, illegal operation, and it's hard to imagine a station operating openly for six months without the authorities being at least aware of the activity.

This proposal would affect only a handful of operations, and thus wouldn't be an unreasonable burden for the DXCC desk. And it would probably encourage more activity from those countries where officials will *allow* amateur operation, but not provide acceptable paperwork, such as Chad TT. Several French operators in Chad have received permission to use amateur radio unofficially, but never received a license per se. This proposal would make these operations (provided they were at least six months in duration) acceptable for DXCC credit.

What do *you*, the reader, think about these ideas? Are these reasonable suggestions to make to the DX Advisory Committee for their consideration? Let me know your thoughts. I'll compile the responses, and report back.

Green Stamps or IRCs?

Another very frequent request in my mail is a list of those countries where it is illegal (or unadvisable) to send US$1 bills (green stamps in DXese). Unfortunately, there are no fixed rules about sending US currency. Possession of foreign currency is illegal in a handful of countries, but many amateurs in those countries are willing to take the risk of violating these rules, and actually prefer US$1 bills to IRCs. How does the DXer decide?

First, the best way to provide postage for the return of your QSL card from a DX station or manager is to provide appropriate postage stamps *of that country* for airmail return. (Don't send US stamps, as the DX station or manager has little or no use for these.) There are several places to buy mint foreign postage: J.E. Mackey, P.O. Box 270568, Hartford, CT 06127-0569, and William J. Plum, 12 Glenn Road, Flemington, NJ 08822 are a couple of the best. Send them a business-sized, self-addressed, stamped envelope for a copy of their latest price list. And remember that foreign postage rates can change rapidly, especially in countries with high inflation rates, such as many South American countries.

Now back to the original question: IRCs or US$1 bills? In almost all cases the US$1 bill is more valuable that the IRC, which presently costs more than US$1 at US post offices. While a single IRC can be

P.O. Box 50, Fulton, CA 95439

The WPX Program

Mixed

1506 ..... DL3SDB 1509 ..... KB6RKR
1507 ..... WV2B 1510 ..... NI9U
1508 ..... I2HVE

SSB

2239 ..... JA7DAT 2241 ..... EA1IF
2240 ..... JA1GFI

CW

2691 ..... NT7R 2693 ..... EA5CZ
2692 ..... HB9CPS

VPX

270 ..... URE252TF

WPNX

262 ..... KB8IGI 263 ..... WL7BXE

Endorsements

Mixed: 550 WI9Z. 600 WI9Z. 700 IK2BLA. 750 IN3PEE, IK2BLA. 800 N7JXS, IK2BLA. 850 N7JXS, IK2BLA. 900 N7JXS, IK2BLA. 950 W4WKQ, N7JXS, IK2BLA. 1000 W3KH, N7JXS, IK2BLA. 1050 W3KH, N7JXS. 1100 CE1YI, W3KH. 1150 CE1YI. 1200 DF4ZL. 1250 DF4ZL. 1550 OK2PO. 1600 OK2PO. 2150 I2PHN. 2200 I2PHN. 2250 I2PHN. 2300 I2PHN. 2350 I2PHN. 2400 I2PHN. 2450 I2PHN. 2500 I2PHN. 2550 N2AC, I2PHN. 2600 I2PHN. 2650 UA3FT, I2PHN. 2700 I2PHN. 2750 I2PHN. 2950 N6JV. 3000 W4BQY. 3050 W4BQY.

SSB: 350 W1DOW, CE5FSB, EA1IF. 400 KV1M, LU1DOW, CE5FSB, EA1IF. 450 KV1M, LU1DOW, CE5FSB, EA1IF. 500 KV1M, LU1DOW, CE5FSB, EA1IF. 550 LU1DOW, N7JXS, CE5FSB. 600 LU1DOW, CE5FSB. 650 LU1DOW, N9ICH. 700 LU1DOW, WD5KBB. 750 LU1DOW, WD5KBB. 800 5Z4BP, WD5KBB. 850 5Z4BP, K2EEK, W4WKQ, IV3VCG. 900 5Z4BP, W3FDU. 950 IV3MJR. 1050 I7VEZ. 1100 I7VEZ, KC9DS. 1150 I7VEZ. 1300 KS3F. 1400 IK5ACO. 1850 EA8AKN. 1900 EA8AKN. 1950 EA8AKN. 2000 EA8AKN. 2050 EA8AKN. 2100 I2PHN. 2150 I2PHN. 2200 W4BQY, NJ0C, I2PHN. 2250 W4BQY, I2PHN. 2300 I2PHN. 2350 I2PHN. 2400 I2PHN. 2450 I2PHN. 2500 I2PHN. 2550 I2PHN. 2600 I2PHN. 2650 I2PHN. 2700 I2PHN.

