ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

MARCH 1996

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- Safely Installing A Roof Tower
- Design Tips For QRP Transmitters
- 1995 Contest Survey... What You've Told Us!
- CQ WW WPX SSB 1995 Contest Results
- CQ Reviews: The MFJ-452 Morse Keyer

cover: Jon Zaimes, AA1K, Wilmington, DE

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IO AMATEUR'S JOURNAL

Best Dual-Banders on Wheels

Receive Up To $85 Cash Rebate.*
Limited Time Only. See Authorized Dealer For Details!

TM-733A
FM DUAL BANDER

144MHz/440MHz Dual-Band Operation

Kenwood's TM-733A is a versatile FM dual-bander with sophistication and power (144MHz; 50W/440MHz; 35W) for high performance mobile communications. As well as receiving simultaneously on VHF and UHF bands, it can receive two frequencies on the same band.

Six-In-One Programmable Memory

Six entire operating profiles—including everything from the frequency range to the dimmer level can be stored in the programmable memory for recall at the press of a button. It's like having six transceivers in one.

Data Connector for 1200/9600 bps Packet

Using the 6-pin mini DIN connector on the front panel, you can hook up a TNC to the TM-733A for either 1200 or 9600 bps packet communications.

1200 9600bps packet compatible

* permits required for MARS and CAP use. Specifications guaranteed for Amateur bands only.

Theft-Deterrent Features

For the added safety, you can choose the quick-release detachable front panel kit (option). The transceiver unit can be concealed under a seat or in the trunk.

Theft Deterrent Faceplate

ISO 9002
Meets ISO Manufacturing Quality System

Other Features

■ 72 multi-function memory channels ■ AIP (Advanced Intercept Point ■ Built-in DTSS with page ■ Cross-band repeater ■ Wireless clone function ■ Wireless remote function ■ Auto simplex checker ■ Built-in CTCSS encoder & optional TSU-8 decoder ■ Key function display ■ Modifiable for MARS/CAP*

144MHz/440MHz & 144MHz/220MHz Operation

The TM-742A (144MHz; 50W/440MHz; 35W) and TM-642A (144MHz; 50W/220MHz; 25W) dual-band mobile transceivers can be converted into tri-banders with the addition of an optional FM band unit: 28MHz (50W), 50MHz (50W), 220MHz (25W; TM-742A only), 440MHz (35W; TM-642A only), or 1200MHz (10W). The transceiver can display and even receive three bands simultaneously.

101 Memory Channels

For each band, there are 100 memory channels plus 1 call channel. Each channel can store transmit and receive frequencies independently or odd split repeaters.

TM-742A

TM-642A

Separate Control & Display Units

The display and controls can be mounted separately on either side of the steering wheel, for example — while the main unit is concealed in the trunk.

TM-742A/642A
FM MULTI BANDER

Other Features

■ Built-in DTSS selective calling with page ■ Independent SQL & VOL controls for each band ■ Built-in CTCSS encoder & optional TSU-7 decoder ■ Wireless remote control function ■ High-visibility illuminated panel keys ■ Wide-band VHF/UHF receive coverage (including Air Band) ■ Date & time display, stopwatch, alarm, on/off timer ■ Cross-band repeater function ■ Modifiable for MARS/CAP*

*Permits required for MARS and CAP use. Specifications guaranteed for Amateur bands only. Kenwood follows a policy of continuous advancement in development. For this reason specifications may be changed without notice.

ISO 9002
Meets ISO Manufacturing Quality System

KENWOOD

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. Box 22745, 2201 E. Dominguez St., Long Beach, California 90801-5745
Customer support/Brochures (310) 639-5300
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*Valid in U.S.A. only.

96ARD-1368

HF TREASURE

Intelligent Digital Enhanced Communications System

FREE Radio Control Program Software Included!

State-Of-The-Art IF-Stage DSP

Once again Kenwood defines the standard with next generation DSP. Utilizing dual digital signal processing chips, the TS-870S captures wave forms at the IF stage (including AGC circuit) in realtime to provide unmatched clarity, noise reduction and control over inbound or outbound signals. The DSP chips deliver a dynamic range of 144dB, enabling you to detect previously unheard signals and customize the filtering system through the menu interface. No other transceiver on the market gives you this much power and flexibility.

Digital Filters

Applying complex algorithms at the IF stage allows you to attain filtering that is unattainable with conventional analog circuits. For instance, you can shape the filter sharp enough to obtain over 100dB out of pass band attenuation with virtually no signal loss. Through the menu-driven interface on the front panel, you can apply standard filters or customize and store them for rapid and convenient access. And because it's all digital, there is no additional cost of optional filters!

Two Noise Reduction Methods

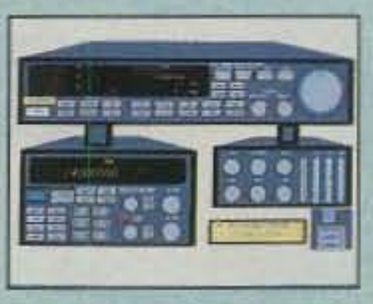
Choose from 2 methods of noise reduction: Line Enhancer Method (LEM) or Speech Processing/ Auto Correlation (SPAC). LEM allows you to custom-shape a filter curve around a target signal, essentially 'carving' it out of the background noise — a powerful tool in SSB operation. For tough CW conditions use the SPAC function, which employs a statistical correlation algorithm to pull weak signals out of the background.

IF Digital Auto-Notch

Another benefit of IF-stage DSP is the ability to detect and eliminate broadcast carrier and continuous beat signals far more effectively than analog systems. It automatically tracks beat signal changes so you can 'set it and forget it'.

57.6 Kbps Computer Control

High speed computer control is available through a built-in RS-232C port and supplied Windows-compatible software called RCP (Radio Control Program). This enables access to most functions of the TS-870S including on/off, frequencies, bands, modes and more. It's also possible to "create" a customized screen radio, based on an original design or the included templates.



Built-In K1 LogiKey Keyer

Sophisticated CW operation is possible with the built-in K1 LogiKey electronic keyer with full or semi break-in, DSP-adjustable rise/fall times, and side tone monitor. A second keyer may also be connected to the TS-870S.

Easy-Access Menu System

Control all of the rig's functions through the menu-driven user interface on the front panel. It also incorporates a Quick Menu feature for rapid access to your most commonly used functions.

Dual Antenna and RX Out

Switch between 2 separate antenna systems from the front panel, plus attach an external receiver to the TS-870S for maximum antenna utilization.

Other Features

■ Beat cancel ■ Variable AGC ■ Selectable voice equalizer (SSB & AM) ■ Speech processor ■ Selectable transmit equalizer ■ 100 watts output on SSB, CW, FSK; 25 watts on AM ■ 100 kHz - 30 MHz general coverage receiver ■ Built-in automatic antenna tuner (TX & RX) ■ Dual VFO with 100 channel memories plus 5 channel quick memory ■ Full band scan, programmable band scan, group scan, memory scan with memory channel lock-out ■ Built-in tone encoder ■ High-quality 60-second digital recording unit option (DRU-3) ■ Voice Synthesizer unit option (VS-2) ■ Modifiable for MARS/CAP*

*Permits required for MARS and CAP use. Specifications guaranteed for Amateur bands only.
Kenwood follows a policy of continuous advancement in development.
For this reason, specifications may be changed without notice.

TS-870S

HF TRANSCEIVER

ISO 9002
Meets ISO Manufacturing Quality System

KENWOOD

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96ARD-1369

The New ETO 91β

Is the Ultimate Value in HF Linear Amplifiers

"... a truly spectacular piece of equipment... that is affordable by the average ham."

Doug Weaver, KD8KX

"I want you to know how pleased I am with my new ETO 91β. It was well worth the wait. Since its arrival in June it has performed flawlessly at 'pile up busting.'*

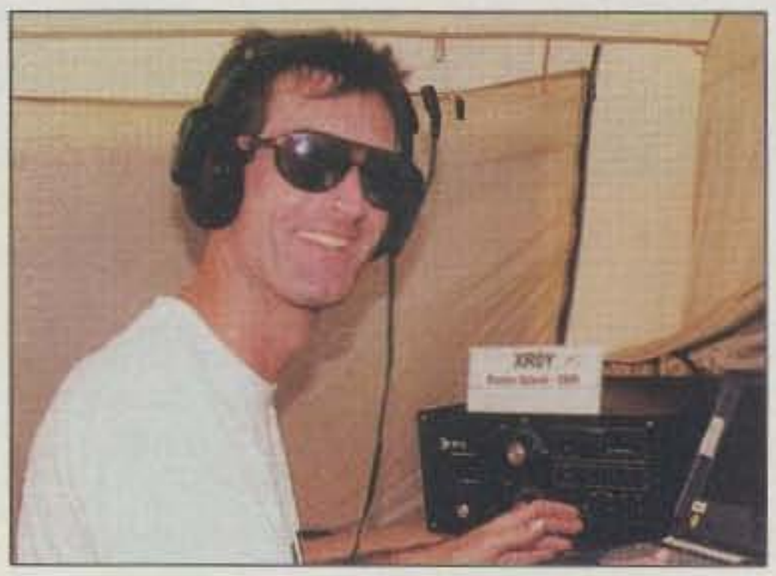
"I am an avid DXer (309 confirmed) and a fairly serious contester. My biggest thrill came recently with XRØY on 40 meters. The only stations getting through at the time were the 6's - it was right at sundown for them.

*"When I fired up the **91β** he came back to me on the second call. I actually had to correct the op and assure him that my call was KD**8**KX and not KD**6**KX!*

*"My **91β** sure has become the envy of all my ham friends."*

Doug Weaver, KD8KX

* A new ETO **91β** to help YOU bust the pile ups is available for prompt delivery if you order quickly. If you're serious about amateur radio, eventually you'll insist on ETO/ *ALPHA* POWER. So why not enjoy it now? To order your **91β** or other ETO/ *ALPHA* amplifier, just call Ray Heaton.



*PAØERA operates XRØY. Five ETO **91β** linears powered some 40,000 QSOs from Easter Island and Salas y Gomez.*

ETO 91β CONDENSED SPECIFICATIONS

RF OUTPUT: 1.5KW, no time limit
COVERAGE: All authorized amateur HF bands
BANDCHANGE/TUNEUP: 'By the numbers'
DRIVE POWER: 55-60W nominal
HARMONICS: At least -50 dBc
INTERMOD: At least -36 dBpk
T/R-QSK: High speed vacuum relay
TUBES: Two 4CX800A ceramic–metal tetrodes; resistive grid; common cathode with rf negative feedback
PROTECTION: Grid & screen current limiting; trip to stby for high SWR or IPavg, RF arc, or severe mistuning; AC off for HV fault
TRANSFORMER: 3.5 kVA, encapsulated, strip wound Unisil-H® core
AC POWER: 100-125/200-250V, 50-60 Hz
WARRANTY: 4 year, limited; 30 day money-back guarantee (US/Canada)

ETO EHRHORN TECHNOLOGICAL OPERATIONS, INC.
4975 North 30th St. • Colorado Springs, CO 80919 • 719-260-1191 • FAX 719-260-0395

CQ Amateur Radio

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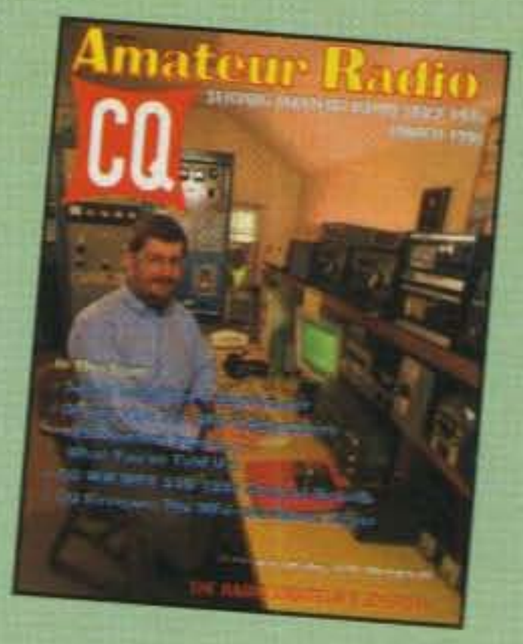
Features

Departments

ON THE COVER: A low-band DXing icon, Jon Zaimes, AA1K, is one of the very best at the game, especially on 160 meters. An impressive array of beverages and transmit antennas, plus filtering and his "incredible ears," allow Jon to work rare DX that others only dream about. (Photo by Larry Mulvehill, WB2ZPI)



ZERO BIAS

AN EDITORIAL

ANNOUNCEMENTS

• **The Foundation for Amateur Radio, Inc**., a non-profit organization based in Washington, DC, plans to administer 57 scholarships for the 1996–97 academic year to assist licensed amateurs. Licensed amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college or technical school. The awards range from $500 to $2000 with preference given in some cases to the pursuit of certain study programs or to residents of specified geographical areas. For additional information or applications, send a letter or QSL postmarked prior to April 30, 1996 to FAR Scholarships, 6903 Rhode Island Avenue, College Park, MD 20740.

• **New 10 meter Tin Can Sailors Net** of New Jersey has formed. The net is for ex-destroyer sailors in New Jersey and will meet on 28.555 MHz at 1800Z SSB. Those interested check in on the 10 meter net or contact WA2FVL.

• **The Annual St. Louis County SKYWARN** Severe Weather Observation Training Seminars have been scheduled for 1996. All are welcome, including those from outside the area. No advance registration required. Certification provided for R.A.C.E.S. and SKYWARN, all at no cost. For additional information, call Michael G. Redman, KAØYXU at 314-889-2362.

• **The following special events are set for March:**

W3FT, from the Greater Baltimore Hamboree and Computerfest, Baltimore, Maryland; The Baltimore ARC; to commemorate the 25th anniversary of the Greater Baltimore Hamboree and Computerfest; 1200–2000Z March 30 1200–2000Z March 31; on 14.240, 7.240, and 146.535. For certificate, send 9½ × 12 SASE, QSL card, and contact number to The Greater Baltimore Hamboree and Computerfest, P.O. Box 95, Timonium, MD 21094.

W4BKM, from the 14th Annual Cherry Blossom Festival, Macon, Georgia; Macon ARC; 1500–2300Z March 16; on 7.235, 14.240, 21.335 phone; and 7.135, 14.035, 21.135 CW. For certificate, send QSL and 9 × 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

WA4TGF and **LA5M**, from Virginia Beach, Virginia and Moss, Norway; The Virginia Beach ARC and Moss ARC; from105th anniversary of the Norwegian Lady; 1400Z March 23 through 2000Z March 24; operation on CW 10 kHz up from the bottom of the Novice subbands and 7.040, 10.120, 14.040; phone 3.878, 7.278, 14.278, 28.363, 146.550. For certificate, send QSL and SASE to VBARC, P.O. Box 62003, Virginia Beach, VA 23462.

KC7LUL, from the Arizona Science Center, Phoenix, Arizona; Center for Amateur Radio Learning (C.A.R.L.); to celebrate HamDaze Weekend, a showcase of amateur radio technology; March 23–24; 1300Z Sat. to 2200Z Sun.; operation in the phone portion of Novice 10 meters, and General 15 and 20 meter bands. For a certificate send QSL and 9 × 12 SASE to C.A.R.L., P.O. Box 51048, Phoenix, AZ 85076-1048.

7-land, Alaska QSO Party; Anchorage, Alaska; The South Central ARC; 0000Z March 23 to 2400Z March 24; suggested frequencies 1.835, 3.700, 3.875, 7.035, 7.135, 7.235, 14.035, 14.245, 21.135, 21.335, 28.135, 28.335 (all ±5 kHz. Submit logs and report by June 30, 1996 to South Central ARC, c/o Jim Wiley, KL7CC, 8023 E. 11th Ct., Anchorage, AK 99504. Certificates for 25 points or 10 contacts.

Ø-land, Burlington, Iowa; IA-ILL ARC stations WØQQZ, WEØU, KØEVX, KØKOP, and WBØB; Iowa's Sesquicentennial Celebration; 1400–2400Z March 20–24; phone 3.898, 7.238, 14.263, CW 3.695, 7.105. For certificate, send QSL and 9 × 12 SASE to Larry Newby, WBØB, P.O. Box 185, West Burlington, IA 52655-0185.

• **The following Hamfests, etc. are slated for March:**

Mar. 1–2, **17th Annual Andy Hamfest and Computer Fair**, Ramada Conference Center, Lewiston, Maine. For more info contact Bill Woodhead, N1KAT, c/o AARC, Inc., P.O. Box 1, Auburn, ME 04212-0001 (phone 207-782-4862; fax 207-784-0222). (Exams.)

Mar. 2, **CDARC Hamfest**, Radisson Inn, Bismarck, North Dakota. Call Tim Rasset, NØSDB, 701-663-6620.

Mar. 2, **Shore Points ARC "Springfest '96" Hamfest**, Holy Spirit High School, Absecon, New Jersey. Contact SPARC, P.O. Box 142, Absecon, NJ 08201.

Mar. 2, **First Annual Bubba Hamfest**, Madison County Fairgrounds, 1/2 mile south of Comer, Georgia. For reservations or more information contact Ron Powell, New Hampshire. For additional information contact Richard Force, WB1ASL, 12 Cottage Street, Lancaster, NH 03584-1903 (telephone 603-788-4428; e-mail r_force@moose.ncia.net.

Mar. 3, **MTARA 11th Annual Amateur Radio/Electronic Fleamarket**, Smith Vocational High School, Northampton, Massachusetts. Contact Lou Calabrese, 800-646-9058. (Exams, preregister call 413-245-3228.)

Mar. 3, **The Cleveland Winterfest**, Cuyahoga County Fairgrounds, Berea, Ohio. For more info write to Don Ritchie, K8ZGW, Hamfest Assn. of Cleveland, P.O. Box 81252, Cleveland, OH 44181-0252; or phone 216-999-7388 in Cleveland; elsewhere 800-CLE-FEST and leave message on pager. (Exams.)

Mar. 3, **South Shore ARC Ham Radio Flea Market**, South Shore ARC Dav #29 Hall, Braintree, Massachusetts. For more info write to William Morgan, 25 Helena Rd., Boston, MA 02122. Pre-registration for exams required. (Exams.)

Mar. 9, **W. Palm Beach ARC Semi-Annual Free Flea**, John Prince Park, Lake Worth, Florida. For information contact Marvin Kaskawits, KD2CK, at KB4VOL at 407-683-2930.

Mar. 9, **Kentucky Mtns. ARC Second Hazard Kentucky Swapfest**, Hazard High School, Hazard, Kentucky. For information contact John Farler, K4AVX, 109 Hall St., Hazard, KY 41701 (606-436-5354); or Sid Adams, WI4M, 401 Sun Valley Terr., Hazard, KY 41701 (606-436-3589). (Exams.)

Mar. 9, **RRRA Amateur Radio and Computer Fair**, West Fargo Fairgrounds, West Fargo, North Dakota. For more info or tickets, write to ARCF '96, P.O. Box 3215, Fargo, ND 58108-3215. (Exams pre-registration required.).

Mar. 9, **Victoria Swapfest 1996**, Knights of Columbus Hall, Victoria, Texas. For further information contact Victoria ARC, 121 S. Main Street., Suite 205, Victoria, TX 77901 (512-573-0821). (Exams.)

Mar. 10, **The Insurance City Repeater Club, Inc. Annual Hamfest and Flea Market**, Bristol Eastern High School, Bristol, Connecticut. For info send SASE to Pete Brunelli, 358 Andrews St., Southington, CT 06489. (Exams by pre-registration only.)

Mar. 10, **Teays ARC Hamfest**, AmVets Building, Circleville, Ohio. For more information, contact Roy Ulko, KG8EK, 132 W. Main St., Circleville, OH 43113 (phone 614-477-2771; voice mail 614-477-8310).

Mar. 15, **Little Rock Hamfest**, Little Rock Expo Center, Little Rock, Arkansas. For more info, contact Ji Blackmon, KB5IFV, 1008 Pine Street, Arkadelphia, AR 71923-4919 (phone 501-246-6734, from 8–5 Mon.–Fri.; 501-246-7833, 24-hour recorder; 501-246-6736, 24-hour fax). (Handicapped accessible.)

March 16, **YSARC Swap Meet/Hamfest**, American Legion Hall, Linda, California. Contact Hugh, N7OKM at 916-846-6702; or Ron, WB5FIX at 916-674-8533.

Mar. 16, **Carteret County ARS Exams**, Fellowship Hall at the First Presbyterian Church, Morehead City, North Carolina. For information, call Art Sylvester, KC4QD, at 726-1205, or Cecil "Penny" Pennington, K4OJV, at 247-6240.

Mar. 16, **MMRA Ham Radio Flea Market**, Westboro High School, Westboro, Massachusetts. Contact Andy, N1BHI, at 508-489-2282; or write P.O. Box 2282, Lexington, MA 02173. (Exams.)

Mar. 16, **Michigan Crossroads Hamfest**, Marshall High School, Marshall, Michigan. For info send SASE to SMARS, P.O. Box 934, Battle Creek, MI 49016; or call Wes Chaney, N8BDM, at 616-979-3433.

Mar. 16, **43rd Annual Kennehoochee ARC Hamfest**, Jim Miller Park, Marietta, Georgia. For info call Margaret, KB4QKW, at 404-977-4405. (Exams.)

Mar. 16, **IRS Hudson NH Flea Market**, Hudson Lions Club, Hudson, New Hampshire. For information, contact John, KA1FYB, 1 Paget Drive, Hudson, NH 03051, or call 603-881-5796.