CW: 350 W4WKQ, N7JXS, NB9CPS. 400 N7JXS, HB9CPS. 450 N7JXS, EA5CZ. 500 N7JXS. 550 W4TYU, N7JXS. 600 N7JXS. 650 N7JXS. 700 N7JXS. 750 N7JXS. 800 AH6JF, N7JXS. 850 KT2C. 1500 W8IQ. 2250 N2AC. 2300 N2AC. 2350 W4BQY.

10 Meters: I8IYW
15 Meters: I8IYW
20 Meters: I8IYW
40 Meters: I8IYW

Asia: I6KYL, I7VEZ, N7JXS
Africa: CT1CQK, I7VEZ
No. Amer.: I7VEZ, WV2B, N7JXS
So. Amer.: CT1CQK, I7VEZ, CE5FSB
Europe: I7VEZ, N7JXS, CE5FSB
Oceania: I7VEZ

Award of Excellence Plaque Holders: N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, 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, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VE3FXR.

Award of Excellence Plaque Holders with 160 Meter Endorsement: AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, K9QFR, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to: "CQ WPX Awards," 880, CR13, Clovis, NM 88101 USA.

Andreas Sochting, DK2AS, frequently heads out on one-man, CW-only DXpeditions. Past spots have included Gibraltar, Aland Island, Dodecanese, and Monaco. Here he operates as CN2CU from Morocco.

redeemed at (most) post offices for enough money to send a minimum-weight letter by surface mail to another country, this is almost always less than US$1, and frequently much less. To provide sufficient funds for *airmail* return, the DXer may have to send two or more IRCs, increasing the expense considerably. The temptation to send US$1 instead is strong.

However, US$1s have another, more important drawback besides possible illegality. In some countries the dollar bills never get to the DX station. Mail is routinely rifled in many South American countries, and many correspondents have reported widespread mail theft in the USSR. I even had a registered letter opened and the valuable contents removed from a letter to a 16-year-old amateur in the Soviet Union.

Given this problem, here's what I recommend to DXers who ask about sending IRCs or US$1: In most cases, send US$1, but take precautions to reduce mail theft. This means no callsigns nor "amateur radio operator" designation on either envelope. Also, use a business-sized envelope; the small airmail envelope with the telltale budge of a folded return envelope is a dead give-away to the value of the contents. Make sure that the bill is not visible when the envelope is held up to a strong light. Many airmail envelopes are very thin to save weight, and often the bill is readily visible. Some stationery stores sell security envelopes with opaque insides. Another (messy) possibility is to wrap the bill in carbon paper. You can also sandwich the bill between the QSL card and the return envelope, tacking the bill to the back of the card so that it doesn't move around.

In countries in which mail theft is common, or to a QSL manager who has reported mail delivery problems, I recommend use of IRCs, as many as required. Use the same precautions, however.

A Japanese DXer has recently published a guideline to help you determine to which countries it is (relatively) safe to send US$1, versus those in which currency is not recommended. The name of this 24-page booklet is "Information on How to Collect DX QSL." The booklet includes information on international postage rates (to Japan, but most are identical to the rate to the US), currency exchange rates, addresses of many QSL managers, and several other features. Copies are available from the author: Hiromichi Fukuda, JA1IFB, Nishi Mita Danchi 3-1-301, Mita 3-2, Tama-Ku, Kawasaki, Kanagawa 214, Japan. Cost is US$8, including airmail postage.

August Events

A couple of DXers intend to spend considerable time in the Pacific this summer. Mike Gauthier, K6ICS, of Downey, California, will operate from several of the Hawaiian Islands this month. Mike will be on as K6ICS/KH6 from Oahu July 30 to August 4, from the Big Island August 4–11, from Maui August 11–16, and from Kauai August 16–23. Look for him on 14195, 21295, and 28495 kHz, as well as in the nets on 14222, 14226.5, and 21245 kHz. QSL to his home call, or via the W6 bureau. US stations should include an SASE for a direct response.

Meanwhile, Carlo Amorati, I4ALU, will be on a CW-only, multi-country DXpedition in the South Pacific. Look for Carlo on 7005, 14005, 21005, or 28005 kHz, listening 1 kHz up. He'll be on Fiji 3D July 19–24, Tonga A3 July 30 to August 11, and South Cooks Islands ZK1 August 18–25. Again, QSL to his home call, or via the Italian bureau.

Another special event in August from the South Pacific is the operation of **VI4HBW** during the entire month. The Hervey Bay Amateur Radio Club will use the call to celebrate the Festival of Whales, which commemorates the annual arrival of humpback whales into Hervey Bay. They offer a special QSL card and an award for working the station. Look for VI4HBM on 28495, 21205, 14226.5, 7085, and 3790 kHz. QSL to Box

The WAZ Program

Single Band WAZ

10 Meter SSB

387	KE9U	389	W5LLU
388	KD5ZM	390	IT9ZGY

15 Meter SSB

374	JH8QBY	377	AA4ZK
375	EA3EQT	378	IT9ZGY
376	I6DQE		

20 Meter SSB

839	I7KXG	842	KI6VR
840	HP6AYV	843	IT9ZGY
841	I2UYT	844	VK2DTH

40 Meter SSB

70 ..... IT9ZGY

80 Meter SSB

58 ..... IT9ZGY

10 Meter CW

111	JA0DAI	112	IT9ZGY

15 Meter CW

205	JA7FS	206	IT9ZGY

20 Meter CW

398	JA7FS	399	IT9ZGY

40 Meter CW

136	K4KUZ	138	JA7FS
137	K4XG	139	IT9ZGY

80 Meter CW

29 ..... IT9ZGY

17 Meter Mixed

3 ..... W4CKD

160 Meters

70 ..... W2FCR

RTTY WAZ

63 ..... W5ZPA

20 Meter RTTY

35	W6JOX	36	WS7I

WNZ

35. . . . KA1WHL, 10 Meter SSB

All Band WAZ SSB

3734	N1CWA	3746	KA1JC
3735	WA2UZI	3747	IK4IEE
3736	HB9DKV	3748	WA4MMO
3737	DF6IC	3749	JA0HJI
3738	JH4ATX	3750	KI6VR
3739	IK1BQB	3751	NR7B
3740	EA5AEN	3752	N5HSF
3741	EA7DLD	3753	JA2CNI
3742	NM5O	3754	IT9ZVL
3743	KK4YA	3755	LU1HM
3744	KE2JR	3756	OZ1CID
3745	TL8WD	3757	SM6IVV

CW/Phone

7003	N1CWA	7011	JJ6WSX
7004	N1CWA (CW)	7012	K6FG (CW)
7005	HA5AWT	7013	I3UBB (CW)
7006	K0QBE (CW)	7014	WA9AKT (CW)
7007	JR5LVU (CW)	7015	Y37OJ
7008	I0OAL (CW)	7016	DF2UA
7009	Y33TL	7017	W1WA (CW)
7010	K0HOW (CW)	7018	F6DEF

CW

1 ..... WA4JTI

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all *CQ* awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

Carlos Cardona, HK6BER, passed away last year after 25 years of DXing had netted him 283 countries and dozens of awards. His son Fernando hopes to get this callsign transferred to himself, in memory of Carlos.

The position is very ably manned by Jim Dionne, K1MEM, 31 De Marco Road, Sudbury, MA 01776. *(Sorry for the oversight, Jim!)*

USSR QSL News

Members of the YL1WW/UQ1GWW club take exception to the information from Igor Kuzhelev, UQ2GJR, that he handles QSLs for their club's operation. They report that he is keeping the funds and not providing QSLs. To QSL **UQ1GWW, YL1WW,** or any of their special-event calls **(RQ7W, RQ9W, RQ6W, EU1Q, ER2Q, EK2RR, YL20LSF, or YL25ID)**, try direct to P.O. Box 50, Riga, Latvia 226010 USSR. (*CQ* magazine continues to receive letters from UQ2GJR soliciting QSL business.)

UA0KBZ says he does not receive cards through the notoriously slow Box 88, Moscow bureau. He suggest DXers looking for a card from **UA0KBZ, 4K4/UA0KBZ,** or **EK0KBZ**, QSL direct to P.O. Box DX (485), Cape Schmidt, Magadan Oblast, 686830 USSR, with 2 IRCs.

Serge Kljushnikov, UA9SAW, reports he has answered all the direct QSLs for his September 1989 **UL1K/UA9SAW** Oblast 029 operation. For cards for his **UH1E/UA9SAW** September 1990 Oblast 044 operation, QSL direct to him at Box 13, Gaj, Orenb. Oblast, 462630 USSR.

QSL special event station **RZ1A** via P.O. Box 417, Leningrad 191011, USSR.

UV6ARS offers help with confirming USSR contacts. Send 4 IRCs or US$1 per 10 QSLs to P.O. Box 1, 353130 Wyselki, USSR. Vasil Kasyanenko, UA6HS, also offers to help confirm USSR QSOs. He asks for one to two IRCs per card. He can also supply direct USSR addresses, at 10 for 1 IRC, or forward cards to local bureau (bypassing Box 88) for 2 IRCs per 20 cards. Contact him at Box 20, Georgievsk 357800 Stavropolskogo, Kraya, USSR.

A couple of Soviets volunteer their services as QSL managers: Mikhail Blizniuk, 829, Hervey Bay, Queensland 4655, Australia.

Closer to home, the Old Barney Amateur Radio Club of Manahawkin, New Jersey, will operate **W2OB** from the Barnegat Lighthouse on August 10–11, celebrating National Lighthouse Day. Look for the station 1200–2300Z both days on 7040, 14040, 21040, and 28040 kHz on CW and 7275, 14290, 21390, and 28390 kHz on SSB. QSL to Joe Fleishinger, NU2F, 75 Joshua Drive, Manahawkin, NJ 08050.