Mar. 16–17, **St. Patrick's Day Swapfest**, Midland County Exhibit Building, Midland, Texas. For more info contact the Midland ARC, P.O. Box 4401, Midland, TX 79704; or by e-mail: oilman@marshill.com

Mar. 16–17, **North Florida Ham/Swapfest**, Fairgrounds, Fort Walton Beach, Florida. Contact Bud,

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: (516)681-2922. FAX (516)681-2926. CQ (ISSN 007-893X) is published monthly by CQ Communications Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices (all in U.S. dollars): Domestic—one year $24.95, two years $44.95, three years $64.95; Canada/ Mexico—one year $37.95, two years $70.95, three years $103.95; Foreign—one year $39.95, two years $74.95, three years $109.95; Foreign Air Mail—one year $84.95, two years $164.95, three years $244.95.
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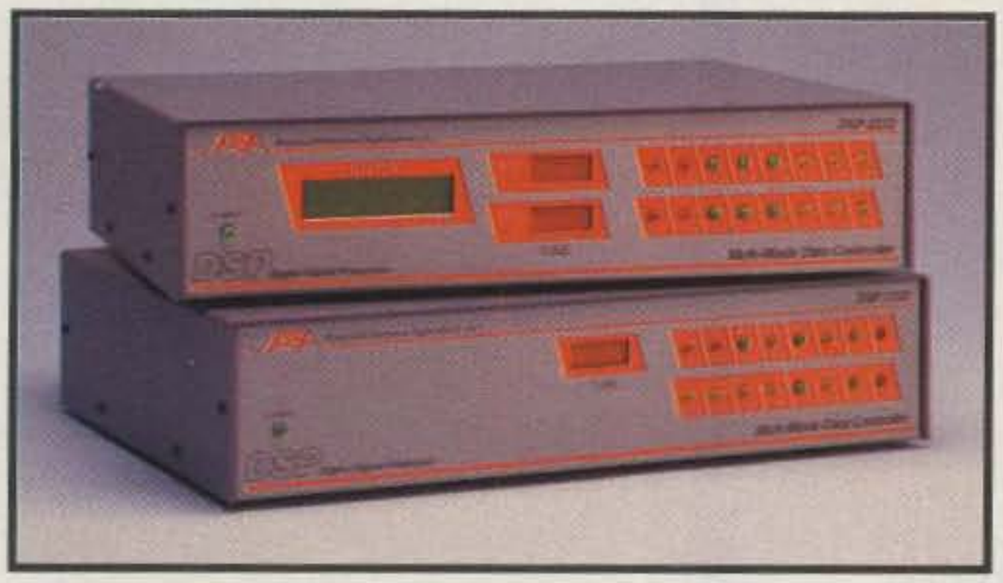
Data Controllers Put You In Control

PK-900

Now Does GPS

- Dual simultaneous ports.
- Automatic signal idenfication.
- 9600 bps modem option available.
- 8-pole Chebyshev bandpass filter.
- Dual-port Gateway: Packet to AMTOR, Packet to PACTOR, and Packet to Packet.
- Twenty software selectable modems.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- 16-level gray scale fax with opt. software.
- Same modes as the PK-232MBX.
- Full PACTOR Memory ARQ.



DSP-2232
DSP-1232

- DSP-1232 has two switchable ports.
- DSP-2232 has two simultaneous ports.
- Same modes as the PK-232MBX.
- Includes modems for satellite use.
- Automatic signal identification.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- DSP-2232 has dual-port Gateway: Packet to AMTOR, Packet to PACTOR, & Packet to Packet.
- DSP-2232 features front panel LCD.
- Up/Down Doppler shift for PSK modems.
- 9600 bps modem included.

PK-232MBX

Now Does GPS

- Designed for multi-mode operation.
- Internal 1200 bps VHF modem.
- Automatic signal identification.
- 18K Packet, PACTOR, and AMTOR MailDrop.
- 2400 bps modem option.
- 8-pole Chebyshev bandpass filter.
- Modes: Morse code, Baudot, RTTY, ASCII, AMTOR/SITOR, PACTOR, VHF & HF packet, B&W fax receive/transmit, NAVTEX/AMTEX, and ARRL Information Services.
- Gateway as a node.

PK-12
PK-96

PK-12 Now Does GPS

- PK-96 is a 9600 bps packet-only controller with 9600 bps K9NG and G3RUH compatible direct frequency modulation and 1200 bps VHF packet.
- PK-12 offers 1200 bps VHF packet at less than 80 mA of power.
- PK-96 features true DCD state machine for open squelch operation.
- 32K RAM, easily expandable to 128K.
- KISS mode for TCP/IP compatibility.
- Control of third-party MailDrop traffic.

Call (206)712-8054 for a complete catalog or information on a specific product. Contact your favorite amateur radio equipment dealer for best pricing.

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OUR READERS SAY

QSL Bureau Volunteer Appeal

Editor, *CQ*:

This is by way of an appeal to all of you who send QSL cards. I am a volunteer handler and have just sorted over one thousand cards, and my eyes simply ache.

Most volunteers are seniors, and many of us have a spot of trouble reading callsigns, especially those made on a computerized system. I mean the ones with all the information cramped on a label the size of a postage stamp. Come on fellas: please make the callsign easily readable and also legible. Guess I overdid that a bit!

Would it not be possible to design a standard reverse side to these cards? One clearly stating all pertinent information, especially the callsign of the recipient. I realize this is a pipe dream, but please make the effort and print the call at least readable without the use of a magnifying glass.

Another gripe while I am on the subject. PLEASE keep your cards to the standard postcard size. Many beautiful cards are ruined because they are oversized and the edges become frayed.

So, friends around the world, take pity on the bureau handlers and make your cards easily readable.

Ron E. Martin, VA3RON (GØUNW)
(VE3ORN @ VA3BBS)
RAC Incoming QSL Bureau Volunteer

A Realistic Face on DX

Editor, *CQ*:

Your January 1996 issue pictured a wonderful contrast that showed the range of amateur radio. Look at the cover photo of the Arizona setup, then look at page 14 for the Andaman Islands station! This contrast reinforces the fact that there is more to ham radio than sleek boxes and flashing lights. There is clearly a pride of technical accomplishment and human communication in both settings.

The article by Jim Smith on amateur radio in the Andaman Islands was excellent. It showed sensitivity to other cultures and the rigors of isolated island living. His writing makes clear that operating skill cannot be underestimated.

More articles that demonstrate how amateurs operate in ordinary, day-to-day life outside the "Western World" would make for fascinating reading, and help put a realistic face on "DX."

Steven Goldman, N9TZP
Roselle, IL

Can't Bear To Share

Editor, *CQ*:

Thought you might have a use for this picture. The shot is of my shack, and that's me, NØJR. At the key is second op Bearlioz (UR5INE?), who can't bear to share the rig! (It's even worse when he hogs the mic! At the operating desk is our favorite ham magazine. One of us has been reading it since he was first licensed in 1958 (Bearlioz likes the pictures). Thanks for a terrific publication!

Jan C. Robbins, NØJR
Cedar Falls, IA

NØJR is waiting for the second op to get off the air so he can get back on!

PRICES REDUCED!*

• NEW STANDARD FEATURES! •

Encode/Decode & 2.5 Watts of Power!

BP-180 battery equipped models. Limited availability.*

*See your ICOM dealer for details!

IC-W31A/IC-Z1A FEATURES:

- BP 180 (7.2 V @ 600 mAh) = 2.5 W; BP 171 (4.8 V @ 700 mAh) = 1.3 W
- Slim profile • Tone scan
- Independent tuning knobs
- Multiple power-saver functions w/ battery voltage readout
- 180 mW audio output
- Accepts 4.5 – 16 V external power (13.5 V= 5 W max)
- UHF/UHF, VHF/VHF, or VHF/UHF band operation
- Simultaneous receive on both bands
- CTCSS encode/decode standar
- New HS-85 optional headset
- Auto repeater offset and memory
- Selectable DTMF auto dialing speed
- Adjustable power output (3 levels)
- Compatible with BC-79A drop-in charger (AD-51 req.)
- AM aircraft Rx • MARS/CAP modifiable

All features are operational in both the single unit and remote configuration (separation kit included).

IC-Z1A

WORLD'S FIRST REMOTEABLE CONTROL PANEL!

ICOM'S NEXT GENERATION TECHNOLOGY IN DUAL BAND HANDHELDS The IC-W31A and IC-Z1A are both small, slim and jam-packed with features you wouldn't expect at such an affordable price.

IC-Z1A REMOVABLE REMOTE CONTROL PANEL IS A FIRST! – Better than a speaker-mic, the remoteable control panel provides a full functional display of all operating conditions (including bands and frequencies) and complete control of volume, operating modes, tuning, scan, band selection, ON/OFF, and PTT. The remote control panel comes standard with an extension cable and lapel clip.

IC-W31A TRADITIONAL SINGLE UNIT OPERATION –1/3 slimmer than its IC-Z1A cousin. Great looks match its outstanding performance.

ALPHANUMERIC MEMORY DISPLAY – Up to 6 characters for memory channel identification. 104 memories may be displayed by either the frequency or alpha name. An EEPROM prevents losing memory information if the battery runs down.

ALPHANUMERIC MESSAGE AND PAGING – Use the alpha display to transmit and receive up to 6 characters (using DTMF tones) as a simple message pager, acknowledgments, etc....

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Results of the 1995 CQ World-Wide WPX SSB Contest

BY STEVE BOLIA*, N8BJQ

The 38th WPX SSB Contest will be remembered as a two-part contest. The first 24 hours generally were very good, considering where we are in the sunspot cycle, and the second 24 hours were very bad. With a K-index of six on the second day, rates dropped drastically and operating became much more of a challenge. In spite of the erratic conditions, scores were quite good, with four world records broken and some very stiff competition in almost all categories. If you didn't work the low bands, you missed a big part of the action.

DX

Operating from the only place in the world where you can see four DXCC countries, EA3NY at EA9AM edged out P4ØR operated by first-time WPXer K4UEE for the world all-band title. Bob had a substantial QSO advantage, but Eddie's big advantage in multipliers made the difference. Flying in from the Philippines, ED8OR operated by OH1XX/DU1 finished third. Coming in fourth was Pedro, HC1OT, followed by K5TSQ at North American champ 6D2X. WR6R/WH6 set a new Oceania record with his sixth place finish. In seventh place was low power champ EL2PP with 9.7M points. Rounding out the top 10 were PQØMM (in Brazil), LT6E (LU6ETB op), and the top Asian entry, 4X2T.

South Americans dominated the high band leader boxes. ZVØW edged out ZV5C for 28 MHz honors, followed by low power entries L3HL, LU1MA, and LU3HIP. ZW5B (PY5EG at the mic) set a new World Record on 21 MHz, with ZPØY second and PY4OY third. Asian champion N6BFM/9K2 was fourth and 5H3CK fifth. Peter, PY5CC, piloted PYØFM to a new World Record on 14 MHz, with KW8N at KP2A finishing second and low power champ IB4M third, followed by CJ7NTT and USA record holder KC1XX. TE1C (TI2CF operating) shattered NP4A's 1986 7 MHz record, with ED9LZ came in second with a new African record, YV5A third with a new South American record, and S5ØA fourth with a new European mark. ON4UN (OT5T) traded his key for a microphone and finished fourth, with S5ØC coming in sixth. In a very close race CJ7SZ edged out S57AW by 40K for the top spot on 3.5 MHz. TO2DX was third, with USA record holder WE3C fourth and KE1Y fifth. On top band both S52CD and S58AB broke the existing world record with Tone winning by less than 6K. Third was K1ZM with a USA record, followed by 9A4D and UA2FF.

More than 50% of all single ops entered the low power category, up slightly from 1994. This category is gaining in popularity and scores are going up. There were several low power expeditions that turned in excellent scores and were competitive with the higher power stations. EL2PP topped the all band category with an outstanding 9.7M point effort. Finishing second was expedition trophy winner WX9E at FS5PL with 7.5M points (number 11 in the world overall). In third was VP2EN with AA4NC operating, followed by L37N and 5T5JC.

This is Peter, PY5CC, who took PYØFM to the number one spot on 20 meters. In the background is part of Fernando de Noronha Island.

All but one of the top 10 scores on 28 MHz were turned in from Argentina. L3HL topped the list, followed by LU1MA, LU3HIP, LU2DW, and LU4OJS. CX6VM edged PP5UA for 21 MHz honors with GIØKOW third, EA7FTR fourth, and Z32JA fifth. IB4M QSYed from 21 to 14 to take world honors, followed by XM7A, GIØUJG, IR9B, and LU5FCI. S54ZZ edged out C6AFV and IR4R for 7 MHz honors, with Z31GX taking the top spot on 3.5 MHz. F5BEG finished second and DL5FDA third. OZ3SK repeated as top band champ, followed by 9A3KR and S59VM.

KA2AEV is the Assisted world champ, with ZS9F (ZS6YA operating) a close second and KY2T third. W6XR/2 (N2NPG op) finished fourth, followed by S59AA. In the Single Band Assisted category LU7HLF turned in a very respectable score on 28 MHz, 7L1FPU/1 was tops on 21 MHz, CJ7SBO had a very nice 14 MHz entry, and W4JVN won on top band. Scores in this category were up a bit from the inaugural year, as was participation.

In the QRP category JA6GCE was the top scorer, followed by YU1KN and LY3BA. L5F operated by LU1FNH was the 28 MHz champion, with UY3CC taking 21 MHz honors. RW9AB had the top QRP score on his way to the top 14 MHz title. JA6UBK, W1MK, and YL3GHD won 7, 3.5, 1.8 MHz, respectively.

USA

KM1H operated again by KQ2M returned to the top of the USA all band list. CQ WW Contest

Obviously pleased with their efforts are AI6V and N7NG, who operated P4ØV to the multi-single world championship.

*4121 Gardenview, Beavercreek, OH 45431

Director K3EST came in second, followed by W3BGN, N7AVK, and K3ZO. Rounding out the top ten were WZ4F, KA4RRU, NB7N, and K5ZD.

KD4HXT, N5OKR, and KC3PZ were one, two, and three on 28 MHz, followed by KY5N and WB2BZR/3. KD4HXT, N5OKR, KC3PZ, and WB2BZR/3 were all low power entries. KC2X came out on top on 21 MHz, followed by W5VX, KZ5D, N2MM, and WC4E. KC1XX shattered the US 14 MHz record, which had stood since 1987. WE9V was second (also breaking the record), with 1994 champ KK9A third. On 40 meters KC7EM beat his existing record by nearly 600K. N7DD also beat Steve's old record. WE3C set a new 80 meter record, with KE1Y and KS9K providing lots of competition. K1ZM more than doubled the old 160 record with his incredible 327K effort. AC4NJ was second and AA4MM finished third.

WS1A repeated as low power champion, followed by N7LOX, NZ5O, WW3S, and AI2C. The top four 28 MHz entries were also numbers 1, 2, 3, and 5 overall on 10 meters. WA7BNM again topped the 15 meter leader box, with WJ7S second and N5NMX third. WF1L won again on 20, followed by KA4KFQ and WA6KUI. In his first attempt at a single band entry, AA9IA worked 12 new countries on 40 and made it to the top of the leader box. W4YDD topped the 80 meter box and WO9S did the same on top band.

In the Assisted class KA2AEV won the world. KY2T was second in the US (third overall), W6XR/2 third, WAØPUJ fourth, and WA4CHI fifth. W4JVN won the 160 Assisted title, and KE4ZFB turned in the top low power Assisted score.

N1AFC and KA1CZF finished less than 1.5K apart in the QRP section. WA6FGV had the top 21 MHz score, N8AXA likewise on 14 MHz, and W1MK as the world champ on 80.

Multis

KP4XS, K3NA, KF3P, W2EOS, and K1RZ operated KP4XS to the top spot in the Multi-Multi category, edging outEuropean champ 9A1A and LU4FM. HG73DX was fourth and OT5A finished at number five. P4ØV operated by AI6V and N7NG topped the multi-single section, followed by PT7CB, HH2PK, TM1C, and EA8BR.

In the US, WZ1R was the Multi-Multi champ, with WA1LNP second and WA8LOW third. N3BB (N3BB and AA5RB ops) won the Multi-Single category, with KT8X second, NE8T a very close third, WX1Z fourth, and N4ZZ finishing fifth.

The Rest of the Story

Electronic submission of logs appears to be a hit, as nearly 100 logs from all over the world arrived via the Internet. Several showed up within a few hours after the end of the contest. E-mail submission of logs will again be accepted. My e-mail address has changed to **N8BJQ@ERINET.COM**. As a minimum, you are required to send a summary sheet, a prefix list, and your log in ASCII format. The log must contain all required information. If you use CT, please send the *.BIN file; the .DAT file for TR; or the .QDF file for NA. These can be sent uuencoded (MIME is also acceptable). Please don't use other forms of compression, as I am not able to decode them easily. E-mail confirmation will be sent for all logs received via the Internet.

Bob, K4UEE, at P4ØR was the number two single op in his first try at WPX contesting. His assis tant is the daughter of his host.

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

WORLD: Stanley Cohen, WD8QDQ Trophy. Won by: **EA9AM operated by Eddie Stark, EA3NY.**
USA: Atilano de Oms, PY5EG Trophy. Won by: **KM1H operated by Bob Shohet, KQ2M.**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **ED8OR operated by Olli Rissanen, OHØXX/DU1.**
EUROPE: Jim Hoffman, N5FA Trophy. Won by: **Joergen Vibaek, OZ5EV.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **P4ØR operated by Bob Allphin, K4UEE.**
OCEANIA: Philip Fraizer, K6ZM Memorial. Won by: **Al Crespo, WR6R/WH6.**
***JAPAN**: The DX Family Foundation Trophy. Won by: **M. Maruyama, JA7BEW.**
WORLD QRP/p: Dayton Amateur Radio Association Trophy. Won by: **Nobuo Matsuoka, JA6GCE.**
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Peter Archibald, N1AFC.**

SINGLE OPERATOR, SINGLE BAND

WORLD: John N. Reichert, N4RV Trophy. Won by: **ZW5B operated by Atilano de Oms, PY5EG (21 MHz).**
WORLD (Low Power): Vern Fowler, W8BLA Trophy. Won by: **XM7A operated by Dale Green, VE7SV (14 MHz).**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **TE1C operated by Carlos Fonseca, TI2CF.**
EUROPE: CQ Magazine Trophy. Won by: **Paolo Peggi, IB4M (14 MHz).**
OCEANIA: D. Craig Boyer, AH9B Trophy. Won by: **Martin Woll, N6VI/KH6 (14 MHz).**
USA 1.8 MHz: Northern California Contest Club. Won by: **Jeff Briggs, K1ZM.**
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **John Rodgers, WE3C.**
USA 7 MHz: Lewis Sayre, N7AVK Trophy. Won by: **Steve Kelley, KC7EM.**
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **Steve Sacco, KC2X.**
USA 28 MHz Novice/Tech: Jon Engelhardt, KAØZFX. Won by: **David Kalahar, Jr., KD4HXT/T.**

MULTI-OPERATOR, SINGLE TRANSMITTER

USA: Oklahoma Comm Center Trophy. Won by: **N3BB operated by N3BB & AA5RB.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Prince Georges Zulu Radio Club Trophy. Won by: **KP4XS operated by KP4XS, K3NA, KF3P, W2EOS, K1RZ.**
NORTH AMERICA: Burt Curwen, KL7IRT Memorial (James Dixon, NL7HI sponsor). Won by: **WZ1R operated by WZ1R, KY1H, AK4L, KB1W, NJ1F, NY1L, WM1K, K1MBO, K1VWL, AA1AS, WA1ZAM.**
USA: Glenn Tracey, KC3EK Trophy. Won by: **WA1LNP operated by WA1LNP & N1NCI.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **FS5PL operated by Paul Gentry, WX9E.**

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PQØMM	8,428,698
LT6E	8,428,628
4X2T	7,933,335
***FS5PL**	**7,528,698**
RZ9UA	7,142,014
KM1H	**6,966,176**
3G1X	6,736,656
OZ5EV	**6,468,090**
OM8A	6,351,870
IR8A	6,221,171
GW4BLE	6,133,923
*VP2EN	5,744,520
ZP6XR	5,552,129

28 MHz

ZVØW	1,553,050
ZY5C	1,232,144
*L3HL	881,892
*LU1MA	843,980
*LU3HIP	811,590
*LU2DW	781,280
*LU4OJS	594,145
*LW1DIP	244,185
*LU3OJZ	233,590
ZL1AXB	186,189

21 MHz

ZW5B	**14,095,142**
ZPØY	12,406,668
PY4OY	6,532,974
N6BFM/9K2	5,275,900
5H3CK	3,049,410
OK1RI	2,982,240
9Q5TT	2,211,552
JI2UNR	1,687,320
*CX6VM	1,663,365
*PP5UA	1,527,760

14 MHz

PYØFM	9,660,432
KP2A	7,088,976
***IB4M**	**5,125,020**
CJ7NTT	4,951,782
KC1XX	4,787,328
IU9S	4,592,434
N6VI/KH6	**3,981,344**
9A7A	3,919,505
WE9V	3,744,000
*XM7A	3,210,350

7 MHz

TE1C	**7,281,630**
ED9LZ	6,047,504
YV5A	4,581,048
S5ØA	4,536,756
OT5T	4,403,994
S5ØC	3,646,830
VK3EW	3,222,576
F2EE	2,882,922
II3T	2,670,472
UA2FZ	2,312,416

3.7 MHz

CJ7SZ	1,757,568
S57AW	1,719,468
TO2DX	1,568,320
WE3C	**1,519,300**
KE1Y	1,295,050
S53EA	1,245,342
ON9CJM	1,223,880
S57O	1,214,904
KS9K	1,203,432
LY6M	1,196,506

1.8 MHz

S52CD	422,532
S58AB	416,806
K1ZM	**327,712**
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HK3JJH	2,238,150
VP5A	2,178,100
CJ6JO	2,037,497
YL2TW	1,872,640
6Y5DA	1,737,580
LU8ADX	1,514,442
UR5EAT	1,389,150
PW2N	1,272,245
EA3GJH	1,252,284
EA3BKI	1,225,434
UA2FB	1,206,445
CJ6V	1,124,840
ED7BHP	1,109,349
VP2MGF	1,092,136

28 MHz

L3HL	881,892
LU1MA	843,980
LU3HIP	811,590
LU2DW	781,280
LU4OJS	594,145
LW1DIP	244,185
LU3OJZ	233,590
LW2DBM	176,813
PY2OZF	107,535

21 MHz

CX6VM	1,663,365
PP5UA	1,527,760
GIØKOW	901,478
EA7FTR	807,824
Z32JA	719,928
YC3BC	652,460
JF3NLQ	552,420
WA7BNM	446,336
UA9USK	430,236
EA3CWS	417,942

14 MHz

IB4M	**5,125,020**
XM7A	**3,210,350**
GIØUJG	2,224,320
IR9B	2,097,405
LU5FCI	1,758,447
ZF1DX	1,394,193
YU1NR	1,159,524
S52UT	1,096,290
CJ2SPY	948,930
CT8BWW	905,625

7 MHz

S54ZZ	830,700
C6AFV	735,572
IR4R	712,920
LX9UN	507,180
LY2BUU	173,886
Z31GB	144,200
UA3DPX	110,630
SV2AEL	107,508
JR7OMD/2	102,240
ZS6IR/PA	91,848

3.7 MHz

Z31GX	527,520
F5BEG	277,680
DL5FDA	264,810
EA3CWT	242,088
OM7V	217,056
OK2PJW	216,580
HA4FV	206,736
PAØMIR	155,940
UA4PNX	138,012
PA2SWL	118,384

1.8 MHz

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ED5OL	1,140,736

28 MHz

LU7HLF	904,383

21 MHz

7L1FPU/1	141,040

14 MHz

CJ7SBO	2,041,571
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1.8 MHz

W4JVN	2,176

LOW POWER ALL BAND

VX3TA	456,960
PA3AAV	187,854

QRP/p

JA6GCE	**A**	**599,860**
YU1KN	A	552,570
LY3BA	A	446,250
OK1DKS	A	247,245
N1AFC	**A**	**175,925**
L5F	28	37,296
UY3CC	21	173,493
JH1HRJ	21	116,660
RW9AB	14	699,648
DL9YEK	14	61,773
JA6UBK	7	99,160
JA2DLM	7	24,300
W1MK	3.7	5,304
SP8YDJ/P	3.7	2,320
YL3GHD	1.8	2,400

MULTI-OPERATOR SINGLE TRANSMITTER

P4ØV	21,390,358
PT7CB	15,515,600
HH2PK	14,583,380
TM1C	13,710,246
EA8BR	13,399,103
CT9M	12,286,732
IR4T	11,434,064
LZ9A	11,311,089
CT5P	10,180,656
P39P	9,633,638
CT8T	9,428,172
XX9X	9,078,220
LV1V	8,755,968
JH5ZJS	8,625,760
C49C	8,552,816
FO5IW	8,374,432
TO5GI	8,298,000
4M3B	8,192,850
VP2MDE	7,852,355
F9IE	7,470,876

MULTI-OPERATOR MULTI-TRANSMITTER

KP4XS	**27,093,690**
9A1A	25,012,814
LU4FM	23,826,270
HG73DX	20,915,066
OT5A	19,638,456
WZ1R	**13,598,020**
EM2I	13,063,454
EW5A	9,104,355
VE7ZZZ	8,005,021
6E2T	7,121,946
LY7A	5,245,882

**Denotes low power.*

If you mail your log, please send a disk. **Top scores will be required to send a disk if a computer is used for logging**. This makes our life easier and log checking more accurate. For a good description of how the logs are checked, see K3EST's article in the premier issue of *CQ Contest* (published by CQ Communications). Many of the same techniques and databases are used by the WPX committee. The more logs we can input into the database, the more accurate it will be.

Beginning with the 1996 contest, the CQ WPX Contest will be adding three new categories in an effort to encourage entry-level and average-antenna stations. These new categories are (1) Rookie category; (2) Tribander and Single-Element category (TS); and (3) Restricted Band category (BR). All three categories will be single operator with no assistance, all band only, and up to the legal power limit of your license. You may only enter one category. An entrant in the Rookie category shall have been licensed as a radio amateur three years or less at the time of the contest. If you enter the TS category, you may only use one tribander for 10, 15, and 20 meters and a single-element antenna on 40, 80, and 160. An entrant in the BR class must hold a license restricting operation to less than the six contest bands (10-160) on both modes. This will include Novices, Technicians, 4 class license, etc. In this category you will only compete with other stations in your own country. **Entrants in any of these categories must clearly indicate on the summary sheet the type of entry (Rookie, TS, or BR)**. A Rookie must indicate the date licensed, TS class entrants must give a complete description of all antennas used during the contest, and BR class entrants must list all bands available for operation by the operator. A complete listing of these new rules will be in the February issue of *CQ Contest*. WPX rules, these new rules, and many other interesting articles and pictures can also be found on the CQ Contest home page on the

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Three separate Output Terminals
Variable Output Voltage (1-14V DC)
Built-in Cooling Fan
Built-in Circuit Protection
Dimensions:
9-3/8"(W) x 5-1/2"(H) x 9"(D)
Weight: Approx. 20 lbs.
DM-1350-1 (110VAC input)
DM-1350-2 (220VAC input)

DX-70T

HF+6m All Mode Transceiver
100 Memory Channels
Subaudible Tone Encoder
Detachable Control head
Built-in Narrow Band Filter
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CIRCLE 166 ON READER SERVICE CARD

JRC

JST-245

160-10 Meters PLUS 6 Meter Transceiver

Fifteen reasons why your next HF transceiver should be a JST-245

1 All-Mode Operation (SSB,CW,AM,AFSK,FM) on all HF amateur bands and 6 meters. JST-145, same as JST-245 but without 6 meters and built-in antenna tuner.

2 MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.

3 AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.

4 MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.

5 GENERAL COVERAGE RECEIVER • 100 kHz-30 MHz, plus 48-54 MHz receiver. Electronically tuned front-end filtering, quad-FET mixer and quadruple conversion system (triple conversion for FM) results in excellent dynamic range (>100dB) and 3rd order ICP of +20dBm.

6 IF BANDWIDTH FLEXIBILITY • Standard 2.4 kHz filter can be narrowed continuously to 800 Hz with variable Bandwidth Control (BWC). Narrow SSB and CW filters for 2nd and 3rd IF optional.

7 QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.

8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

10 CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.

11 DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.

12 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.

13 COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.

14 ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.

15 HEAVY-DUTY POWER SUPPLY • Built-in switching power supply and a cooling systems designed for continuous transmission at maximum output.

JRC *Japan Radio Co., Ltd.*

430 Park Ave., 2nd Floor New York, NY 10022 Phone: (212) 355-1180 Fax: (212) 319-5227

CIRCLE 151 ON READER SERVICE CARD

MFJ *tunable* DSP *filter*

NEW

. . . Tunable "brick wall" bandpass, lowpass, highpass, notch, SSB, CW filters . . . programmable pre-set filters . . . automatic multiple notch filter eliminates heterodynes . . . adaptive noise reduction reduces noise and QRN . . . for Voice, CW, Data . . .

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

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

MFJ-784B

$249.95

Patent pending

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

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

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

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

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

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

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

Automatic notch filter

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

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes.

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

Turn on *automatic* notch and you'll never hear unwanted heterodynes of tuner-uppers.

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

Adaptive Noise Reduction

Turning on noise reduction silences background noise. It reduces fatigue and makes noisy signals readable.

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

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

Tunable highpass/lowpass filters

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

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

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

NEW MFJ-784B Features

- Tunable *Spotting Tone*™ -- an *MFJ invention* -- accurately tunes even the narrowest CW filter
- MFJ's exclusive *Adaptive Tuning*™ -- Center frequency tuning automatically becomes finer as you narrow bandwidth -- makes extremely narrow filters easy-to-use
- Improved automatic notch with *variable* aggressiveness
- New quieter audio amplifier gives you *full* 2½ Watts output
- Speaker ON/OFF button, phones always active
- Accurate easy-to-use input level indicator
- *Filter Talk*™ function sends precise filter settings in Morse code
- Filter automatically bypasses during transmit for monitoring CW sidetone, voice or data by sensing PTT line
- Improved manual notch in the CW mode
- Manual notch and automatic notch can be used simultaneously
- Noise reduction,automatic notch and tunable manual notch can be used in Memory mode
- Adjustable line level output
- More Mark-Space frequencies and baud rates for data filters
- Improved self-test for all digital circuitry, switches and controls

Unlike other filters, speech is not distorted by unequal time delay.

When signals are weak, you can improve copy by removing noisy high and low speech frequencies that contain little information.

On crowded HF bands, you can "slice-off" overlapping SSB signals to improve copy.

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

Tunable bandpass filters

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

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

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 47 dB.

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

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

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

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

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

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

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

Plus more . . .

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

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

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

MFJ-780, $99.95, "brick wall" DSP data filter. Plugs inside MFJ-1278B or MFJ-1278 Multimode Data Controller.

No Matter What ™ guarantee

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

Call your dealer for your *best* price

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

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CIRCLE 147 ON READER SERVICE CARD

World-Wide Web at http://www.access.digex.net/~cqmag/cqtest.html

Many thanks to EA3DU, N9AG, WR3G, and N6AA for their help with the log-checking chores this year. EA3DU acts as a collection point and checks logs coming into the *CQ Radio Amateur* office in Spain. N6AA as usual was a big help with his database efforts. Without the help of both Scotts, Sergio, and Dick, putting all this together each year would be much more difficult.

Again this year, thanks go to the many who come up with the special prefixes or go on expeditions for the contest. These folks, help to make the contest fun and add to our WPX and CQDX/DXCC totals. Some of these are 4U9Q, 7Z5OO, XR4M, 3G1X, FH5CQ, P39P, BVØFMT, E2ØAT, EM2I, GXØBS, IB8S, II9E, TO2DX, XU95HA, XX9X, and all of the special prefixes from Argentina and Canada. Thanks from all of us.

The 1996 WPX SSB Contest will be held on 30 and 31 March 1996 (GMT). Complete rules can be obtained from *CQ* magazine for an SASE or on the CQ Contest WWW site. Log/summary sheets can also be obtained from *CQ* for an SASE. Please continue to mark your log envelopes WPX SSB or CW so they will get to me on time.

73, Steve, N8BJQ

Random Comments

Who pulled the plug on Sunday? . . . *VE6SH*. Had fun running QRPp with a rare callsign. . . . *SO5TW*. "Do as you would be done by." This sentimental proverb is quite out of date in these days—days of QRO! . . . *SP4CMW*. Was really doing well until the solar storm hit Sunday morning. Sunday was almost a write-off with a rate of 5 QSOs per hour. . . . *VE6BMX*. Tremendous signals from Eastern Europe in the evening. Some LP to Western Europe but not many were QSX. . . . *N6VI/KH6*. I think I'm going to ask for a government grant to do a study on the correlation between major contest weekends and the occurrence of aurora. . . *CJ6V*. Wow! What fun it is to have propagation good enough to allow the running of a few Europeans. . . . *KC7EM*.

I celebrated my 50th birthday in between WPX! . . . *S56A*. Too many generator problems to be competitive. . . . *4U9Q*. By the end of the contest, the generator caught fire and went up in flames. Not before spitting out 400V and blowing up the amp, though . . . *9Q5TT*. EU, SA, CARIB, and E2ØAT all heard at the same time, but still couldn't find any Pacific stations. Great fun as usual. . . . *K1DWQ*. Severe storms kept me off the air for several hours. . . . *WM4Z/5*. Tnx to all who heard my small signal. Condx were vy bad in midwest. . . . *WA9BOW*. Very difficult with so much line noise! I may be getting too old! . . . *TO2DX*. First WPX. CU AGN next year. . . . *KA7PNH*. Fun test. Band went belly-up Sunday! . . . *K7ABV*. 88% of my contacts were multipliers. . . . *K9FOH*.

Without a doubt this was at bottom of the cycle here up north. Not a sound was heard on 10 meters; 15 meters bad also. Solar flare Sunday didn't help . . . *KC7UP*. Tnx gud contest. Amp cut to 1/2 power 2 hrs into contest but did okay anyhow. . . . *KG6LF*. Great fun and found I added one new country (5T5JC) when I had finished checking the log. . . . *K9OSH*. It was fun even for us little guys. . . . *AD4ES*. While QRN vy high Friday nite, these were probably the best SSB condx to Europe I've ever seen in a 160M DX contest . . . *K1ZM*. No amp, no packet cluster, no beer, no wild women—this contest is always a lot of fun running low power. Tnx DX for the points. . . . *AA7UN*. "Always fun! Too bad the "sun" didn't support us!" . . . *W6TKF*.

Fifteen was great fun; only DX was the birdies in my radio from the computer but enjoyed the weekend. . . . *WJ7S*. High bands were very tough; low bands were good; 40 was great. . . . *KD4LHA*. I thought that 15 low power was tough. Well, folks, it's easy compared to 20. . . . *KA4KFQ*. Bands were terrible. Lowest Q's in any contest I've ever been in. Can't wait for CW. . . . *N2PEB*. My puny score reflects the worst ever conditions on 10-not even a stateside opening. . . . *K6SVL*. Running 25 watts to a Hamstick antenna mounted on a 1990 Oldsmobile. . . . *K2YJL/M*. Great to be back on 14 MHz again after about a 7 year absence. Most fun was working the new Russian prefixes. . . . *W7FP*. Lots of line noise on 20 and 15. Steady winds and humidity between 19 and 23 PCT the whole weekend. . . . *K3ZO*.

Went cross-country skiing. Bands were dead. . . . *NL7DU*. Finally hearing KL7 on 160M, though apparently he couldn't hear me. Just need him and ME for 160M WAS. . . . *WK5K*. Being a real old man (84 years old), I am not anymore able to follow a contest all the time through; however, it was again fun. . . . *DL3ME*. First contest without teeth! Can't wait for CW weekend. . . . *N2OO*. Good exercise for the mouth muscles, especially when phonetically saying 13 syllable call. . . . *WA6KUI*. Condx good to USA, poor to Japan. To enter 40 meters must have nerves of steel! . . . *S5ØA*. Biggest thrill: JT1M and SU2MT calling me for new zones. . . . *KI4HN*. Great contest. The only problem was that I started out sick and had to stop with a high fever. Better next year. . . . *PA3AEB*.

Best part was working 5X4 on a "dead band." . . . *ZL1AXB*. Great contest. Looking forward to the next WPX Contest. . . . *KA4RRU*. Enjoyed the test until the computer failed to wake up on the second day! . . . *GM4PVC*. I never finish a *CQ* contest. My son or my wife are illness (headache, flu, etc.) . . . *EA5YJ*.

USA TOP SCORES

SINGLE OPERATOR ALL BAND

KM1H	**6,966,176**
K3EST	4,957,470
W3BGN	4,289,229
N7AVK	4,083,795
K3ZO	3,768,210
WZ4F	2,790,530
KI4HN	2,758,682
KA4RRU	2,487,148
NB7N	2,447,864
K5ZD	2,415,520
WA7FOE	2,247,900
NQ4I	2,222,208
K4VUD	2,081,968
KC7V	1,814,961
W6TKF	1,755,444
K6HNZ	1,755,365
NXØI	1,654,432
AJ7/JK2VOC	1,438,400
WM4Z/5	1,386,606
N3MKZ	1,300,772

28 MHz

***KD4HXT/T**	**24,596**
*N5OKR	24,480
*KC3PZ	23,622
KY5N	18,204
*WB2BZR/3/T	17,802

21 MHz

KC2X	**1,471,080**
W5VX	1,200,933
KZ5D	1,177,397
N2MM	787,520
WC4E	772,708

14 MHz

KC1XX	4,787,328
WE9V	3,744,000
KK9A	2,830,620
K1KJT	826,200
KI5JC	665,529

7 MHz

KC7EM	**1,950,228**
N7DD	1,644,480
W3GH	712,008
KF8UM	198,584
K8DO	72,046
KC4YM	42,456

3.7 MHz

WE3C	**1,519,300**
KE1Y	1,295,050
KS9K	1,203,432
N6RO	822,120
AB6ZV	796,262

1.8 MHz

K1ZM	**327,712**
AC4NJ	149,940
AA4MM	88,400
KA7T	6,192
KG5YA	5,840

LOW POWER ALL BAND

WS1A	967,600
N7LOX	730,132
NZ5O	722,768
WW3S	647,972
AI2C	645,216
ACØW	604,384
K2QMF	567,760
WA4ZXA	528,990
AA1EY	524,032
NT5D	436,536

28 MHz

KD4HXT/T	**24,596**
N5OKR	24,480
KC3PZ	23,622
WB2BZR/3/T	17,802
K6SVL	12,322

21 MHz

WA7BNM	446,336
WJ7S	399,630
N5NMX	100,394
W2IQL	79,659
AAØSQ	27,927

14 MHz

WF1L	555,984
KA4KFQ	443,785
WA6KUI	408,480
AKØA	353,424
N4YGY	329,406

7 MHz

AA9IA	52,216
K9FOH	26,492
W2FGY	11,526
N3KIP	1,092

3.7 MHz

W4YDD	9,120
AB5HD	1,558

1.8 MHz

WO9S	5,220
WA8KEM	1,620

ASSISTED ALL BAND

KA2AEV	4,670,150
KY2T	3,146,504
W6XR/2	1,647,564
WAØPUJ	1,452,562
WA4CHI	1,435,532
KC3MR	1,108,480
NE9U	1,089,327
NO9Z	878,570
KW4T	803,200
N1CC/2	794,200

1.8 MHz

W4JVN	2,176

LOW POWER ALL BAND

KE4FZB	47,676
AA1CB	30,875

QRP/p

N1AFC	**A**	**175,925**
KA1CZF	A	174,503
WA6FGV	21	3,360
N8AXA	14	1,219
W1MK	3.7	5,304

MULTI-OPERATOR SINGLE TRANSMITTER

N3BB	**4,916,969**
KT8X	4,133,184
NE8T	4,119,200
WX1Z	3,416,129
N4ZZ	2,669,586
WV6U	2,664,116
KU8E	2,330,498
NCØP	1,986,023
KF9PL	1,935,780
KQ4HC	1,748,916

MULTI-OPERATOR MULTI-TRANSMITTER

WZ1R	**13,598,020**
WA1LNP	**880,453**
WA8LOW	512,068

**Denotes low power.*

MFJ ACCESSORIES

Compact Speaker/Mics

Here's a **Compact** *Speaker/Mic that fits comfortably in your hand and has a* **full size** *speaker for crystal clear audio.*

No need to remove your handheld from your belt to talk or monitor calls. Clip it near your ears so you can easily hear every call with the volume turned down.

First-rate electret mic element and full size speaker gives superb audio on transmit *and* recieve. Earphone jack, PTT, lightweight retractable cord. Gray. 1¼x2x3 in.

MFJ-284 fits Icom, Yaesu, Radio Shack, Standard; **MFJ-286** fits Kenwood.

MFJ-284 or MFJ-286
$24.95

Mini Speaker/Mics

These **tiny** *MFJ Speaker/Mics are so small and so lightweight you'll forget they're there -- until you get a call.*

Excellent audio from electret mic element and speaker. Has swiveling lapel /pocket clip, PTT button with transmit LED, earphone jack, lightweight retractable cord. Available with L or regular connector. *Tiny* 2x1¼x¼ in.

Order MFJ-285/MFJ-285L for ICOM, Yaesu, Alinco; **MFJ-287/MFJ-287L** for Radio Shack, Standard, Kenwood; **MFJ-283** for split plug Alinco; **MFJ-285W** for IC-W2A.

MFJ-283, MFJ-285, MFJ-285L, MFJ-285W, MFJ-287 or MFJ-287L
$24.95

L Connector also available - order L model.

MFJ Artificial RF Ground

MFJ-931
$79.95

Creates artifical RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding.

Greatly improves your signal if you're using a random wire or longwire antenna with an ineffective ground.

Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver

MFJ-9020
$189.95

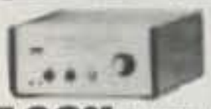
Throw this *tiny* MFJ 20 Meter CW Transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go. You get a high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 watts output, semi/full break-in, much more. *Free* manual. See *free* MFJ catalog for 40, 30, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super *Active* Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to- operate active antenna...quiet...excellent dynamic range...good gain... low noise...broad frequency coverage... excellent choice."

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

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



$129.95 MFJ-1024

Cross-Needle SWR Meter

MFJ-815B
$69.95

Peak/ average Cross-Needle SWR/ Wattmeter. Shows SWR, forward/ reflected power in 2000/500 & 200/50 watt ranges. 1.8-60 MHz.

Mechanical zero. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

"Teflon® is a registered trademark of Dupont"

MFJ Coax Antenna Switches

$39.95 MFJ-1701

$21.95 MFJ-1702B

$59.95 MFJ-1704

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MFJ-1701, $39.95. 6 position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. 10x3x1½ in. DC-60 MHz.

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MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

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MFJ-260C, $29.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 650 MHz. 2½x2½x7 in. *MFJ-260CN, $34.95, N connectors.*

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Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna.

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$19.95 MFJ-108B

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MFJ-108B dual clock has separate UTC and local time displays. Huge 5/8 inch LCD digits are easy-to -see. Brushed aluminum frame.

MFJ-112 shows hour/minute/ second, day, month, date, year at any QTH on *world map*. 12 or 24 hour display. Daylight saving time feature.

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Earphone jack for private practice, tone and volume controls for a wide range of sound. Speaker. Adjustable key. Can be hooked to transmitter. Sturdy. 8½x2¼x3¾ in.

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CIRCLE 15 ON READER SERVICE CARD

Here are the second- and third-place low power ops in 1995. From left to right are Lionel, FS5PL; Will, AA4NC (VP2EN); and Paul, WX9E (FS5PL op).

Working YS1 and YB2 (first). . . . *WH6LU*. My equipment is poor, but I could enjoy the contest. . . . *JG5OYU*. Condx was rather good on 21 MHz. . . . *JA1AB*. Two business lunches and one meeting spoiled my contest. . . . *5N0MVE*. Forty meter dipole struck by meteor first night. . . . *AA7RW*. Great openings to Europe on both nights, but where were the JAs? . . . *N7DD*. First WPX in ages, also my first non-CW contest in ages. Would not manage without voice keyer. First night bad condx to USA, second nite excellent. . . . *OT5T*.

Interesting "scatter" propagation on Sunday. Since 1600 UTC "USA" was coming out of SA, even the small pistols! . . . *OK1RI*. Please include on next year's edition a category for Single Op less than 50 meters away from railway. Railway high-tension cables gave me 59+ static. . . . *CQ7ERK*. Trying to get over a bad cold and sore throat and run an SSB test is not conducive to good health. . . . *HP3/KG6UH*. Pretty slow on 160! . . . *KA7T*. Very interesting contest, unusual propagation, in any case bad on upper bands. . . . *S50R*. I went with my car across all Spain to go to the only place in the world where you can see four countries of DXCC. . . . *EA9AM*. Chill factor at time of contest was -65 deg. I was really rolling along until a gust of wind put me out of business. . . . *WL7MA*.

What happened to 40 meters? . . . *XO5SF*. This year everything went fine for me. If it wasn't for the bad condition we had the last night I probably would have reached the 1300 QSO level. . . . *CJ2DR*. Sincere thanks to "Gerry," F6FGZ, for lending me his "SUPER-STATION." . . . *TM7XX*. Special prefix with kind help

Ken, KP4XS, is getting ready to put up his secret spider antenna. It must have worked, as they were the top multi-multi station.

of the South African Telecoms Dept, for contests, and the SARL! . . . *ZS9F*. With a K-index of 6 on second day, only had 29 QSOs in the final 8 hours of the contest. . . . *WA7BNM*. Went barefoot; too much like work this weekend. . . . *K3WW*. Difficult conditions, limited time, so tried for highest score in minimum number of QSOs. . . . *K5ZD*. Thanks to my wife, Penny, who allowed me the entire weekend without interruption. . . . *KD3HN*.

No propagation on 10! No power to 40/80 meters! . . . *PW2N*. Poor activity of US OMs on 40 meters. Where are they? . . . *EA5BY*. QTH is Mafia Island (AF054). . . . *5H3CK*. My first WPX SSB. Tnx for nice contest. . . . *OH6KZP*. Rough condx on 80 meters Friday night, but great Saturday! . . . *WE3C*. Excellent opening first day. . . . *CJ7SBO*. High wind kept quads at the 20 foot level Friday night. . . . *K6HNZ*. Made a few mistakes on when to take timeouts, but I'll take the overall results. . . . *KP2A*. First low power entry for me. Definitely a humbling experience. Thanks to all the US stations for the QSOs. . . . *XM7A*. Great contest and lots of fun when the band was open for first 24 hours. Very boring the second 24. Hard to stay focused. . . . *KZ5D*.