Finally, a couple of readers are looking for contacts. Serge Bertuzzo, VE3CHZ, is operating from Kuala Lumpur, Malaysia, until next year, as **9M2NA.** He's most often on 28005 or 14005 kHz 12–1500Z, plus an occasional excursion up the band to operate RTTY. He welcomes skeds. Write to him at No. 4 Persiaran Taman Tunku, Bukit Tunku (Kenny Hills), 50480 Kuala Lumpur, Malaysia. Also, 16-year-old Anton Koval, UB5COS, writes that he would be "Glad to get acquainted with American radio amateurs, irrespective of age, especially YLs." (Sixteen-year-olds are the same around the world!) He speaks English and Russian. Contact him at Box 322, Cherkassy 257000 Ukraine, USSR.

CQ Awards Info

No doubt many of you have noticed the absence of an honor roll this month. Normally the WPX Honor Roll would appear, but Norm, K6ZDL, although he is in his new location in New Mexico, has been having trouble getting his computer system up and running. By the October issue, however, everything should be back on line, and the updated honor roll will appear in the column.

Last month we published the updated rules for all the *CQ* awards. There are several corrections and omissions of note. In the USA-CA Award rules, section C, we make mention of *The National Zip Code and Directory of Post Offices* as a helpful reference book for those working on this award. The paragraph also states "shipped one to the U.S.A. or Canada." This should say "shipped *only* to the U.S.A. or Canada."

In addition, the WAZ Award rules do not say who the WAZ Award Manager is.

5 Band WAZ

As of April 30, 1991, 316 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

HA8XX
JA6JPS
VE3ICR

The top contenders for 5 Band WAZ are:

N4WW, 199	K7UR, 199
SP9PT, 199	K9EL, 199
K6YRA, 199	NAØY, 199
PY7ZZ, 199	VE7DX, 199
DL9WW, 199	WØPGI, 199
KØCS, 199	W2YY, 199
KBØG, 199	I8IGS, 198
ZS6BCR, 199	VE7AHA, 198
UA4RZ, 199	SM6AHS, 198
AA4KT, 199	K1ST, 198
RT5UY, 199	W1JR, 198

717 Stations have attained the 150 zone level as of April 30, 1991.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

UT5-187-150, Stepaniana 9-26, Sevastopol 335038 USSR; and Vlad Sheremeta, P.O. Box 991, Vinnitsa-12, 286012 Ukraine USSR.

QSL Notes

QSL the November 1990 **9H3OA/4** Gozo Island operation direct or via the bureau to Mike Peters, DL1HCM, Kaufbeurer Str. 68, 8500 Nurnberg 60, Germany. For direct, airmail return, please include US$2 or 2 IRCs with your SAE. (German airmail postage is more than US$1.) Cards received with insufficient funds to cover airmail return postage will be answered via the bureau.

QSL **JW9XG** via Terje Roghell, LA9XG, Aspveien 14, N-8200 Fauske, Norway.

PJ9X in the CQ WW WPX SSB was operated by OH6DO. QSL via OH6QU. Also, QSL **PJ2/OH6DO** via OH6QU.

QSL the special call **5K1R** via Raul Gonzalez, HK1LDG, P.O. Box 6060, Barranquilla, Colombia.

Doug **KG4DD** says he is no longer receiving QSL cards via the Guantanemo Bay KG4 bureau. For a KG4DD QSL, send direct to Box 692, FPO New York, NY 09593-0055, with US return postage.

Luis Kemper, ZP5JCY, will be operating with the special call of **ZP50Y** this year, including all major contests. This

QSL Information

1A0KM to I0IJ
3A/DK6AS to DJ8MT
3A2B0SM to 3A2LF
3B8CA to WB7DZX
3C1EA to EA4CJA
3D2QB to SM3CER
3D2RW to ZL1AMO
3V8AL to KE1Y
3X1SG to ON6BV
4K1B to UV6AAP
4K2BDU to UA9MA
4K2FJL to W6MKB
4K2OIL to UA9MA
4K2PGO to RA9LA
4K4/UA0KW to UA0KCL
4L0DXC to UT5HP
4L1QRQ to UW3AA
4X43ID to 4X4HQ
5B4AAL to WB8HWO
5R8JD to F6FNU
5Z4FO to KB4EKY
6W1QB to DK3NP
6W7FZ to DK6ZZ
7P8TX to ZS4TX
7Q7JH to K7UP
7Q7MS to FD1LRQ
7Q7WW to KD6WW
7S30WG to SM3CVM
7X2CR to IS0LYN
9G0R to LZ1KVZ
9H1ED to UA6HSN
9J2SZ to SP8DIP
9M6HF to WE2K
9M8FH to N5FTR
9M8PV to WA4WTG
9N1MM to N7EB
9Q5BG to F5JT
9Q5TE to SM0BFJ
9VIXQ to K2QBV
A41KJ to N5FTR
A71AA to DJ9ZB
A92FN to KI3V
AB6AS/DU3 to KB7EC
BV2DA to DL7FT
CM8OH to CM8OH
CS7LR to CT4LR
CU0WPX to KB3RG
CU2DX to KB5RA
D68FT to DL7FT
EH5TCD to EA5GIW
EJ3GZ to EI3GZ
EK0KBZ to N0IGP
ER4L to UA4LCQ
EX1FAL to UF6FAL
EX1FFF to UF6FFF
EX1FU to UF6FAL
EX2FP to UK6DZ
EX9DZ to UB5FS
FG5FC to F6DZU
FH5EJ to F6EBA
FK8FU to NA5U
FK8GA to WB9HPR
FO0IGS/AU to F6EEM
FO0VU to DB5UJ
FS/JA1IFP to JA1IFP
FS/JA4RED to JA4RED
FT4WC to F6GVH
FT4YD to FD1NZO
FW/VK2BEX to VK2BEX
FW0BX to ZL1AMO
FY5FA to F6GNG
GP4IPA to GU4XGG
H44VU to DL4YAH
HH2T to HI3JC
HR1LW to JA1LW
HS0AC to NY2E
HS0E to K9EL
HV0HH to IK6FHG
HV3SJ to I0DUD
JX1UG to LA5NM
JX3EX to LA3EX
JX7DFA to LA7DFA
K9EL/VS6 to K9EL
KB5LRO/KH9 to WA2NHA
KC4USV to KG5GH
KH0AC to K7ZA
M0RSE to RSGB
OD5PL to HB9CRV
OY1CT to F6GNG
OY1R to W2KF
P29DK to KE4EW
P40V to AI6V
PJ7JC to K2PEQ
R4CG to UA4CK
RB1IZ to RB5IIU
RH2E to RA3QK
RJ1J to UJ8JMM
RL3I/RA9SB to RA9SB
S21U to JA1UT
S79KMB to KN2N
ST0DX to WA2NHA
SV0DV/9 to WB4TDB
SV0HV/9 to KA5EJX
SV2ASP/A to SV2UA
SY/DJ6SI to DJ6SI
SY/DJ6SI to DJ6SI
SZ9A to SV9AKI
T30NAD to JO1CRA
T32Z to N7YL
TJ1MR to F6FNU
TK/DL7HZ to DL7HZ
TK7A to TK5EP
TR8GL to F6IXI
TR8JWH to G4TWT
TU2PA to KE0LS
TV90IS to FD1MRE
TZ6VV to N0BLD
UA2FEK to I0WDX
UA6GAT to DL1VJ
UA9TF to UA9TF
UD6N/UZ3YWH to UA3YBA
UD65DKW to RA3YG
UF7Q/UL7LS to UL7LS
UI8ZAA to K9FD
UL7CM to UL7CBO
UZ3AYR to WF2S
V2A/KR8S to KR8S
VK0KC to VK4BB
VK6BFW/VK9X to JA0GPT
VP2EDH to K8BL
VP2EXX to KC8JE
VP5P to WN5A
VP8CFM to GM4KLO
VQ9HW to KA1CRP
VR6TC to W6HS
XE3AAF to KD8IW
XQ0X to CE3ESS
XT2BW to WB2YQH
XU1SS to JA4KFA
YB0ARN to KC9XN
YJ8RN to N9DRU
YL20SM to UQ1WX
YQ3R to YO3CD
YS1DRF to W2PD
YS1YS to YS1OR
YU400/5B4 to K2VHW
Z21HQ to DF2RQ
ZC4CZ to G4SSH
ZD8DX to WB2K
ZD8VJ to G4ZVJ
ZD8Z to W6CF
ZV8WAS to PY4AG
ZW0ORF to PY2MT
4J0Q to Box 50, Riga, Latvia 226010
4S7WP to Box 80, Colombo
BT0TUA to Box 2654, Beijing
CE0ZVS to Box 38D, Santiago, Chile
EA6AAK to P.O. Box 1778, Palma
EP2HZ to Hassan, P.O. Box 16765-3133, Tehran
EX0FWR to Box 97, Tbilisi 380004
EX1RB to Box 88, Poti 384691
EX9AB to Box 8, Tbilisi, Georgia 380002 USSR
FH4EH to Box 123, Sada Is., Mayotte 97640
JT7AA to Box 64, Muren City
JY9SR to Box 354, Amman, Jordan
NH6YG/KH3 to Richard, Box 976, APO San Francisco, CA 96305
OD5ZZ to P.O. Box 782, Tripoli, Lebanon
RC2AZ to Box 80, Minsk-83, 220083
SV9BAI to Box 92, Chania 73100
TA3D to Box 963, Izmir, Turkey
TA8C to P.O. Box 13, Gaziantep, Turkey
UH2E/UA9TZ to Box 13, Gaj 462630
UH9YWA to Box 73, Serdobsk, 442BB
UM8ML to Box 1332, Frunze 720010
V31SW to Box 1522, Belize City
VR6BX to Brian Young, Box 21, Pitcairn Is.
XU1DK to P.O. Box 80, Koji Machi Tokyo 10291
YN1CB to Box 3733, Managua
Z21HS to Box 4110, Harare, Swaziland