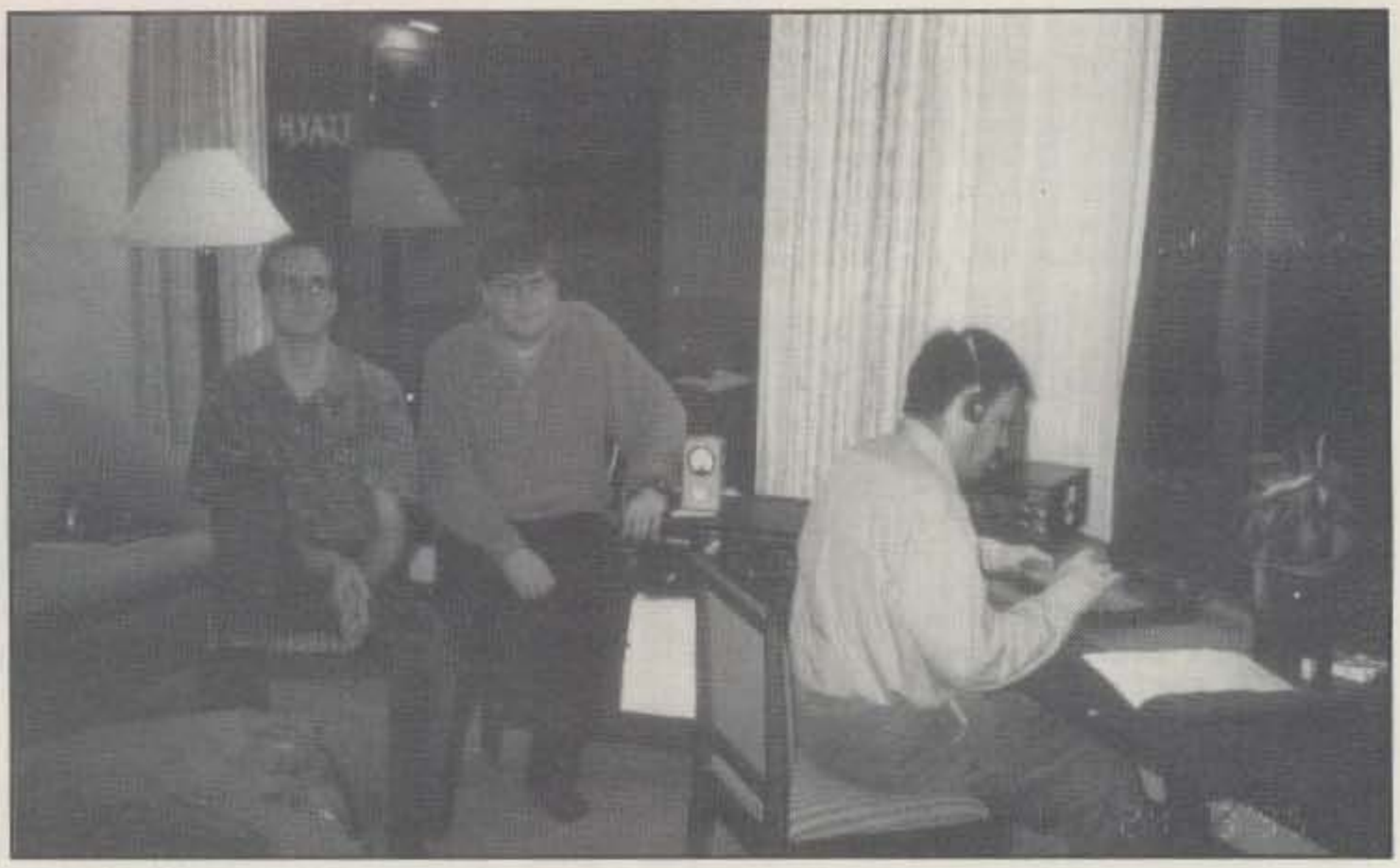
Due to last-minute change in plans could only operate a few hours of the contest. Will be back again with a bigger score next year. . . . *VU2PTT*. Enjoyed it. My one and only in 23 years. Hardest job: preparing the report by hand. . . . *6Y5DA*. Working on 10 meters with 80 watts without propagation is a very HARD task! . . . *L3HL*. Was a nice contest. Hope to participate next year. . . . *XE3LMV*. Noticed there were quite a few European ops who did not bother to listen up for USA on 40 and 75 meters. I wonder why! . . . *KA2AEV*. Biggest thrills: 20M—9K2, HV3, and YB2. 15M—3A2, 5R8, 9Q5, CN8, 9G1, and HZ1. . . . *KY2T*. This year participation is dedicated to G. Marconi (he was born in my town). I'm very proud to celebrate 100 year of radio using an homemade rig. . . . *IR4B*.

This is my 20th CQ WPX Phone contest. I didn't lose any since 1975. . . . *UT4UZ*. First contest. . . . *WB9OHJ*. It was my first big contest. I have had many enjoyment. . . . *LX1HX*. First WPX Contest. Great fun! . . . *P4ØR*. Greetings from Russian Pacific Coast! . . . *RZØLWA*. Rain, heavy QRN, and hard competition with KP2A and others. . . . *PYØFM*. March 26 operated with ES1QD/Ø from Saaremaa Is. and March 27 with my home call from Tallinn. . . . *ES1QD*. Little stations also work in this contest. . . . *YC6PUP*. Eighteen hours of part-time operation. Forty is a tough band for SSB, where a few stations camp on the clear freqs for the entire test and S&P dries up quick. . . . *K8DO*. I think this is the best contest of the year! First time I ever broke the 1 million mark! . . . *N1HRA*.

Good to be back. Limited operation last year due to change of tower and aerials, etc. . . . *GW4BLE*. Still the greatest contest of them all. Conditions were better last 5 hours of the contest. . . . *CT8BWW*. I actually persuaded my OM (N5NMX) to let me do some operating. Was he being nice or was it that 15 meters was a waste?. . . *KB5NFZ/N*. Real fun contest, but next year I'm going to call CQ more and sleep less. . . . *K6GSS/KH6*. Fairly good condx, but QRM, QRM, QRM. . . . *DL8PC*. Tnx for a wonderful contest. . . . *KH6FKG*. Less 300 QSO than last year, but same score! Tnx for low band contacts. . . . *IR8A*. Many thanks to all the VEs who stopped by to give me a QSO. Heavy QRN made it tough to hear all the DX that was calling. . . . *KS9K*.

Field day type of operation from woodlands area. 95% of QSOs on R-5. . . . *VP2MGF*. Incredible EU/West Coast condx on Saturday. Twenty meters produced the most solid and longest lasting morning EU opening I've experienced in 20 years. . . . *CJ7NTT*. Picked up 10 new ones on 40. Forty isn't dead; just need a contest to bring out the Europeans. . . . N7WWQ. You find out quickly how good you and your station are when you go low power. . . . *AI2C*. Hard to compete against beams on 40 while you just have a dipole at 17 meters, but had fun and worked some new ones. . . . *LX1NO*. My third WPX; second with my own callsign. Great fun. Ten meters still my favorite band. . . . *CT1ETE*. The "queen of the bands" gave me the fun I hoped! . . . *IU9S*.

Do you have much patience? Work on 10 at the bottom of the cycle! . . . *LU2DW*. Each contest I have



Here are three of the ops at XX9X. From left to right are Marco, OH6DO; Martti, OH2BH; and Tom, DK5WN, operating.

to marvel at how wonderful the "ops" are. I am proud to be a ham. . . . *WA3DMH*. My second 160 test. Lots of QSOs and mults. . . . *AC4NJ*. I was on a pace to easily beat my score of last year. Then on Sunday the "gods" decided to turn off propagation. . . . *KC6X*. My first WPX. Great fun and courteous contesters. Will be great at the top of the cycle. . . *KV1W*. More US stations than usual had strong 80 meter signals into Europe. . . . *ON9CJM*. I enjoyed the contest and it gave me a chance to try out my new antenna. . . *NZ5O*. Thought for sure I would make the 1 meg mark. Then came Sunday; only made 76 contacts. . . *N7LOX*.

Nice to work XX9X in his big pile-up. The temporary aerial must have been radiating something. . . *G3YOG*. Nice to give out CJ3 prefix. Too bad condx so poor on 15 meters. . . *CJ3ZD*. First contest in 25 years. I worked 80% of stations heard. Too bad I didn't hear more. . . . *WA1WRH*. Incredible QRM, great propagation on 20 meters. . . . *N4EUK*. The greatest thrill was working several new countries for the DXCC. . . *KA7KUZ*. Should have done much better but age is creeping up. 81-1/2 years young. . . . *VE4RP*. Thought I was going great guns on 40 until a phone call told me that I was causing TVI to a neighbor! So it brought it to a crunching halt. . . . *VE3CWE*.

Nice working top band as a newcomer. FM5WD showed up in the shack with some tips. Here we go. . . . *FM5DN*. P4ØV and PJ9T on 75 brings me a new one. . . . *RAØFA*. First time single band and with only 80 watts out—12 new countries on 40 meters! . . . *AA9IA*. Nice long-distance conditions. Miss a lot of European PXes. . . . *Z32JA*. This is my first trial. I start DX this year. . . . *7N3IWA*. Condx was so good. I enjoyed WPX so much. I will operate full time next year. . . . *JH6SQI*. I renovate my room during the contest. That's why the great rests. . . . *DL1RNH*. More Europeans and Asians would have done me good! . . . *C6AFV*. WPX is always one of the best contests. . . . *RK9CYA*. Who said 10 meters is closed? . . . *IK2ODD*.

Working 5Z4, 5H3, and 5T5 on a "flat" 10 meter band. . . . *VE1RAA*. Getting Europe and Caribbean Islands on 160 meters. . . . *KA3AVB*. During the con-

This is Paolo, I4ABF, who made the best of his special call IB4M to take world honors on 14 MHz low power (third overall).

test I had a QSO with 3D2CT. He did not give me points for the contact but he gave me a new country. . . . *9A3ZG*. First time in WPX. Nice experience. . . . *IT9AJP*. I fought with my wife, therefore I operated in a hungry state. . . . *HL5BVQ*. My first experience in SSB—monoband! . . . *UA2FZ*. Very bad propagation from Far East to NA. . . . *UAØJQ*. First time million over score! . . . *JA8RJE*. We spent more time to improve our antenna farm instead of contesting. . . . *PI4COM*. First time multi-single. Had a ball. Will be back next year with planning and all that good stuff. . . . *NX3Y*.

Eighty meter dipole a dummy load. Forty meters full of ambient RF crud. Good warm up for CQWW. We will be loud and serious. . . . *VP2MDE*. Jim White, KC8EK, became a silent key due to another heart attack 3 hours after the contest ended. He left us knowing we achieved our objective. . . . *KT8X*. Linear went away and bad pizza did not help. There is always next year. . . . *W1BK*. We did well for we had storm damaged antennas and rotten propagation. . . . *WV6U*. Our first contest together (AA5RB and N3BB). Difficult to keep station on 48 hours with only two of us, but went well. . . . *N3BB*. We again operated father/son multi-single but from KC1F's smaller station and fewer hours. Did we have any challengers? . . . *KC1F*.

Nice contest, but the poor DX conditions on low bands urged us to fall asleep the second morning (hi). . . . *DLØRH*. Propagation was the *pits* this year. Could have done as well with one rig and paper and pencil. . . . *W6EEN*. Nice opening on 10; wished the same pile-up on other bands. . . . *OE2S*. Ten meters gone for sure. Only LUs. Beautiful opening Saturday nite over the pole made up for it! . . . *KF9PL*. Good conditions for most of the contest. Many stations were using far too much power. Splatter was annoying. . . *EJ9HQ*. Well, it happened this time: amplifier blew up second morning, lost power for a few hours, the SWR of the TH7 was fluctuating. . . . *C49C*. We enjoyed the contest from the "English School" radio club. The operators are all high school students 17/18 years old. . . . *P39P*.

Everything okay until linear blew up. . . . *GXØFDX*. It was great fun to operate the contest with such a rare callsign and very good equipment. Tnx to OH2BH and XX9AS for making this operation possible. . . . *XX9X*. CK7U is a special call to commemorate the completion of construction of the first buildings at Univ. of B.C. . . . *CK7U*. First serious contest for this club. Lots of wire, but Murphy did it his way. . . . *9A1HBC*. Wire antenna for all band! Propagation super. No failures for a change. . . . *NW2B*. Target of this Multi/Single team was to let the hams become friendly with contests and help them log one contact after another. . . . *IB8S*. It was nice operation from St. Nikola Island (EU-163) at first time in the air. Thanks for nice pileups. . . . *YT9N*. Nine JAs answered my CQ at sunrise on 75 meters thanks to KY1H's 2L at 150 feet! Wow! . . . *WZ1R*.

Station Operators Multi-Op Multi-Transmitter

4N5ØA: YU1EA, YU1YV, YT1PZ, 4N1DXX, YT1MA, YU1UA, YU1AC, YU1RA. **6E2T**: XE2Z, XE2MX, KD6QK, N6AZE, N7QQ, KJ6HO, WB6NBU. **9A1A**: 9A2's OG, RA, DQ, HO, LJ, MP, NJ; 9A3's GW, NR, 9A4KW, 9A5WW, F2CW, OH6XY, S58KW. **BVØFMT**: BV2AD & KC6KH. **DU2AAU**: DU2AAU, DU2ABS, 4F2KWT, AA6KX, DU1JXP, DU1MHX, Armand. **E2ØAT**: HS1's CHB, JQP, HNK, JAN, DYE, CKC, GAB, WSQ; E21's VK, IYK, SMN, ITG, FTZ, NCL, VD, PTA, TLH, SAD, NNW; HSØ's WYX, TBV, YOZ, ZBI, ABZ, HS7IKF, HS5MB, HS4DEV, HSØ/HL1CAN, WQ5W. **EM2I**: UT2IA, UT2ID, UT2II, UT2IJ, UT2IM, UT2IO, UT2IV, UT2IZ, UR3IKY. **EW5A**: EU1AZ, EU1DX, EU1EU, EU1MM, EW1CZ, EW1EW, EW1ACF, EW1JM, EW1TZ, EW2AA, EU1-010, EW1-004, UC2-188-148.

HG73DX: HA1's TJ, DAE, DAC, AH, HA2RX; HA5's GF, IW, OM, ML, TI, UA, AWH, CCC; HA6's NF, OQ, NY, ND, PX, ON. **IO2W**: IK2MKM, IK2VFQ, IK2DUW. **JA1YXP**: JL1SIF, JM1UWB, JS1INN, 7K1EWD, 7L1DGK, 7L1ETO, 7M1WGZ, 7N1WIY, JL7CMB, JRØUUU. **KP4XS**: KP4XS, K3NA, KF3P, W2EOS, K1RZ. **LU4FM**: LU2FFD, LU2FYU, LU4FPZ, LU5FAO, LU5FEW, LU5FYV, LU6FEC, LU6FHL, LU9FIO, LU9FDG. **LY7A**: LY1DF, LY1EE, LY2AO, LY2BMX, LY2NK, LY2UF, LY3BLF, LY3DA. **OF1AA**: OH1HD, OH1LEG, OH1MYA, OH1SY. **OH3NE**: OH1KAG, OH3MMH, OH2AWX, OH3KUN, OH3KGR. **OH7AB**: OH7JCX, OH7KNV, OH7KUD, OH7MKR, OH7MSW, OH7MWX, OH7NVU, OH7UE.

OI6AY: OH1KBI, OH2KHX, OH2LYW, OH5MPZ, OH8KZD. **OT5A**: DL3EBM, ON1AEI, ON1AFF, ON1AOT, ON1ARZ, ON1AWB, ON1BQI, ON1CIM, ON1GL, ON4ACA, ON4AID, ON4AIL, ON4AJZ, ON4AKH, ON4ALL, ON4ALT, ON4ALY, ON4AMI, ON4AML, ON4AMX, ON4ASB, ON4AWU, ON4BAG, ON4BI, ON4DB, ON4FI, ON4MA, ON4MV, ON4ON, ON4QQ, ON4WW, ON5CD, ON5DH,

(Continued on page 112)

CONSTRUCTION

How To Install A Tower On Your Roof

AD5X provides us with an alternative to a full-scale tower project. Once you have the necessary material and paperwork (if needed), this basically is a one-day project.

BY PHIL SALAS*, AD5X

Would you like to have a beam antenna, but you are intimidated by the thought of putting up a tower? Is the thought of digging a big hole and pouring tons of concrete awesome? Well, there may be a way around this for you. You might consider, as I did, a roof tower. While roof towers aren't for everyone, they do offer quite a lot at a reasonable price.

Ideally, I wanted to have a beam up at least 35 feet for 20 meters (a half wavelength high), which means having a two-story house comes in handy. In my case, the peak of my second floor roof is at 25 feet, so a roof tower and mast combination that gives me about 10 feet in height would do the trick. After examining several roof towers available on the market, I de-

*1517 Creekside Dr., Richardson, TX 75081

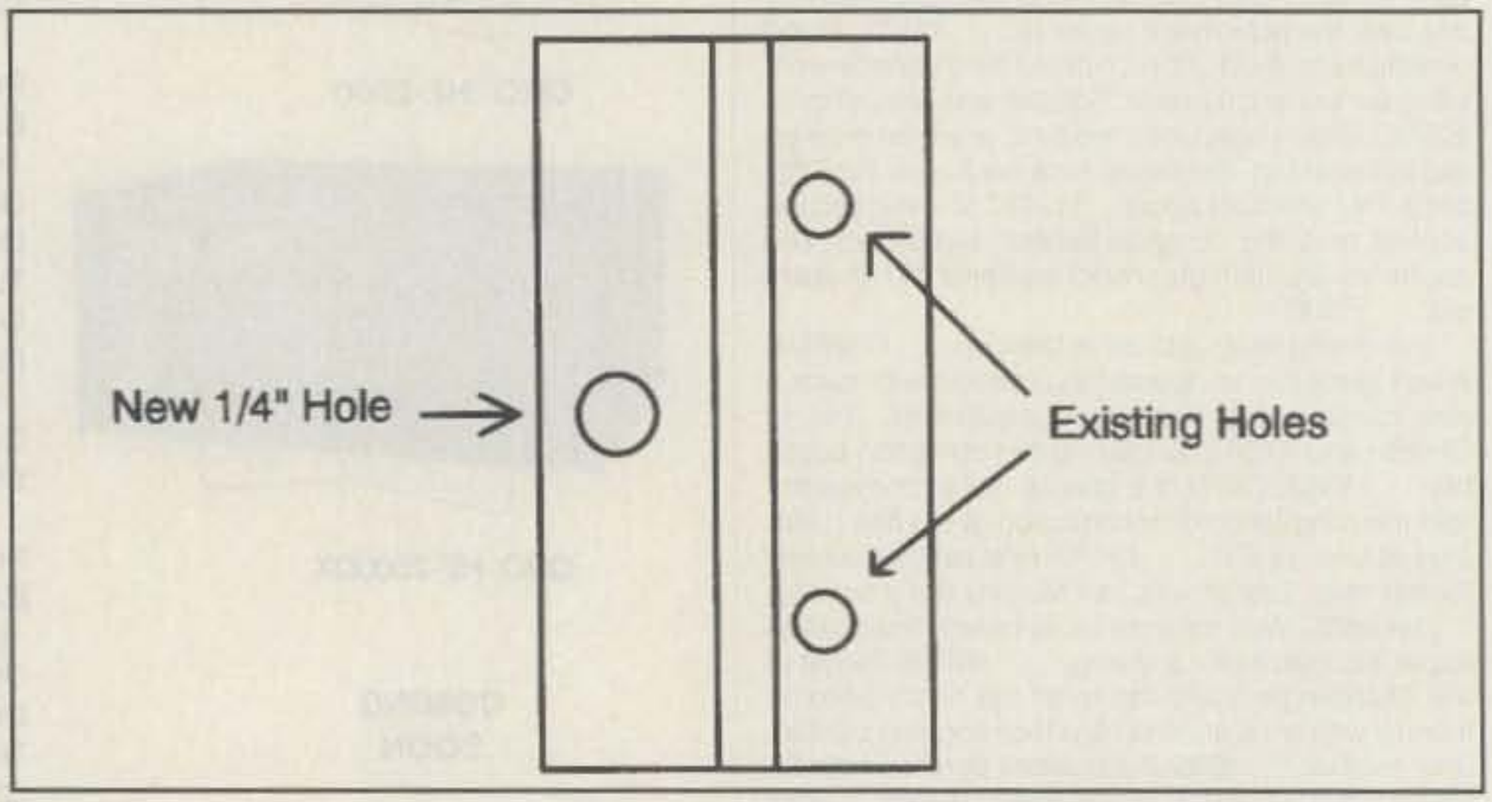


Fig. 1– Top view of the tower mounting foot.

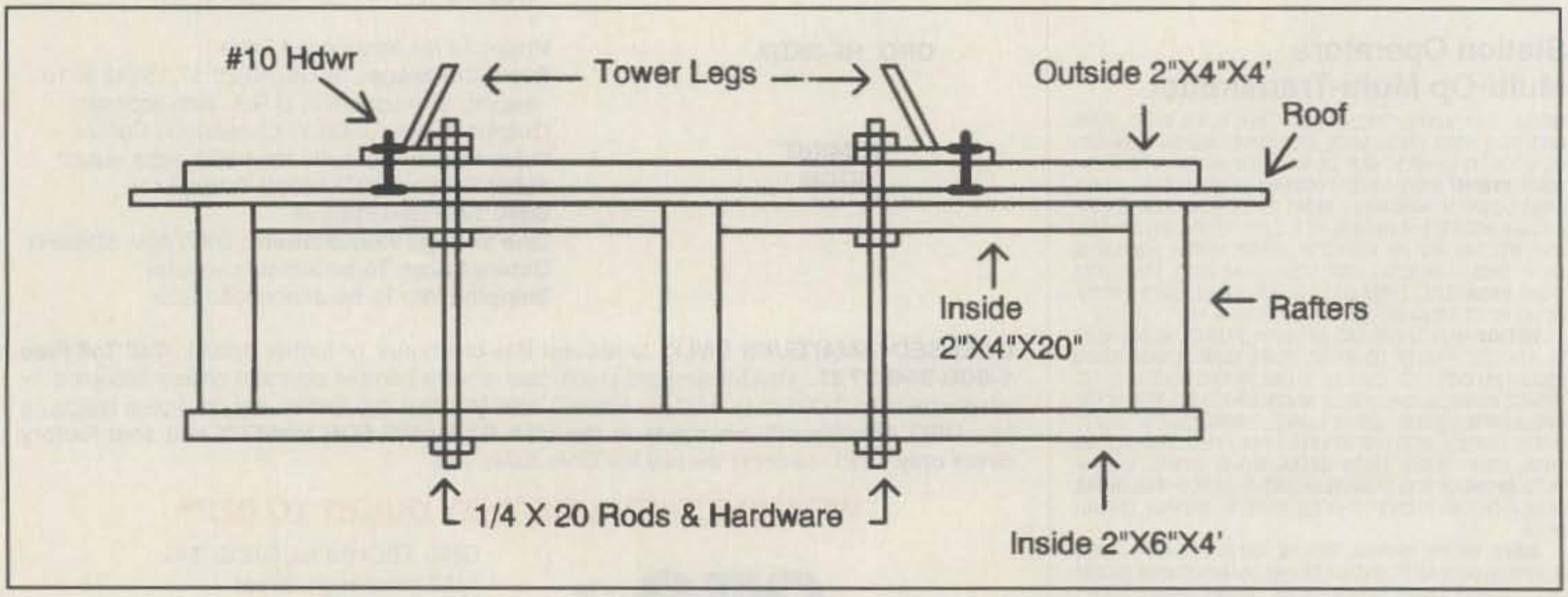


Fig. 2– Tower/roof mounting details as described in the text.