CQ DX Awards Program

SSB

1864	IK8ERL	1871	XE1MD
1865	N3CYD	1872	N5HSF
1866	AA6FW	1873	EA1IF
1867	N9JJX	1874	EA3AYK
1868	WK3N	1875	4X4JO
1869	N4VXX	1876	KC6EYZ
1870	NY3Y		

CW

824	W8URM	826	WB5MTV
825	UA0IDD		

SSB Endorsements

320	I8AA/322	300	W5LLU/308
320	K9MM/322	300	K8YVI/305
320	EA4DO/322	300	N4KEL/M/302
320	I0AMU/321	300	F6BFI/302
320	CT1FL/321	275	W8URM/294
320	DL6KG/321	275	I4CSP/290
320	YS1GMV/320	275	EA8TE/287
320	IT9ZGY/320	275	WK3N/282
320	EA1QF/320	250	VE7HAM/274
310	WA4IUM/318	250	HP6AYV/256
310	IK8BQE/317	200	IK8ERL/247
310	G4ADD/317	200	N5HSF/246
310	K2JF/316	150	NY3Y/166
310	VE2PJ/316	150	N3CYD/150
310	KF7SH/313	28 MHz	WK3N
310	KA6V/313	28 MHz	KC6EYZ
310	AA6BB/313	3.5/7 MHz	WK3N
310	K1HDO/311	Mobile	KC6EYZ
300	XE1MD/309		

CW Endorsements

320	K9MM/321	300	N4AH/302
320	DL8CM/320	300	K9DDO/302
310	DL3RK/319	275	IT9VDQ/297
310	K1MEM/319	275	K2JF/290
310	K2OWE/314	275	WB5MTV/287
310	K9BWQ/313	275	W8URM/281
310	IT9ZGY/313	275	NC9T/278
310	W0HZ/312	275	K1HDO/276
310	WA4JTI/311	250	N1HN/260
300	WA4IUM/304	200	N4KEL/M/228

Total number of active countries is 322. A new CQ DX RTTY award is now available. 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 air-mail reply. Please make all checks payable to the awards manager.

call is in commemoration of the 50th anniversary of the Paraguay Radio Club. For a prompt QSL, send direct only to him at Box 416, Asuncion, Paraguay. He will QSL eventually via the bureau, but don't expect a response for many months, as he is still 10,000 bureau cards behind on his **ZP0Y** and **ZP5Y** QSLing.

DF2UU says he is *not* the QSL manager for D68FT. QSL D68FT direct to Frank Turek with minimum US$2 for postage. Frank does not belong to the DARC, and hence does not receive QSLs via the bureau.

QSL the **TV6M** WPX SSB operation by the gang at *Megahertz Magazine* via Silvio Faurez, F6EEM, 4, rue Duguesclin, F-35170, Bruz, France.

VP2ERA in the 1991 ARRL DX test was *not* by the previous holder of VP2ERA: N6RA. *Don't* QSL via N6CW. QSL only the **1988** VP2ERA ARRL CW operation via N6CW.

Hiro Kusano, JH1GZV, says he can now confirm any of the following operations: **BV2A/B**, 1980 on; **AD1S/KH5**, 1983; **VK0HI** and **VK0CW**, 1983; **BV2JA**; **BV2YL**, 1984; **N2DHZ/VP2V; N2AIR/VP2V, JP1DYZ/VP2V, JA1XGQ/VP2V, JA2IVK/VP2V; VU4APR** and **VU4NRO**, 1987; **K9AJ/KH5K** and **W0RLX/KH5**, 1988; **JA2EZD/BV2**, 1988; and **VU7APR** and **VU7NRO**, 1989. His address is P.O. Box 43, Oji, Kita-ku, Tokyo 114, Japan. To QSL via the bureau, direct your cards to JP1LAB.

Jarmo Jaakola, OH2BN, says he has finished processing all the **AH3C/KH5J** QSL cards, and is resigning from a long service of QSLing. Anyone still needing a Jarvis QSL (or an **XF4L** card from 1989) should write to Martti Laine, OH2BH, Muottaniementie 10-D-20, 02230 Espoo, Finland.

73, Chod, VP2ML

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PROPAGATION PATH ESTIMATOR with signal launch angle and number of hops. 5¼ inch diskette with GCD, station bearing, and free space attenuation. $12.50 including handling and shipping. Write: VVDRG, 1724 Regal Ridge, Las Cruces, New Mexico 88001.

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MacMININEC: MININEC for the Macintosh. Powerful antenna analysis software in the Macintosh environment. Easy to use editor. Plots radiation patterns. $35 postpaid. Chris Smolinski, N3JLY, 40 South Lake Way, Reisterstown, MD 21136.

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QRP-QRO COMPONENTS CATALOG: LSASE to KA7QJY, Box 7970, Jackson, WY 83001.

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WANTED:**OLD**, Western Electric, RCA, Mcintosh, Marantz, Altec, Klipsch, Jensen, EMT, JBL, Electrovoice, Langevin, Fisher, Telefunken, Fairchild, Citation, Dynaco, Tannoy, AR, Leak, Westrex, Ampex; **TUBES**, Speakers, Amplifiers, etc. Call (713) 728-4343. FAX (713) 723-1301. Maury Corb, 12325 Ashcroft, Houston, TX 77035.

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AA1A SIDEKICK ANTENNAS 1-800-874-2880.

TURKS AND **CAICOS** DX VACATION: **VP5JM** "Hamlet" on Providenciales hillside near water. Jody Millspaugh, 809-946-4436, or 3500 S.W. 11th Ave., Ft. Lauderdale, FL 33335.

HAM RADIO CALLSIGN NEW MEXICO LICENSE PLATES WANTED. Bill Johnston, N5KR, Box 370, White Sands, NM 88002. Phone 505-382-7804.

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FOR SALE: New, unused, in original cartons—Commodore C-64, 1571 disc drive, CP/M 2.2, Compucover, Comrex Joystick. $265.00. K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

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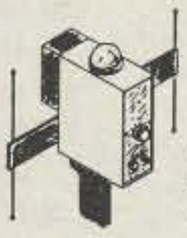

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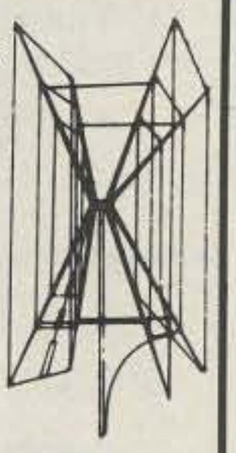

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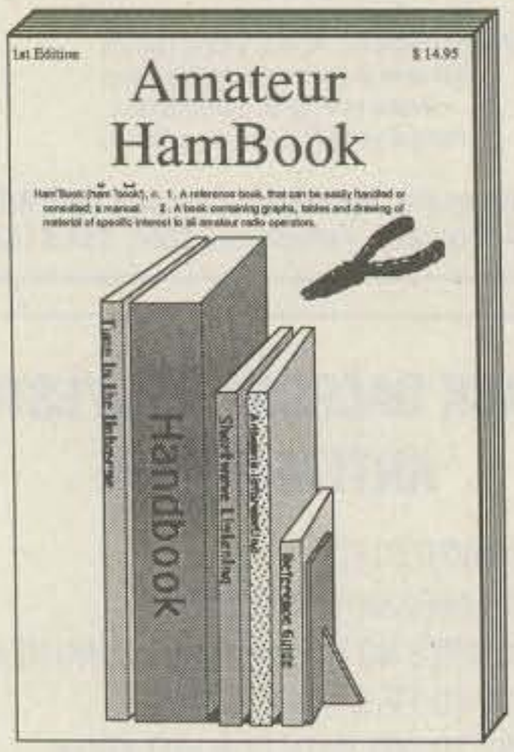

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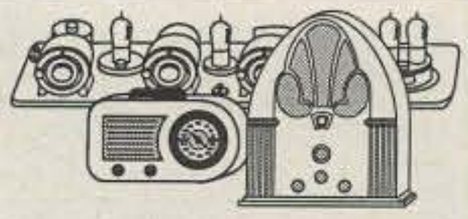

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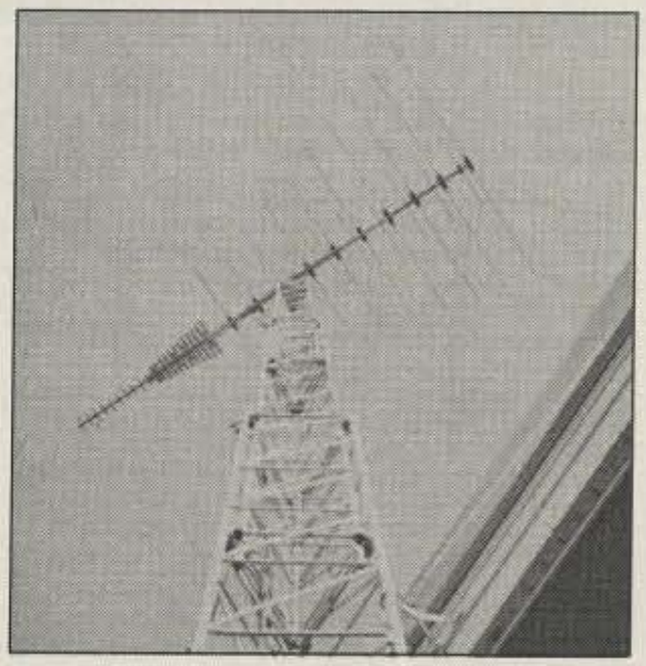