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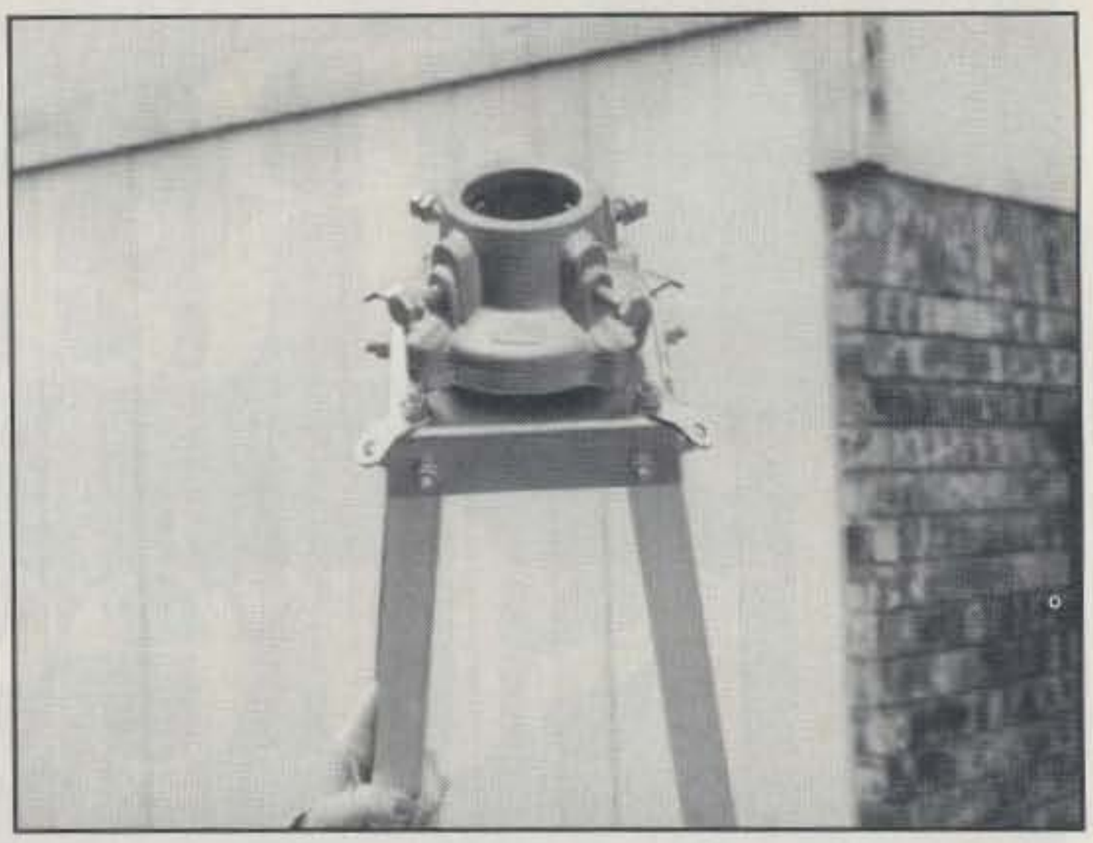
CIRCLE 18 ON READER SERVICE CARD



▲The optional thrust-bearing mounts on top and is a worthwhile addition.

◄The author, who is 5 ft. 9½ in. tall, standing next to the roof tower prior to installation.

cided on the Create CR18. The specs for the CR18 are:

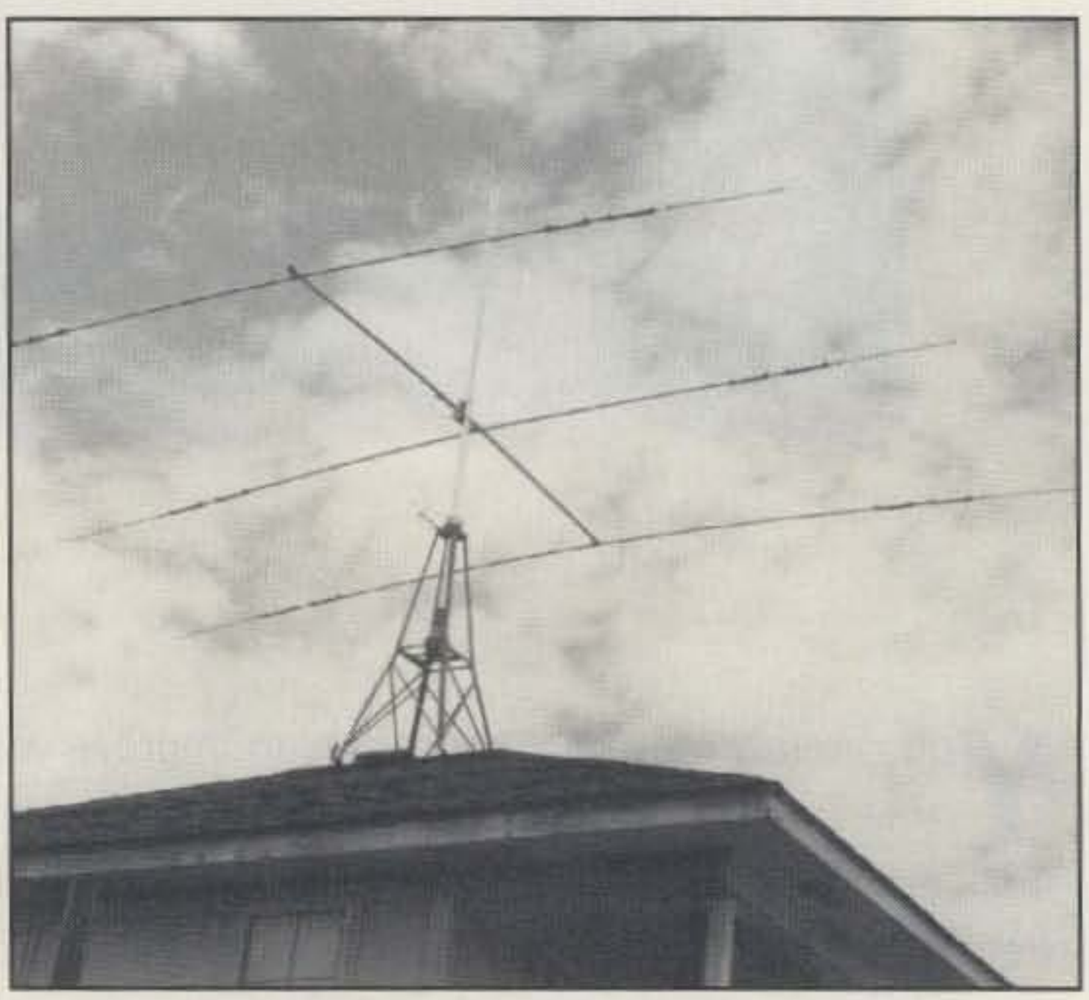
Height: 5 ft. 10 in.
Base Width: 31.3 in.
Wind Load (sq. ft.): 21 @ 90 mph
Vertical Load: 440 lbs.
Weight: 18 lbs.

The roof tower seemed capable of handling a good-size antenna, especially since the above ratings are without guys. The tower itself is aluminum with galvanized steel bracing and includes a shelf for mounting the antenna rotator. The rotator shelf, however, is specifically designed for Create rotators, although the pattern will also support a Hy-Gain Ham IV (which I use) simply by supporting it on ½ inch standoffs to clear the control wires. I also spray painted the entire tower with a light gray paint, which does a good job of protection and makes the tower blend into the sky. Additionally, I bought the Create CK46 thrust bearing, which will handle a 2 inch diameter mast.

Installing The Roof Tower

The key to a successful roof-tower installation is in the way you attach it to your roof. You certainly don't want to damage your roof or provide a new path for rainwater. Here in Richardson, Texas you must have a permit to put

The antenna rotator mounting plate can be adapted for several models of rotator.



When it's all done, you'll have a sense of pride and be able to work more DX.

an amateur radio antenna above 25 feet. This permit also requires that a Professional Engineer approve your installation. As it turned out, his was the first roof tower with which our local PE was involved. However, after brainstorming with him over a few weeks, we came up with a good method for mounting the tower.

The Create towers by design have a steel foot covered with hard rubber for roof protection. This foot has two holes in it which marginally pass 1/4 inch bolts. However, the holes are so close to the vertical steel portion of the tower foot that there really is no adequate space for 1/4 inch nuts to fit without interference. I found that #10 screws and hardware would fit well, but there was a definite concern about the strength of the #10 hardware in this application. In order to solve this problem, a 1/4 inch hole was drilled into the foot as shown in fig. 1.

In fig. 2, you can see the details of the entire mounting scheme for the tower installation. First, using #10 screws the tower legs were mounted to 3 foot lengths of 2" × 4"s, which were treated and painted. In addition, a 1/4 inch hole was drilled through the wood at each new 1/4 inch hole in the tower's feet. Next, the tower and wood assembly was placed on the peak of the roof and leveled. Then the interior section of the roof was reinforced. Several pieces of 2" × 4" were added adjacent to the interior portion of the roof sheathing. The length is enough to span the space between two rafters. The wood is held in place with angle brackets, and there should be a piece of this wood under each tower leg. In my case, the spacing is 20 inches.

Using a long 1/4 inch drill, I drilled through the foot/wood combination, roof, and interior 2" × 4"s. Next, lengths of 1/4 × 20 threaded rod (also called running thread) were inserted through the tower feet/wood combination, roof, and interior 2" × 4". These rods were sized to be long enough to pass through all the material shown in fig. 2, which in my installation turned out to be 12 inches. The rods were secured with 1/4 × 20 washers, lockwashers, and nuts as shown.

Finally, two 2" × 6"s were placed so they straddled all of the rafters under the roof tower feet, two per board. Holes were drilled in these to pass the ends of the threaded rod, which were also secured with 1/4 × 20 hardware.

The 2" × 6" boards were secured to the interior face of the rafters with #8 wood screws. All exposed outdoor mounting hardware was then painted to inhibit corrosion, and roofing tar was placed around the outside 2" × 4"s to prevent any water from entering the house. When the building inspector showed up for final inspection, he commented that the only way this tower would ever come down would be if the entire roof were to come off with it!

Conclusion

Once the tower was in place, the rest was easy. I installed a 12 foot mast in the tower and mounted a Cushcraft A3S triband beam on it as shown in the photograph. The beam only weighs 27 lbs. and has a little over 4 square feet of wind load, so it is easy for one person to put it in place. I now have and enjoy a beam antenna that is at a reasonable height and that required significantly less effort than the more traditional tower installation. ■

The MFJ-452 Morse Keyer

BY PAUL CARR*, N4PC

I began in the hobby of amateur radio in the mid-1950s with a new military-surplus J-38 key. It was the only new piece of equipment that I owned for many years. I have since retired the key to the mantel in my den. Boy, radio was exciting and frightening in those days! The bakelite knob on top shows the signs of being partially dissolved by the perspiration from my shaking hand.

There are new keying techniques in use today. One version is the keyboard type; you can send perfect code although your fist may not be the best in the world. MFJ has a system that uses this technology. Here is the report of my test results for their unit.

The MFJ-452 Morse keyer available from MFJ Enterprises.

The Morse Keyer System

The MFJ-452 Morse Keyer is actually many systems in one. It is a keyboard CW keying system, and by attaching an iambic paddle it becomes a full-featured iambic keyer. It is also a CW tutorial system. Let's take a look at these features.

The Keyboard System. This system consists of an RF-suppressed AT101 type keyboard and a small, specialized computer. On the front of the small box that houses the keying computer there is a two-line LCD display. One line of the display has the contents of the 150-character type-ahead buffer, and the other shows the characters that are being transmitted. This display shows 16 characters on each line.

The computer has a capacity of eight 250-character messages that can be stored in nonvolatile memory. The messages are held in memory even though there is no power applied to the system. Messages can be typed beforehand and proofed for accuracy prior to use. This is a handy feature for contest weekends. The function keys F1 through F8 are used to store and send messages. The Alt key is used with the function key to store a message. The function key alone is used to send the message. The speed of the code can be set by using the F10 key. Simply depress the F10 key and alter the speed by use of the up/down keys or the keyboard. The speed, weight, and tone are also controlled from the keyboard.

The Iambic Keyer Function. There is a provision for attaching an iambic keyer paddle. In the iambic mode, the speed, weight, and tone are controlled from the keyboard.

The Morse Code Trainer. Another nice feature of the MFJ-452 is the code training device. If you select the F9 key, you enter the command mode. The function key followed by special one-key entries will program training features into the system. The code characters can be sent in Farnsworth mode or with regular spacing. In the Farnsworth mode the characters are sent at 18 wpm, but the spacing between characters is increased so the code is at the selected speed. By increasing the character speed, students learn the sound of the individual letters instead of counting dots and dashes, which greatly facilitates learning. Code practice can consist of clear text or random groups. Frequency of the sidetone can also be controlled from the keyboard.

Using The System

There are provisions for direct and grid-block keying. I tested the system with many homebrewed transceivers as well as commercial rigs. The performance was flawless. There is also a provision to convert the space bar to a straight key if you so desire. If you have never used a keyboard to generate code, you have a real treat in store.

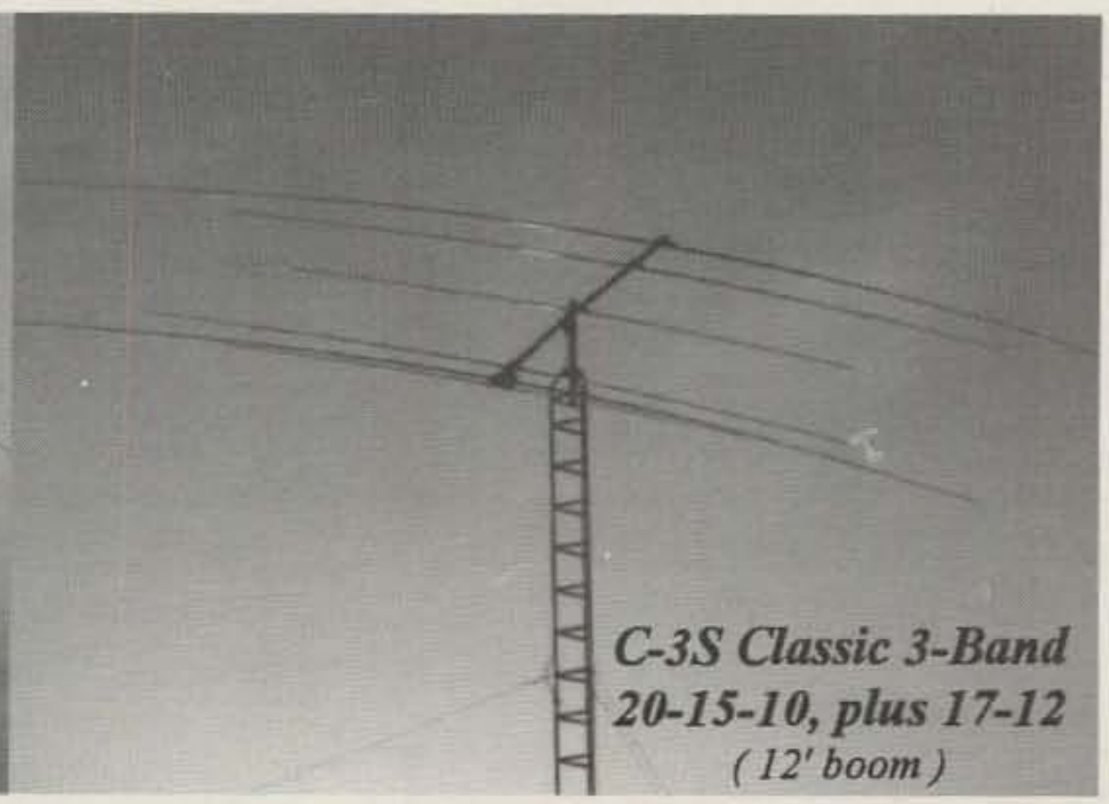
Availability

The MFJ-452 is manufactured by MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762. The price of system including the keyboard is $129.95. An optional 12 volt power supply is also available. The system has a twelve-month warranty if purchased from MFJ Enterprises or an authorized distributor. The iambic paddle shown in the photograph is not included. ■

*97 West Point Road, Jacksonville, AL 36265

In response for a smaller model of the fantastic *C-3*, we put it on a little diet: the *C-3S*.

C-3 Classic 3-Band
20-15-10, plus 17-12
(18' boom)



C-3S Classic 3-Band
20-15-10, plus 17-12
(12' boom)

C-3S NUTRITIONAL INFORMATION PER SERVING

Serving Size (Mtrs)	20-15-10 primary + 17 & 12	Elements (all full size)	6
Net Wt.	26 Pounds (12 kg)	Length of Boom	12'
Power Handling	5KW	Wind Load (sq.ft.)	4.9
Fat	0	Wind Rating (min.)	>80 mph
Average Gain (20-15-10)	4.5dBd	Average F/B (20-15-10)	>14dB
Number of Traps per Antenna	0	Efficiency	>98%
Number of Phasing Lines	0	Average Time for Assembly	1 hour
Pre-aligned elements (on boom)?	YES	Riveted Construction?	YES
Easy-On™ Mount?	YES	Optional Bands per Antenna	40 Mtrs
Standard Packaging	4' box	1:1 Balun or RF Choke Required?	YES

Percentage of Minimum Daily Radio Enjoyment 100%

The unbeatable ***C-3*** performance has been extended to a smaller footprint. The ***C-3S*** incorporates a re-designed 10 mtr section allowing the boom to be only 12'. The trade-off is the ***C-3S*** covers about 1.1 MHz (i.e. 28.200-29.300) with a 2:1 VSWR, where the ***C-3*** covers the entire 10 mtr band. The gain of the ***C-3S*** is within .1 to .2dB of the ***C-3***. The ***C-3S*** can also cover 40 Mtrs, with 130 kHz 2:1 VSWR. This is the ***C-4S***. The ***C-4C*** conversion can be utilized later to make the ***C-3S*** into a ***C-4S*** in the field.

Force 12 has the finest line-up of antennas to cover the classic 20-15-10 bands with a single feedline. The antennas also feature gain on 17 and 12 mtrs, with a VSWR of about 2.8:1, easily matched with any tuner. All are trapless and are acclaimed as outperforming all the various trapped antennas. Included in the line-up is the C-3XL, a composite of larger monobanders.

The complete series of antennas for the classic 3 bands (plus 40 mtrs) is the following:

C-3S 20-10 mtrs, 12' boom ***C-4S*** 40-10, 12' boom ***C-4SXL*** 40-10, 23' boom (includes 2 el on 40)
C-3 20-10 mtrs, 18' boom ***C-4*** 40-10, 18' boom ***C-4XL*** 40-10, 30' boom (includes 2 el on 40)
C-3XL 20-15-10, 32' boom, which has a 3 el 20, 3 el 15 and 4 el 10, all with separate feedlines for maximum versatility.

Force 12 has more than 60 antennas from 160-6 mtrs. They include rotatable dipoles for 160, 80/75, 40, 30; 2 and 3 element yagis for 80, 40 and 30. Several combinations of 40/20, 40/30/20 and 40/30 yagis; the ***MAGNUM 2 / 2*** which has 2 el on 80 and 2 el on 40. Multibanders for 20-17-15-12-10, 20-17-15, 17-15-12-10, 15-10, 17-12; all without traps or phasing systems. There are also magnetic transmitting and receiving loops (***MTR***'s) for 80, 40 and 40-20 made from 2" tubing. They provide an excellent antenna for confined or restricted locations. ***MTR***'s are perfect for regional coverage with NVIS propagation. There is more.

The C-3S is available at all 12 HAM RADIO OUTLET stores and TEXAS TOWERS. List is $429. Buy now & have fun!

Order Line: **(800) 248-1985;** Info/Technical: **(408) 720-9073**; FAX **(408) 720-9055**
Internet: FORCE12E@LIGHTLINK.COM
In the U.K. & Europe: **Vine Antenna Products, Ltd. Ron Stone, GW3YDX**
Tel: **+44 1691 831111**, FAX: **+44 1691 831386**.
In Sweden/Scandinavia: **Leges Import, Sam Gunnarsson, SM3PZG**
Tel/FAX: **+46 660 19032**
Please call for Distributors in Spain, Italy, Portugal, Russia, Japan.

Why imagine the ultimate when you can have it?

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Antennas and Systems

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3015-B Copper Road, Santa Clara, CA 95051

CIRCLE 155 ON READER SERVICE CARD

SHOWCASE

Computer Aided Technologies' SCANCAT GOLD

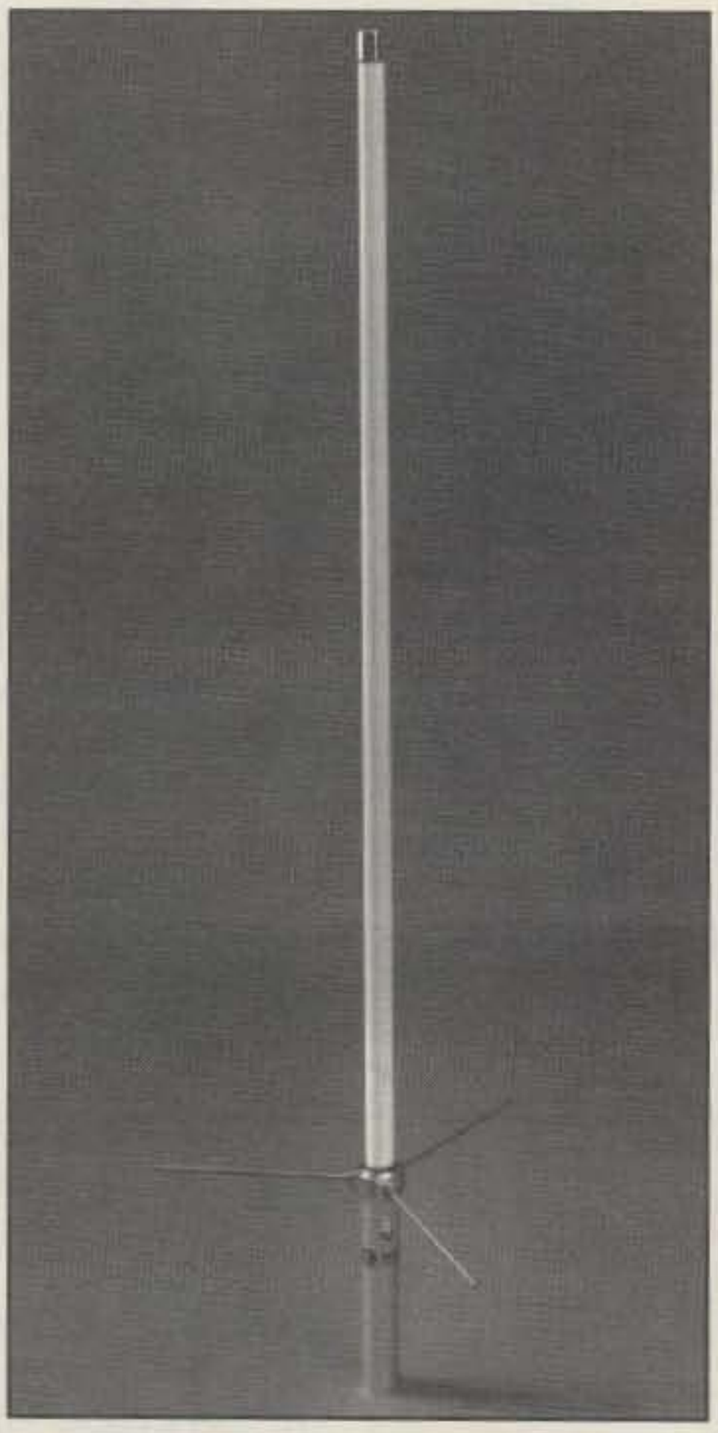
Computer Aided Technologies has announced the availability of a new computer-aided scanning program. SCANCAT GOLD supports radios from AOR (including the AR-8000), Drake, Kenwood, ICOM, Yaesu, and JRC, in addition to the Pro-2005, 6, and 2035/05456, plus the Lowe HF-150 and Watkins-Johnson HF-1000. Features of SCANCAT GOLD allow users to: search between any two frequencies by any increment; log found frequencies to files while scanning; send spectrum analysis to screen or printer; use multiple search filters; link up to 15 frequency disk files; and perform demographic searches for frequency coordination and two-way usage analysis. SCANCAT GOLD also includes "Scanport," an import utility that will read ASCII text, comma delimited, DBase, and other formats including TRS Consultant's "Schedules," and Percon's Spectrum Frequency Disk.

A 640K MS-DOS computer with RS-232 C port and hard disk is required. A 100+ page manual is included. The suggested list price of SCANCAT GOLD is $94.95. For more info, contact C.A.T., P.O. Box 18285, Shreveport, LA 71138 (phone 318-636-1234; fax 318-686-0449), or circle number 100 on the reader service card.

GENESYS G-1 Dual-Band Antenna

GENESYS Products Group has a dual-band base-station antenna, model G-1. The G-1 is the company's smallest dual-band base-station antenna. This VHF/UHF base-station antenna is suited for amateurs who have tight space requirements or are restricted by local antenna ordinances. It is 42½ inches from the bottom of the mounting bracket to the apex of the antenna. Factory-tuned for the center of the 2 meter band (146 MHz) and the 70 cm band (446 MHz), the G-1 is capable of generating 3.0 dB on 2 m and 6.0 dB on 70 cm. The antenna comes supplied with a mounting sleeve which protects the UHF (SO-239) connector from the elements; two U-joint brackets that fit up to 2½ inch OD antenna masts; and three ground radials, allowing placement in environments where a good ground is not accessible (attics, chimneys, wood railings, etc.).

Suggested retail price is $99.95. For more information about the G-1, contact GENESYS Products Group, Ltd., 10815 Gulfdale, San Antonio, TX 78216 (800-847-4745, fax 210-647-8007); via Internet at genesys@connecti.com; or circle 103 on the reader service card.



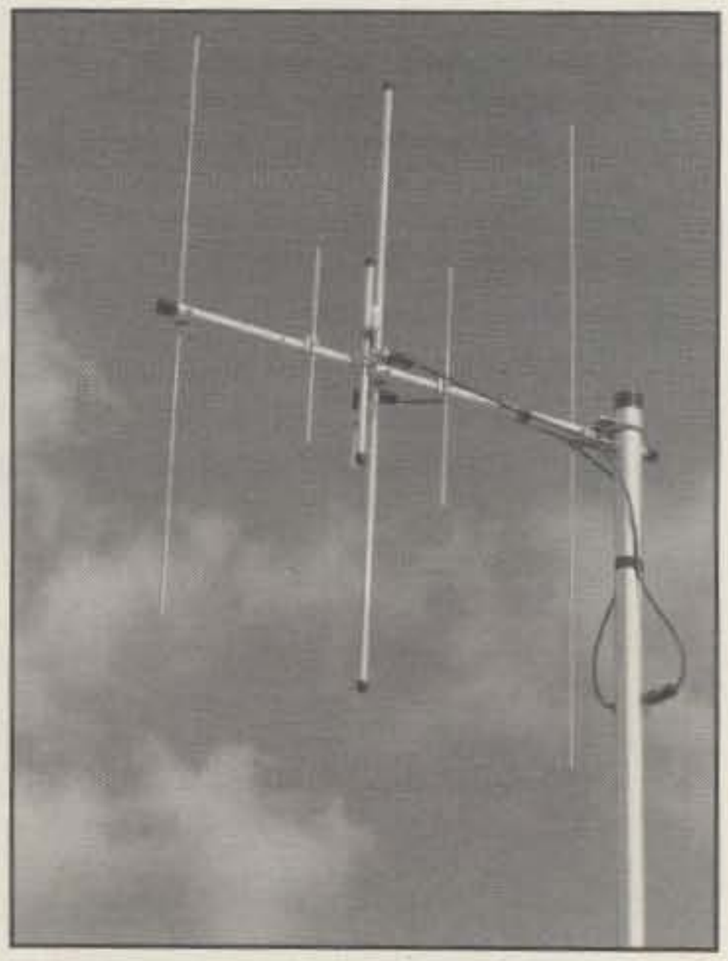
New Rope Available From The Wireman, Inc.

The latest addition to the line of rope offered by The Wireman is the 1/4 inch CQ 817, which is 1/4 inch Dacron double-weave ultraviolet resistant rope that can be used for all-weather applications such as dipole support, beam yokes, small mast and tower guying, etc. All models are black for minimum visibility. The CQ 817 is one of a variety of breaking strengths available from The Wireman. The CQ 815 is 3/32 inch (500 lb.); the CQ 816 is 3/16 inch (700 lb.); the CQ 818 is 5/16 inch (1300 lb.).

For more information, see any Wireman dealer, or contact The Wireman, Inc., 261 Pittman Road, Landrum, SC 29356 (phone 803-895-4195; orders 800-433-WIRE (9473); or circle number 104 on the reader service card.

Cushcraft A270-6S Dual-Band Yagi

The new Cushcraft A270-6S dual bander for 2 meters and 70 cm has the gain and directional characteristics of a Yagi and the convenience of a single compact antenna with one

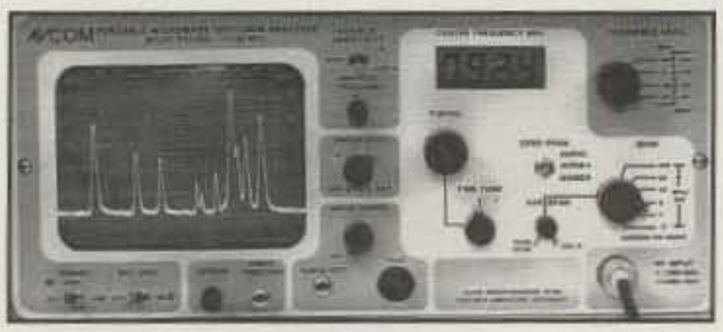


feedline. The A270-6S has a turning radius of under 3 feet and features stainless-steel hardware. The antenna comes with a fully illustrated assembly manual.

For more information, contact Cushcraft Corporation, P.O. Box 4680, 48 Perimeter Rd., Manchester, NH 03108 (phone 603-627-7877; fax 603-627-1764), or circle number 105 on the reader service card.

Portable Spectrum Analyzer From AVCOM

AVCOM of Virginia Inc. has a new portable microwave spectrum analyzer, model PSA-65B. The PSA-65B covers frequencies from less than 1 MHz to 1250 MHz and has greater than –95 dBm sensitivity. The battery or line operated spectrum analyzer can be used for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, and cellular and production use. Accessories for the PSA-65B include the BNG-1000A tracking generator for doing swept measurements, 1250 MHz wide frequency extenders, the RFP-24 preamplifier for increasing sensitivity to less than 1 microvolt, and the LPA-1000 Log Periodic Antenna. Internal options include a 10 kHz resolution bandwidth, FM demodulator, and AM detector. The PSA-65B measures 11.5"W × 5.5"H × 13.5"D inches.



U.S. domestic price is $2,930. For more information, contact AVCOM of Virginia, Inc., 500 Southlake Blvd., Richmond, VA 23236 (phone 804-794-2500, fax 804-794-8284), or circle number 107 on the reader service card.

K6STI RITTY 1.0 DSP Radioteletype System

RITTY 1.0 combines an FSK modem with a terminal program to enable the user to transmit and receive radioteletype signals on a PC. RITTY uses advanced digital signal processing algorithms but does not require DSP hardware. RITTY uses your sound card for analog input/output and optimized assembly language for speed so it can run right in the PC. RITTY eliminates the need for specialized demodulator hardware and can recover weak RTTY signals that ordinary terminal units can't copy. RITTY does not use an input limiter. It also does not use a wideband discriminator. Instead, it filters the mark and space signals with optimal FIR matched filters. The filter widths track baud rate and the channel frequencies are continuously adjustable.

RITTY provides a simple, intuitive interface with pop-up menus and a special typeface. You can select baud rates from 45 to 100 baud, quickly adjust mark and space frequencies, set transmit and receive audio levels, and vary the number of transmit stop bits. You can also select one of two Baudot punctuation sets and modify any punctuation mark. RITTY has several data features to enhance weak-signal recovery. It provides eight general-purpose memories, each over 2000 characters long, for CQs, early reply buffers, etc. RITTY also provides precise frequency/timing correction for your sound card.

RITTY requires a 386/40 or better, math coprocessor, VGA; and Sound Blaster 16 sound card (it will not work with 8-bit cards or other brands). RITTY 1.0 is $100.00 (add $5 overseas). For more information, contact Brian Beezley, K6STI, 3532 Linda Vista, San Marcos, CA 92069; phone 619-599-4962; or circle number 102 on the reader service card.

Harlan Technologies Upgrades COLOR Slow Scan

Harlan Technologies now has version V1.2 COLOR Slow Scan TV for the Sound Blaster sound card. The new version V1.2 is an upgrade which adds Martin 1 and Martin 2 to the list of modes. Other improvements include speeding up the display of pictures; new drivers for both video and sound; and COLOR SNOOPER, which shows the color levels in a

picture line by line, adds the user's callsign to pictures sent, and allows voice and .PCX pictures to be stored in separate directories. COLOR Slow Scan will send and receive Robot 8, 12, 24, 36 second black and white, Robot 36 and 72 second color (displaying in COLOR), Scotty 1 and Scotty 2 (displaying in COLOR), and now in Martin 1 and Martin 2 (also COLOR). Requirements for COLOR Slow Scan are a PC computer (286 or better) with DOS 3.3 or higher and 640K memory, hard drive, VGA display capable of 640 × 480 256 colors, and a Sound Blaster compatible card such as Sound Blaster, SB PRO, SB16, Thunder, PAS16, Fusion, etc.

COLOR Slow Scan can be ordered from Harlan Technologies, 5931 Alma Drive, Rockford, IL 61108 (815-398-2683; fax 815-398-2688); for $99.95 plus $5.00 shipping (overseas shipping $10.00). Illinois residents add $6.25 tax. For more information contact Harlan Technologies, or circle number 101 on the reader service card.

Electronic Repair Manual From Jensen Tools

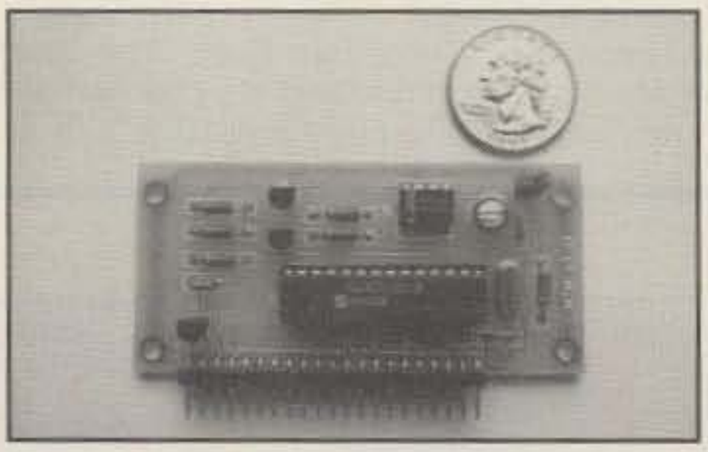
Jensen Tools offers Weka's *Electronic Repair Manual*, which provides information on how to repair and maintain a wide variety of electronic equipment. The manual has a plastic cover, and information in the three-ring binder is divided into sections that cover electronic repair basics, tools and test equipment, and troubleshooting and maintenance. The manual also includes repair tips and helpful hints. Each section includes theory of operation, specific repair instructions, and schematic diagrams, all with safety in mind.

The *Electronic Repair Manual* from Weka Publishing is available in the new 1996 Jensen

Tools Catalog. For a free copy of the catalog, write or call Jensen Tools, Inc., 7815 S. 46th Street, Phoenix, AZ 85044 (phone 800-426-1194), or circle number 108 on the reader service card.

MIM Module From Clement Engineering

The MIM module is a miniature APRS-compatible packet radio telemetry unit. When attached to a suitable FM transmitter, the unit can send any or all of the following: APRS GPS position reports, analog and binary telemetry data



in packet form (APRS compatible), a beacon text message, and a CW Morse ID. Each of these can be sent at user-selectable time intervals. A single digipeater path can be designated for packet transmissions. The unit accepts GPS data directly from GPS receivers in NMEA 0183 (RMC) format for position reporting and can telemeter five A/D inputs (8-bit resolution) as well as eight bits of parallel digital data. Through the use of PC configuration software "MIM.EXE," the user can customize callsigns and other packet transmission parameters by temporarily attaching the module to a PC serial port. An on-board EEPROM stores all configuration information indefinitely. An on-board voltage regulator accepts power from an unregulated 8–40 VDC source and the board may also be powered from a regulated 5 VDC source.

The module requires 15 ma operating current. The MIM module produces standard tones and transmitter keying signals that can be connected directly to most transmitters and handi-talkie equipment. MIM Modules may be purchased for $89.95 plus $4.00 s&h from Clement Engineering, Inc., P.O. Box 1086, Severna Park, MD 21146 (410-268-6736, fax 410-268-4612; e-mail: wiclement@aol.com), or circle number 109 on the reader service card.

1996 Catalog for AEA Products

Advanced Electronic Applications, Inc. (AEA) has their new 1996 Product Catalog in stock. AEA introduced 16 new products in 1995, and they are now featured in the 1996 Catalog, which offers information, specs, and pictures of their new products as well as all the other AEA data controllers, software, antenna analysts, remote radio controllers, and keyers.

If you are on AEA's mailing list, you should have received a catalog by now. If you did not receive a catalog and would like one, send your name, callsign, and address to Advanced Electronic Applications, Inc., Attn: '96 Catalog, P.O. Box C-2160, Lynnwood, WA 98036 (fax 206-775-2340, or circle number 106 on the reader service card.

The Latest from LOWE

HF 150 IBSH H H H

REAL RADIO, RUGGED, RELIABLE

Simplicity makes the HF150 easy to operate, and the synchronous detection produces superb audio which enhances the outstanding performance!

- Frequency: 30kHz - 30MHz
- Multimode: AM, AMN, LSB, USB
- 60 Memories (FREQ. & MODE)
- Tuning Step: 8Hz
- Bandwidth 7kHz & 2.5kHz
- 3 Ant. inputs, 600 Ohm BAL, 50 Ohm Coax and high impedance whip
- Built In Speaker, Ext. Jack & Record OUT
- Power 10-15VDC .15A (.3A max)
- Includes FREE AC adaptor
- Size: 7.3"W x 3.2"H x 6.3"D; 2.9 lbs.

AP150

The Ultimate Lowe Accessory!

A combination audio filter, amplifier and speaker. Works well with any SW receiver or transceiver, but designed to compliment the HF150.

Features:

- 10W Audio amplifier
- Variable notch filter
- High pass filter
- Low pass filter
- Built-in loudspeaker
- External speaker output
- Headphone output

PR150

Pre - Selector w/ Pre-Amplifier

A perfect match to the HF 150, but equally effective with other SW receivers. Obtain wide coverage of 100KHz to 30MHz through the use of seven tunable bandpass filters. Multiple antenna inputs, pre-amp attenuator and much more. Hear what you've been missing!

Antenna input: 50ohm unbalanced, 600ohm balanced • **Power:** 10 - 15VDC

Size: 7.3"w x 3.2"H x 6.3"D

ACARS FROM LOWE....THE AIR MASTER!

A super combination of hardware and software for the receiving and decoding of **ACARS** (Aircraft Communications Addressing and Reporting System). This format is used to transmit data between aircraft and airport ground stations. This information is transferred via VHF to the **ACARS** ground station. When using the Air Master software with your PC and an air-band receiver, you'll be able to view the **ACARS** messages as they are received. The package includes the MS-DOS software for use with a 386 or higher PC, the computer interface and manual.

NEW HF250

The Lowe HF 250 is set to become the new world standard for mid-priced receivers. The new HF 250 combines Lowe's traditional high standards and quality of construction together with the advanced facilities and control features required by today's discerning listener!

FEATURES

- Frequency coverage 30kHz to 30MHz
- Tuning step size 8Hz
- Back-lit display
- Display resolution 100Hz
- 255 memory channels
- Memory channels also store frequency, mode, filter selection and attenuator setting.
- Computer control via RS232 port.
- Clock with 2 independent timers
- Fast tuning in 10kHz steps
- 1MHz up/down tuning
- Infra red remote commander

WRTVH RECEIVER OF THE YEAR!

HF 225

IBSH H H H

Rated 4 stars by Passport's Larry Magne

- Multimode, AM, SSB, CW • 30 Memory Channels • Optional AM Synchro & FM • Filter for all Modes: 2.2, 4.7, 10kHz 200Hz audio CW filter
- Built-In Speaker, Ext. Speaker, Rec. Jacks
- 10-15VDC .15A (.3A MAX) AC/Nicads Opt.
- Size 10"W x 4.2"H x 8"D; 4.18 lbs.

HF 225E EUROPA

A "Turbocharged" HF225 for the dedicated DXer! Same high performance features of the HF225 plus these additional features:

- 7, 4.5 & 3.5kHz replacement filters for excellent selectivity
- Reduced residual noise thru shielded coils and switching diodes
- Synchronous detector (D225) & KPAD1 standard on Europa version

SEE YOUR DEALER FOR DETAILS!

HF 235

Top of the line rack version of the HF225, with similar specs. A professional communications receiver for the discriminating user, with high stability OSC & opt. computer RS232.

Keypads for the HF150 and HF225, Carrying Cases, Mounting Brackets, and a Computer Control Interface are just a few of the extras which can give you optimum performance of your LOWE product. Contact EDCO for the dealer nearest you!

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Contact your favorite Dealer Today!

CIRCLE 5 ON READER SERVICE CARD

A DXpedition To St. Tudwal's Island (EU-106)

A DXpedition to a rare island can be a relatively short boat ride away. However, it can also present the same joys, hardships, and logistical problems as any exotic spot on the globe.

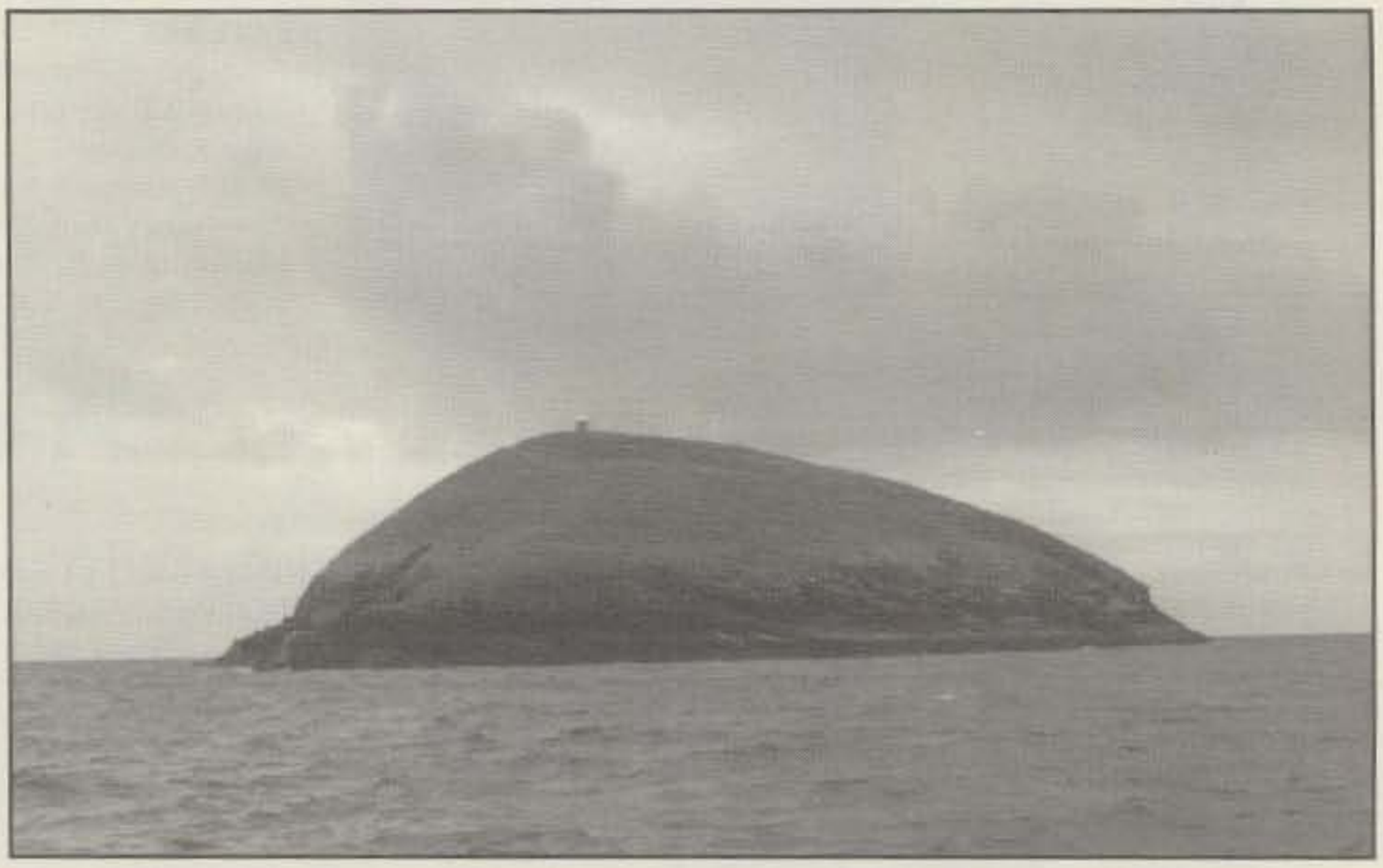
BY DECLAN CRAIG*, EI6FR

For several years some friends and I had been involved in activating Irish islands for the IOTA program. We operated as the Islandhopper's Group and went to The Saltee Islands EU-103 under the callsign EJØSI, and on two occasions we activated the rare Blasket Islands EU-007, first as EJ5ID and then in 1993 as EJ6FR and EJ3HA, taking part in the inaugural RSGB IOTA Contest.