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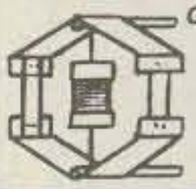

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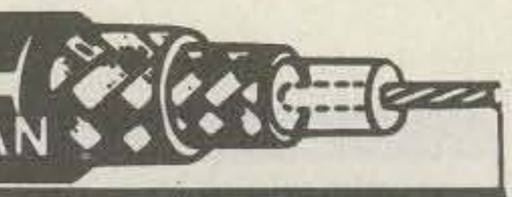

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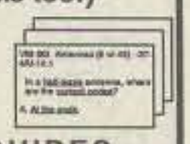

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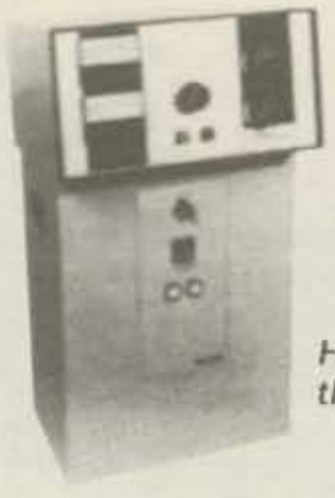

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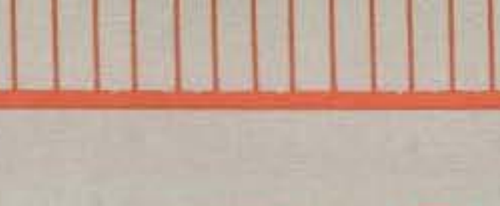

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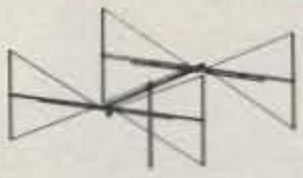

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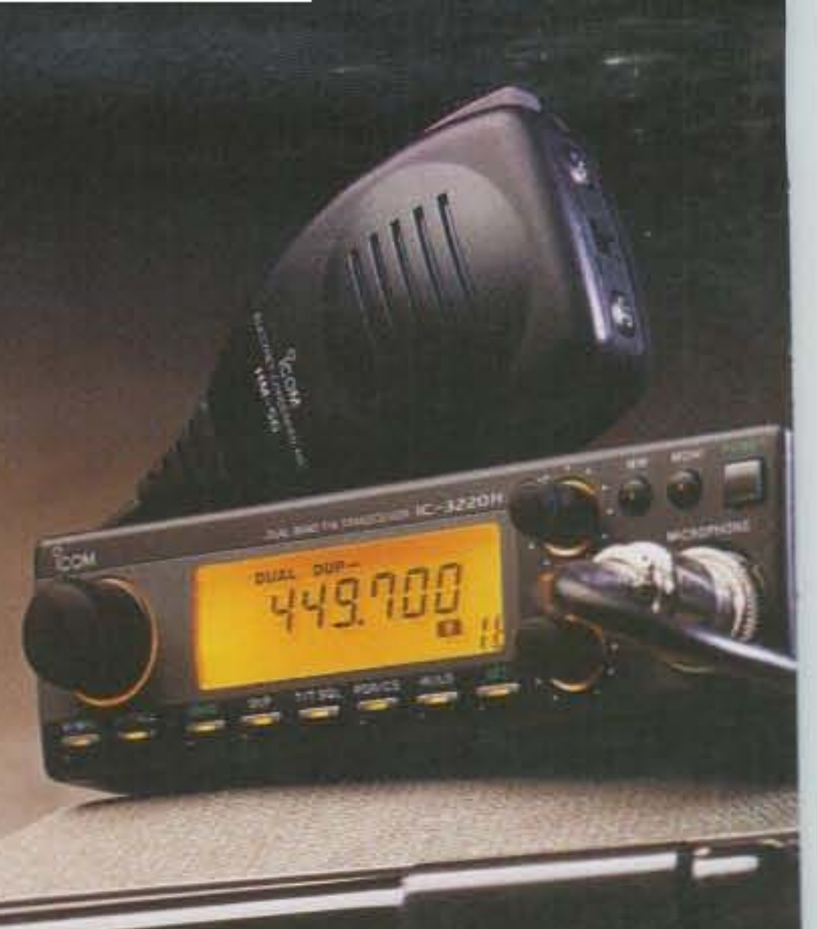
REACH FOR PERFECTION IN DUAL BAND PERFORMANCE



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