Back in late 1993 some members of the Islandhopper's Group—Declan, EI6FR, Tony, EI2GX, and Alan, EI9IF, became involved in the EI packet radio scene and brought to the air the EI6FR PacketCluster node serving Dublin and its hinterland. Of importance was that being located on the Eastern seaboard, the DUBDX node was in an ideal position to link to the UK and EU networks and break the isolation that had existed for the other EI clusters up until that time. A casual remark to GW user Tony, GW4VEQ, led to many hours of tireless and selfless work by him and then led to a link to the UK from EI. Eventually this also led to Tony starting up the first GW cluster at his QTH on the Isle of Anglesey under the callsign GB7ADX. Over the next year of working together as cluster sysops, very firm friendships between us were built up across the Irish Sea. We later were joined by Pete, GI1ONL, who launched the first GI cluster (GB7UDX) linking to Dublin.

Now we had EI, GI, and GW in our Western Network. It seemed proper somehow that we in EI should invite our new friends on an IOTA operation to build on our relationship, so plans began to take shape. We thought perhaps a new name should mark our efforts. It seemed appropriate that out of our Western Network the West Net DX Group was born.

Where we should go was the first question. *When* was easy, as the IOTA contest would take place in July, and it was obvious that we should make a strong effort at that time. First we thought that perhaps a return visit to either The Saltees or Blasket would be the order of the day. The Saltees in particular are an excellent contest site, and access is reasonably easy for a heavily laden contest team. After some thought, however, we began to look a little farther afield for a rarer island to boost demand for our station as a contest multiplier.



St. Tudwal's Island (EU-106) rises almost straight up in Cardigan Bay, Wales.

The Lighthouse, at the high point of the island, is the ideal location for the operating site. One tent served as a litchen, and the other became sleeping quarters for the crew.

*167 St. James's Road, Greenhills, Dublin 12, Republic of Ireland

There was a rare island, St. Tudwal's, off the Welsh coast. The island had first been activated by Tony, GW4VEQ, and Roger, GW4OFQ, in 1986 and had been allocated the IOTA reference EU-106. The island, located in Cardigan Bay, is quite an operator's challenge. It is uninhabitated now, since its lighthouse was automated. There is no power, nor indeed a source of fresh water. The island itself rises steeply from the sea to a height of some 200 feet above sea level. Steep cliffs threaten the unwary visitor, and the seas also make landing hazardous at times. The total size of the island is only some 300 yards long by 100 yards wide. When Tony and Roger gave IOTA a new island back in 1986, their equipment by neccessity was simple—just an FT102 and a G5RV only raised to 10 feet. Still, many contacts were made even as far away as VK. We hoped that the island would prove to be a worthwhile location for us also.

Planning began in earnest for the July 1994 contest. The cluster link from GW to EI to GI was kept busy as equipment lists, budgets, and many other messages passed among the group, who by this time had been finalized to include nine members. From EI there would be Declan, EI6FR; Tony, EI2GX; Tony, EI3HA; Alan, EI9IF; and Liam, EI7DSB. Joining the effort from GI would be Rob, GIØKOW, and Pete, GI1ONL, while the Welsh members would be Tony, GW4VEQ, and John, GWØONY.

Transport for the EI/GI members was arranged. Stena Sealink would carry a car and five passengers at a good rate, and two lucky team members would walk onto the ferry with as much as they could carry. As it turned out, the ferry company had not bargained for just how much gear an island DXpedition team could squeeze into a single car along with the passengers. With the car laden down on its axles and with the two walkers laden down like mules, we did make it aboard, however.

Meanwhile in GW Tony had been busy arranging for generators, fuel, pneumatic masts, etc., for the island site. He also contacted the ferryman who had brought he and Roger to St. Tudwal's some eight years before. Yes, he said he again would be happy to provide transport for the team, mentioning of course that eight years of inflation would take its toll on the price. Such is the lot of the island expeditioner. The main difficulty would be getting the generators and the pneumatic mast to the top of the island. Lots of pain and sweat looked likely, until John surprised us with the news that a business contact had agreed to airlift the heavy equipment to the site for us, provided permission to land could be obtained. Having contacted, among others, the Royal Society for the Protection of Birds to ensure that the aircraft would not disturb nesting seabirds, we all were delighted when this part of the plan fell into place.

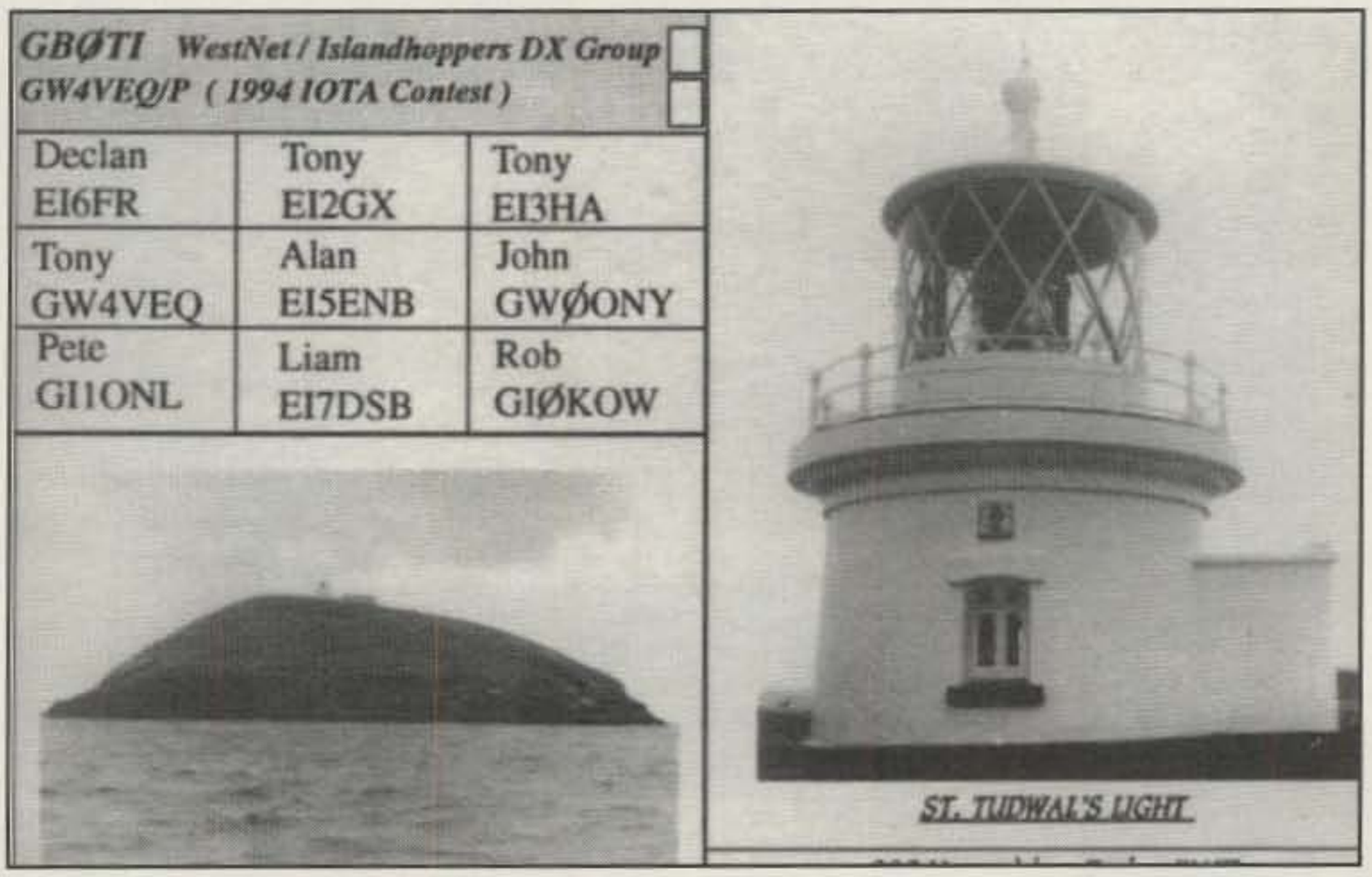
From EI we were bringing along a pair of large chalet tents and several small sleeping tents. However, we were fortunate to get permission to use the old, derelict lighthouse-keeper's house, which would become the shack. The two chalet tents would be the sleeping quarters and the GW/EI3HA Catering Corp kitchen. We have always considered ourselves very lucky to have an excellent chef on the team, the standard DXpedition fare being raised far above the usual burgers and beans. It has meant, however, that the call of the belly is sometimes louder than the call of the pileup, causing some very rapid QRTs at times.

The operating position for the DXpedition was situated in the abandoned lighthouse keeper's quarters. Shown here (left to right) are Liam, EI7DSB, Declan, EI6FR, and Rob, GIØKOW.

The EI/GI group arrived in GW shortly after 1 AM on Friday morning. We were met by Tony, GW4VEQ, and we traveled back to his home, as several of us were to spend what remained of the night at Tony's QTH. The remainder of the group was to sleep at the home of John, GWØONY.

It was a short night for all, and after breakfast the team reassembled at John's place. We began loading the cars and trailer for the journey to the village of Abersoch, from where we would depart. After a pleasant couple of hours driving through the magnificent Welsh countryside, we arrived at the small harbor. The state of the tides meant that several journeys needed to be made by dinghy before we had all equipment and people aboard the small fishing boat that was to take us to St. Tudwal's. Fortunately, the weather was very favorable and the sea was calm. After about 40 minutes we were alongside the jetty at the island. We began unloading at once—a task completed quickly, as we all were anxious to get the station on the air. Just then, while the last of the equipment was being brought ashore, we were delighted to hear the sound of rotor blades as the helicopter carrying our masts and generators appeared over the island, landing and offloading the equipment at the summit, and relieving us of the burden of hauling the heaviest items the 200 feet to the site.

After a couple of hours of hauling, all the gear was at last on site. The team then broke up to complete some of the needed tasks. The tents were erected by one group. Another group looked after the raising of the mast and tribander, a difficult task in itself, as the island had a covering of long, matted grass on bare rock, making the location of suitable achor guy points difficult. Yet another group took on the



The QSL card that made a lot of people happy. It confirmed either GBØTI or GW4VEQ/P and EU-106.

task of transforming a derelict ruin into a working radio shack. This they did in record time, clearing debris, making operating benches from old doors and whatever else was at hand, sealing out the weather, and providing electric lighting and power where it was needed.

The shack itself had a Kenwood TS-850s with a Yaesu FL2100z amplifier. An FT757GX was available at the second station and for backup in the event of a rig failure during the contest. Two laptop computers also were made ready for logging and for linking back to the GB7ADX cluster on the Isle of Anglesey. Outside the antennas were tuned. The tribander was at 40 feet on the Clark mast, but at some 250 feet above sea level. We were to receive tremendous reports on the HF bands from this antenna. Dipoles for 40 and 80 meters were put in place. Also, a Butternut HF6V was available as an all-band backup antenna.

Tony, GW4VEQ, had been fortunate to secure a special callsign for this operation, and we came on air on Friday evening as GBØTI. The logbook for this callsign would record some 1200 QSOs outside of the IOTA contest, with stations as far as VK, ZL, KH, and XV all being worked. Because of the rules laid down by the RSGB, we could not use our special callsign during the contest. Instead we would use GW4VEQ/P.

Quite early during the contest we realized that our tremendous site was allowing us to be quite competitive. Checking serial numbers with other stations, it appeared that we were doing quite well indeed. We did, however, suffer from our proximity to the mainland UK. Contacts with the UK mainland were limited to the 40 and 80 meter bands, although we did make several GW and G QSOs on 10 meters in the closing hours. Huge pileups from the European continent and from Stateside made up for the 10-point disadvantage we suffered from lack of UK QSOs. Also, operator fatigue affected the EI/GI team members somewhat during the middle hours of the contest, as the results of traveling began to take their toll. However, as the contest ended we believed we had done quite well for our first contest effort as a group. When the results came out we were in seventh position, but we had made more QSOs than some of the stations ranked above us, having lost out on multipliers somewhat. We would do better next time, we promised ourselves.

After the contest we operated for several more hours as GBØTI. At about 2200 on Sunday evening we pulled the plug on the rig and retired to the mess tent, where the cork was pulled on many bottles and we drank a toast to us and to the future.

Some 3500 QSOs had been made from the little island of St. Tudwal's during our stay. On our return home, in the best tradition of the IOTA program, Declan, EI6FR, QSLed every station in the log, hopefully confirming a new island for many of "the Deserving."

Dawn broke a little too early and just a little too brightly for heads weary from contesting and a little sore from celebrating. Still, it was Monday morning and time for us to begin to make our way home. Tony, GW4VEQ, checked with the coastguard and reported that a downturn in the weather conditions was expected, so we felt we had better leave as soon as possible. There was more bad news a short time later, when we were told on the marine radio that the helicopter would not be able to return to pick up the heavy gear, as it was fogged in at its airfield. We began the task of hauling all the equipment to the jetty, this time including the three generators and both portable masts.

After this was accomplished, we watched anxiously as sea conditions gradually got worse. In the early afternoon the fishing boat came alongside. The sea was bad at this time, and again and again the boat was hurled against the jetty. We quickly loaded the gear while some of the boat's crew used boat hooks to prevent the boat from smashing against the pier. John, GWØONY, was knocked off his feet and hurled across the boat by a large wave. Luckily he did not sustain any serious injuries.

Finally we pushed away from the jetty and made our way back toward Abersoch. Once we were away from the island the sea moderated, and we could relax and enjoy the trip back. All was not over for us yet, as nature had one more prank to play on weary DXpeditioners.

The tide was out, and a long way out at that. The fishing boat could only approach within a half mile of the harbor before going aground. Once again it was off load to small dinghies and make for shore. After 500 yards or so these dinghies too went aground, but this was something for which the experienced Welsh fishermen had planned. These dinghies had wheels on the bottom! Out went a crewman in waders, and he hauled the boat along the bottom to the shoreline, where we emptied the gear onto the sand. It was then a team relay race to carry the equipment another 500 yards over the sand in front of the incoming tide and onto the pier.

It was a very tired, bedraggled team who loaded the cars and made for the GW4VEQ QTH for very much needed hot showers and cold beers. That evening we met in the Valley Hotel for a super dinner and to look back at what we had done—what had gone right and what had gone wrong. At 1 AM Tony escorted his EI and GI friends to the Holyhead Ferry terminal for the 4 hour sail back to Dublin. As we waited to say goodbye, we thought about IOTA '95 and where we would go then. Maybe to Inis Meain in the Aran Islands, one of the most westerly islands in Europe. And of course we did, but that's another story . . . ■

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• FEATURES •

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- **Filters:** (kHz) **SSB** 4 **AM/NFM** 12 **WFM** 180
- **Memories:** 50 ch. x 20 banks=1000 total
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BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Best Is Yet To Come!

Many commercial users, utilities, and public-service organizations are abandoning the low-band VHF systems and moving to the now popular 800 MHz region. This action is providing many of us with a new source for data radios.

Here is a letter I received recently from David Deelstra, N7ISH, of Salt Lake City, Utah. The message is from Bernard Valentine, KA7EWN. The text contains an explanation of how the GE (Ericsson) Pheonix SX is modified for use at 9600 baud. The text of the message follows:

These mods are all I have done to make both VHF and UHF Phoenix radios work on 9600 baud packet using the TNC2 clones MFJ-1270B, C, with 9600 baud modems and the PacComm Tiny 2 with PacComm's MC-NB96.

1. Connect audio *in* at J301 using a 1 to 4 mFd non-polarized cap.

2. Connect audio *out* at HL-35 on synthesizer board just in front of pin 14 on U-704 (4066).

3. Remove casting that covers the reference oscillator and VCO, and remove C-308 and C-309 from the circuit. I only unsolder (or clip) one leg of each capacitor and tip capacitors out of the way so the unit can be returned to normal use if necessary.

4. Make sure channel guard pot is turned all the way down, and then follow the modulation adjustment with *digital channel guard* instruc-

211 Luenburg Drive, Evington, VA 24550
MITREK™ is a trademark of Motorola Inc., Communications Div., Schaumburg, IL 60196

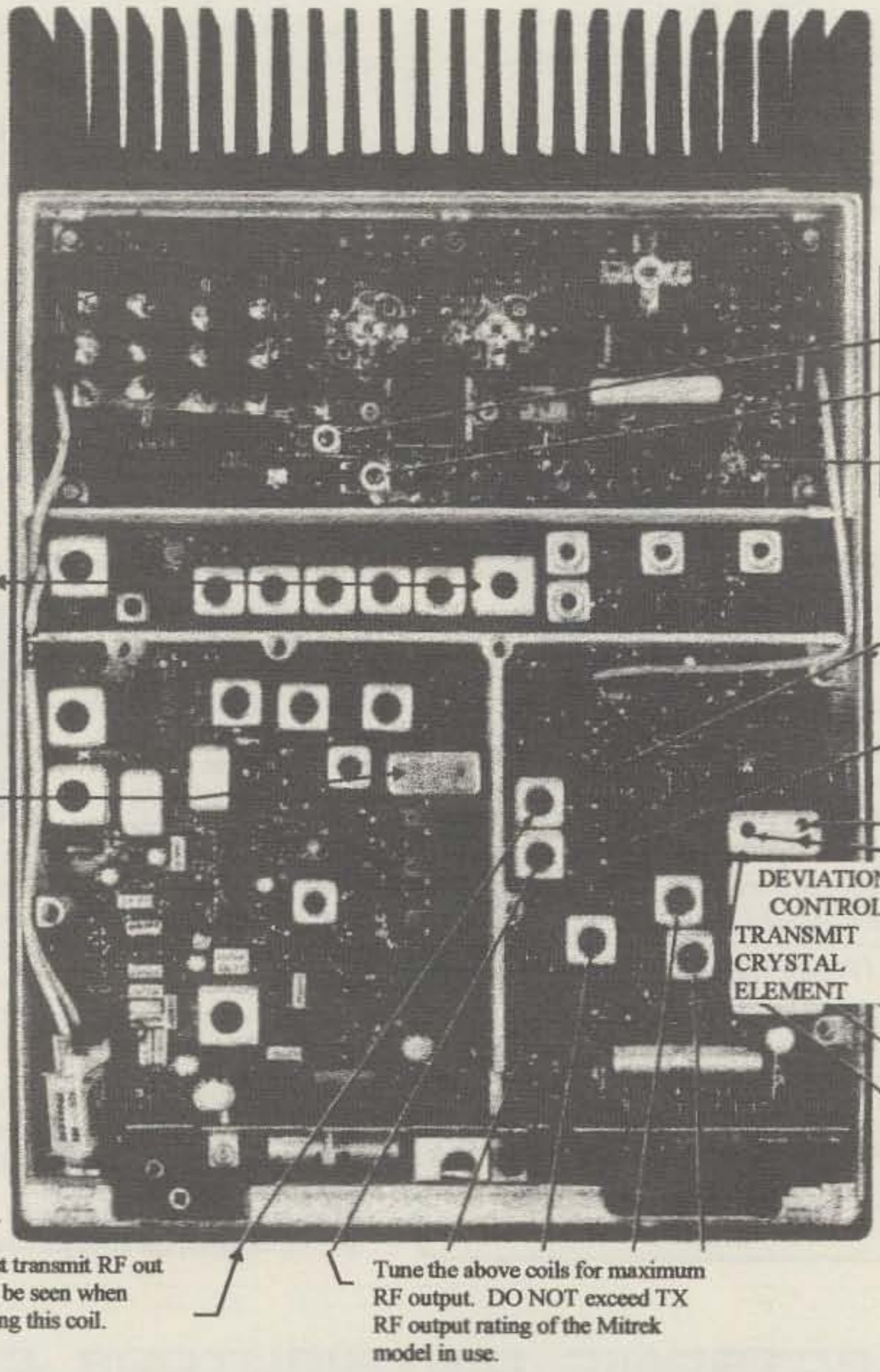
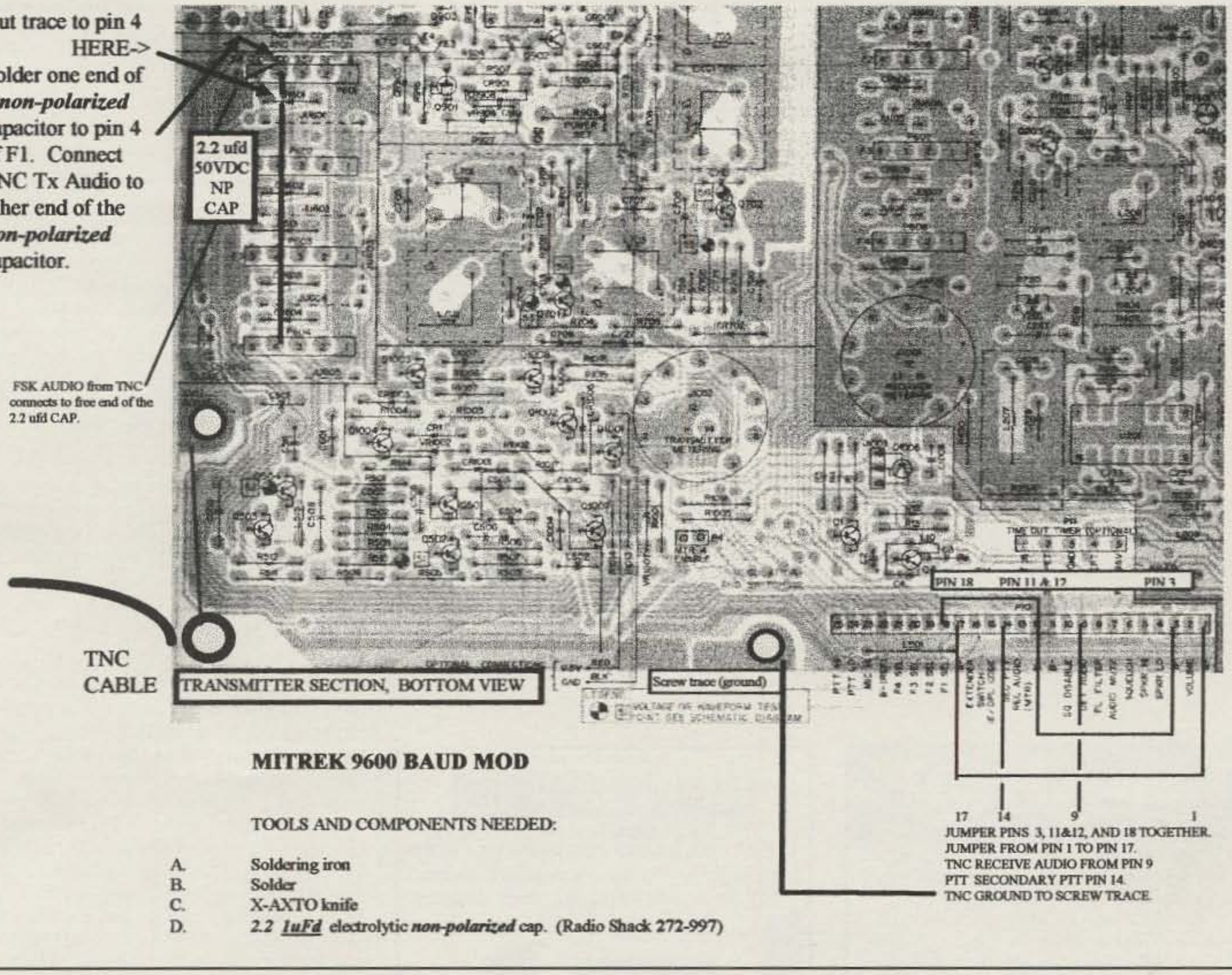


Fig. 1– Location of tuning coils and power-level controls. Note the "deviation" control is located on the transmit crystal element. Some tuning of the RF PA section may be needed to obtain optimum power output. (See text for more details of the modification.)



MITREK 9600 BAUD MOD

TOOLS AND COMPONENTS NEEDED:

A. Soldering iron
B. Solder
C. X-AXTO knife
D. *2.2 1uFd* electrolytic *non-polarized* cap. (Radio Shack 272-997)

Fig. 2– Bottom view of the circuit board showing the modifications and tools and components needed.

tions located in the Transmitter Alignment procedures of the GE manual (available from Ericsson/GE, Lynchburg, VA 24502).

You only need to perform step 6 of the procedure described in the manual and the modulation should be set for 2.75 kHz to 3.00 kHz. **Do not** exceed 3.00 kHz, or the bandwidth of the transmitter could exceed the normal passband of narrow-band radios if more than 1 to 2 kHz frequency error between any two radios is present.

Good Luck!

Bernard Valentine, KA7EWN

P.S.: I have five of these in service—four UHF and one VHF (user port), and they all work well. The TX delay varies from unit to unit, with the best being 90 ms and the worst being 160 ms, so be careful when setting node prams remotely if there isn't another way to connect.

Long Nights and Happy Days

For several years now I've made it a point to include some of the 9600 baud modifications that we've employed to make these transceivers data-ready for our high-speed backbones. After some long nights in my lab, I've modified another one of these older commercial transceivers for 9600 baud use.

Using some of the techniques described in one of my books (*The Packet Radio Operator's Manual*, published by CQ Communications), we made a similar modification to the Motorola MITREK™. This mod makes it operational as a 9600 baud backbone transceiver. The modification is quite simple and easy, and it can be completed in one evening.

Here is the information and directions to help with the modification of this commercial transceiver. This conversion details how the low-band VHF MITREK is modified for 9600 baud. The same mod may be made to other VHF and UHF MITREKs using similar techniques.

As a note of interest, the only part that will be needed is a 2.2 µF, 50 volt *nonpolarized* capacitor; note that I stress *nonpolarized*.

To make your search for this component less tiring, the Radio Shack part number for the 2.2 µF, 50 VDC capacitor is 272-997. If your local Radio Shack does not have it in stock, you can use their part number 272-996. The difference is that you drop a microFarad, and in turn lose some of the audio coupling to the direct frequency modulated stage of the MITREK (crystal and oscillator element).

The latter change may cause a small loss of audio drive. However, it is not significant, since there is plenty of level from the MFJ-1270CQ turbo (9600 baud) modem. There is also extra level to be had from the direct frequency modulator (see fig. 1, deviation control).

Using Network Nodes And TheNet X-1J4

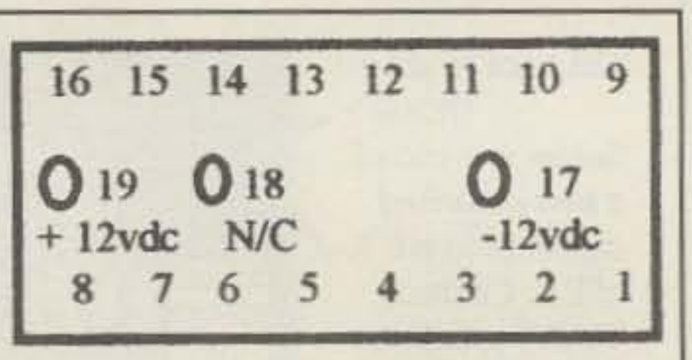
If your network or backbone node(s) is being used for point-to-point backbone traffic only with no user access, the backbone nodes should have the ACL set ON (ACL and 127), and the routes locked to neighbor nodes (R 0 [call-ssid] + quality). The ACL feature may be used to set all neighbor-nodes in using the following format:

"ACL [neighbor-nodecall] + 0"

Only the System Node Operator's (SNO) call and network manager callsigns may be ACLed using the "+ 0" (zero). All other calls will be wild-carded (ACL * + 127). *Be careful!*

Caveat

Make sure you have set your call in at 0 "zero" (ACL YOURCALL + 0) before you exit the SNO command mode. This ensures that you will be able to connect to the node later. The other side of this formula is to ensure that only neighbor network or backbone nodes will be seen



J1 Connector as viewed outside MITREK

Fig. 3– Connect PLUS (RED) +12 volts DC switched, with 20 ampere in-line fuse to 19 of J1 on the front panel of the MITREK. Connect MINUS (BLACK) –12 volts DC to pin 17 of J1. No other connections to J1 are necessary. All jumpers, PTT, Tx, and Rx connections are made internally to the bottom of the MITREK PC board (see fig. 2).

in the backbone nodes list, and user access to the backbone will not be allowed. Careful routing will enable your network to function with ease while making the system totally transparent to the user.

If I Can Help . . .

I am using the MFJ-1270CQ Turbo (9600 baud) TNC on the 51+ MHz backbone nodes here and the results are good. A DB25 interface cable must be made to interface/gateway the two TNCs together. The schematic/drawing for this interface is shown in fig. 4.

To give you some idea of the alignment layout, I've included as fig. 1 the transmitter and receiver tuning-coil locations. There is not a lot of tuning to do after installing the 50 MHz crystals. A good source of crystals is JAN Crystals. Ask for Sue Brick and tell her you want the LO BAND Motorola MITREK (50 MHz) crystals. Sue has a database already set up for these radios and the necessary input capacities. In other words, she has the information already in-house. Crystals are $15.00 each ($30.00/pair—Tx/Rx) plus shipping ($2.50 approximately). Allow three to four weeks for delivery, or add $3.00 for each crystal to receive them in eight working days. Contact JAN Crystals, P.O. Box 60017, Fort Myers, FL 33906 (1-800-526-9825).

Begin The Beguine

Locate the transmit audio amp/splatter section on the transmitter section, similar to fig. 2 (circuit board bottom view, upper left). Note the last transistor, Q504, on the 39–50 MHz version. There is a trace that connects all transmit crystal element pin 4's together. This trace is attached to the collector of Q504 via a small RF choke (see fig. 2).

Next locate the transmit channel element(s). Locate pin four (4) on channel element F1 or #1. Note in fig. 2 the line going to pin 4 of element #1 to the collector of Q504. Pin 4 of the element will become the direct frequency modulator input. Cut the trace at the channel element so that all other elements and Q504 are no longer attached.

Solder one end of the 2.2 µFd electrolytic cap to pin 4 of the channel element F1 (see note on drawing mentioned above). The opposite end of the 2.2 µFd capacitor is now your modulation input from the TNC. The FSK line in the MFJ cable is **black.** Attach (solder) shield wire to the ground screw nearby.

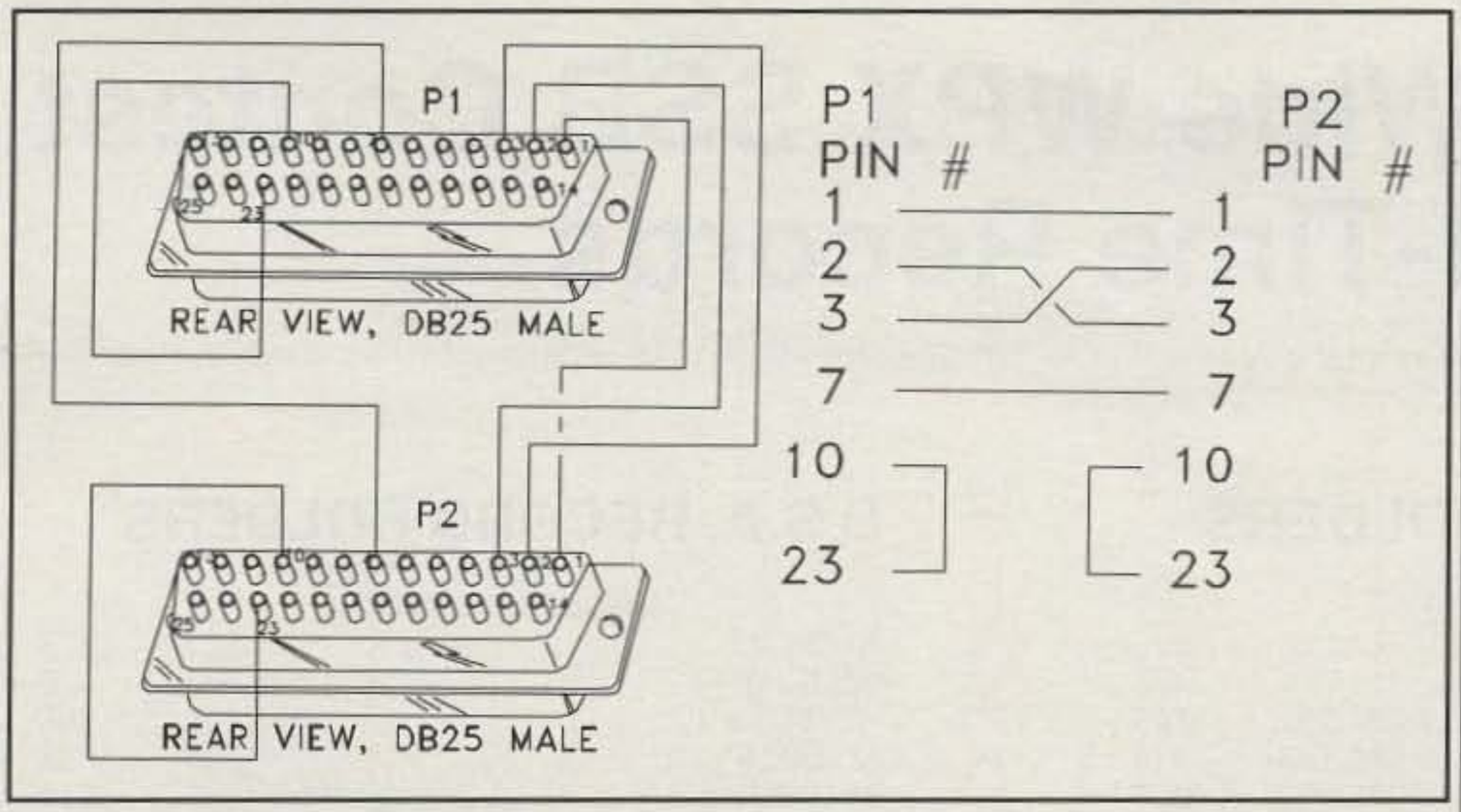


Fig. 4– This drawing illustrates the interface cable utilized when porting a TNC2 or clone 1200 baud to 9600 baud X-1J4 gateway into the backbone (see text).

Some Final Notes

There is no substitute for good documentation. If you care to have the complete service manual for the MITREK, you may purchase it from Motorola, Inc., Communications Division. The service-manual number is 68P81037E65-B.

Regardless of what you may have heard or been told by others, it is imperative that you set the deviation to 3 kHz. I make this adjustment by setting the 9600 baud TNC TXDelay to 120 and sending several long packets through the TNC (into a dummy load, of course).

While the TNC is (keying the transceiver) sending the long TXDelay, I set the deviation level using the control atop the transmit crystal element. This is where my IFR-1200S becomes the guidepost to confirm exact adjustment.

You may wish to begin your test of the node with a TXDelay setting of 200 milliseconds. This equates to TXD 20 with most TNCs. Try lowering the TXD, making sure you have good ACK confirmation. In some MITREKs I've been able to bring the TXD below 12 or 120 milliseconds.

Having fun at 9600 baud!

73, BucK4ABT @ WA4RTS.VA.USA

CQ World-Wide WPX SSB Contest All-Time Records

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

SINGLE OPERATOR

1.8	S52CD('95)	422,532	291
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	TE1C('95)	7,281,630	745
14	PYØFM('95)	9,660,432	939
21	ZW5B('95)	14,095,142	1054
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060
QRP/p	HC8A('94)	7,520,562	714

MULTI-OPERATOR SINGLE TRANSMITTER

HC8A('93)	32,502,677	1107

MULTI-OPERATOR MULTI-TRANSMITTER

ED8ACH('91)	47,278,236	1319

U.S.A. RECORD HOLDERS

SINGLE OPERATOR

1.8	K1ZM('95)	327,712	308
3.5	WE3C('95)	1,519,300	475
7.0	KC7EM('95)	1,950,228	495
14	KC1XX('95)	4,787,328	832
21	WN4KKN/6('92)	4,538,050	814
28	WM5G('89)	4,213,127	799
AB	KM1H('92)	7,854,840	945
QRPp	KR2Q('92)	1,269,960	557

MULTI-OPERATOR SINGLE TRANSMITTER

WC4E('92)	11,611,929	1113

MULTI-OPERATOR MULTI-TRANSMITTER

WZ6Z('89)	18,737,170	1138

CLUB RECORD

Northern California Contest Club('92)	97,527,906

QRPp RECORD

HC8A('94)	7,520,562

WPX (Prefix) RECORD

HG73DX('91)	1,337

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	ED9LZ('95)	6,047,504	631
14	EA8AH('94)	8,194,536	852
21	TR1G('90)	6,788,925	825
28	FR5DX('91)	7,543,818	831
AB	ZD8Z('94)	18,118,880	992

ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UA9CSS('94)	1,074,780	315
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	JH1AJT('89)	4,848,480	740
AB	7Z2AB('92)	9,177,296	809

EUROPE

1.8	S52CD('95)	422,532	144
3.5	S57AW('95)	1,719,468	486
7.0	S5ØA('95)	4,536,756	714
14	IU9S('94)	5,677,177	869
21	CT2A('92)	6,029,559	919
28	9H1EL('89)	5,882,825	787
AB	YZ9A('91)	8,518,112	928

MULTI-OPERATOR SINGLE TRANSMITTER

AF	EA8BR('94)	15,311,851	953
AS	TA5/NØFYR('91)	16,474,965	1005
EU	IJ4R('91)	16,027,956	1146
NA	VP2EC('92)	24,409,580	1115
OC	P2ØX('93)	13,440,570	858
SA	HC8A('93)	32,502,677	1107

NORTH AMERICA

1.8	K1ZM('95)	327,712	308
3.5	VA3EJ('91)	1,950,592	448
7.0	TE1C('95)	7,281,630	745
14	KP2A('95)	7,088,976	912
21	FG5R('89)	9,936,240	912
28	J68AX('92)	4,709,985	651
AB	KP2A('93)	16,694,570	1006

OCEANIA

1.8	T32AF('83)	16,872	37
3.5	N6VI/KH6('94)	1,016,652	273
7.0	T32AF('93)	3,995,928	437
14	KG6DX('90)	4,558,527	733
21	AHØK('92)	7,206,850	698
28	P2ØA('92)	5,184,625	703
AB	WR6R/WH6('95)	9,907,968	798

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	YV3A('91)	1,664,476	362
7.0	YV5A('95)	4,581,048	579
14	PYØFM('95)	9,660,432	939
21	ZW5B('95)	14,095,142	1054
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060

MULTI-OPERATOR MULTI-TRANSMITTER

AF	ED8ACH('91)	47,278,236	1319
AS	VS6WO('94)	16,555,040	967
EU	HG73DX('91)	30,664,095	1337
NA	VP2EC('94)	39,530,455	1285
OC	FKØAW('89)	26,538,972	1002
SA	ZZ5EG('87)	38,096,250	1250

Scanners/CB/Weather Stations

New Scanner Products Available

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Bearcat 3000XLT-U handheld	$344.95
Bearcat 890XLT-U base/mobile/weather alert	$227.95
Bearcat 860XLT-U 100 channel base	$154.95
Bearcat 760XLT-U base/mobile	$189.95
Bearcat 700A-U information mobile	$144.95
Bearcat 560XLA-U base/mobile	$76.95
Bearcat 220XLT-U handheld/SPECIAL	$207.95
Bearcat 178XLT-U base with weather alert	$124.95
Sportcat 150-U handheld with 800 MHz.	$158.95
Bearcat 148XLT-U base with weather alert	$83.95
Bearcat 120XLT-U handheld	$129.95
Bearcat 80XLT-U handheld with 800 MHz.	$144.95
Bearcat BCT7-U information mobile	$168.95

Weather Stations

Now you can be your own weather reporter with the Davis Weather Monitor II. Our top-of-the-line weather station combines the most advanced weather monitoring technologies available into one incredible package. Glance at the display, and see wind direction and wind speed on the compass rose. Check the barometric trend arrow to see if the pressure is rising or falling. Push a button, and read indoor and outdoor temperature, wind chill, humidity and barometric pressure. Our package deal includes the new ultra high resolution 1/100 inch rain collector part **#7852-U**, and the external temperature/humidity sensor, part **#7859-U**. The package deal is order **#DAV1-U** for $479.95 plus $15.00 shipping. If you have a personal computer, when you order the optional Weatherlink computer software for $139.95, you'll have a powerful computerized weather station at an incredible price. For the IBM PC or equivalent order part **#7862-U**. Apple Mac Plus or higher including PowerBook, order part number **7866-U**.

The Weather Monitor II (7440) comes complete with anemometer with 40 feet of cable, external temperature sensor with 25 feet of cable, junction box with 8 feet of cable, AC-power adapter, detailed instruction booklet and one year limited factory warranty.

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Davis Weather Wizard III **7425-U**	$154.95
Davis Perception II Indoor stand-alone weather monitor **7400-U**	$124.95
Davis Remote Display Unit **7815-U**	$84.95
Davis Rain Collector II 0.01" **7852-U**	$59.95
Davis Rain Collector II 0.2 mm **7852METRIC-U**	$59.95
Davis Rain Gauge Stand-alone 0.01" **7520-U**	$79.95
External Temperature/Humidity Sensor **7859-U**	$99.95
Davis Anemometer Mast Mount **7890-U**	$15.95
Weatherlink Software for IBM PC Version 3.0 **7862-U**	$139.95
Weatherlink Software for Apple Version 3.0 **7866-U**	$139.95
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6-Conductor 40' (12.2 m) extension cable **7878-U**	$21.95
8-Conductor 25' (7.6 m) junction box cable **7880-U**	$14.95
8-Conductor 50' (15.2 m) junction box cable **7881-U**	$24.95
8-Conductor 100' (30.5 m) junction box cable **7882-U**	$44.95
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Thermometer with AM/FM clock radio by Oregon Scientific **CR388-U**	$39.95
Indoor/Outdoor Thermometer with Jumbo Display by OSI **JB880EX-U**	$24.95

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Mfg. suggested list price $769.95/**CE Special $369.95**

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Turbo Scan · VFO Control · 10 Priority channels
Auto Store · Auto Recording · Reception counter
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Frequency Coverage:
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Ranger RCI2950-U 25 watt 10 meter transceiver	$239.95
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Uniden WASHINGTON-U SSB CB Base († $25.00 shipping)	$199.95
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VHF Transceiver

RELM® WHS150-U Transceiver/SPECIAL

Mfg. suggested list price $481.67/**CE price $299.95**

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CIRCLE 159 ON READER SERVICE CARD

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Getting Started—Part III

Here is the third part of this five-part article. The previous parts covered building or modifying equipment considerations, clubs, custom consoles, dummy loads, high or low power, junk equipment, magazines, new versus used equipment, receiver characteristics, solid-state versus tube or hybrid equipment, stacking equipment, and SWR/power meters. Back issues of this magazine can be purchased from *CQ*.

Bill Peterson, N2WNR, lives in Morris Plains, New Jersey. He has had an interest in amateur radio since he was a teenager, but did not become a licensed amateur until he was 52 years old. Bill has been active in ARRL Field Day and Novice Roundup activities. His station includes an ICOM IC-736 transceiver, 40 and 80 meter tree-suspended dipoles, a homebrew memory keyer with paddle, and a straight key. He is also active on packet radio and 2 meter FM.

Safety

Be sure you install a completely safe station. If you use a receiver and transmitter combination, do not leave the antenna changeover voltage (usually 115 VAC) exposed at relay coil terminals. Tape over (or otherwise cover) all exposed points that may present an electrical hazard to your family, pets, or yourself. Children and pets are naturally curious, and it is up to you to make it impossible for them to receive an electric shock from anything external to your equipment.

One side of the keying lead is usually connected to the chassis (ground) of the transmitter, and this wire should be attached to the terminal that connects to the base of the key. The ground lead connects to the barrel of the key plug, and it is easy to trace keying leads to make sure the transmitter chassis is connected to the base of the key. Erect your antennas so that they cannot come in contact with electric power lines if they do come down.

It is a good idea to take a first-aid course and to have everyone in your household learn how to help anyone who gets an electric shock.

Electric Power

The electric power requirements of most initial amateur radio stations are not high. One can normally plug gear into nearby house power wall sockets and have no problem sharing a circuit with household electrical and electronic devices.

If you want to customize your station's electric power input, there are several good powerline strips available which allow you to power all your station equipment through a separate fuse, and they include a switch used to turn all station power on or off at once. These power strips use a single plug connection to the house power wall socket. Several AC power receptacles are mounted on the strip, and station equipment AC power cords are plugged into the strip receptacles. An indicator lamp is usually included in these strips to indicate whether power is, or is not, available at its outlets. These strips are also available with surge-protection capability to protect electronic equipment. It is not necessary to install this type of electric power input control in a station, but many amateurs like to add this feature.

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When using one of these strips, it is common practice to leave all required equipment power switches in the on position at all times, and to simply turn the whole station on and off with the switch (or circuit breaker) on the powerline strip. Use of a strip also minimizes the messy appearance related to many power cords extended to remote wall sockets. It is certainly better to install a power strip than it is to use extension cords and cube taps (multiple outlets), neither of which is as safe to use.

RF Ground

It is important to establish an excellent RF ground for your station, and this is the one thing I usually find lacking in new stations. Here are a few major facts that you should know.

Do not assume that you have an adequate station ground simply because you have connected a large-diameter wire between your equipment and some assumed ground point, such as the electric power ground or a cold-water pipe. Suitable RF grounds seldom exist where they are needed, and one usually has to be carefully established for each station. Your home's electric power ground can be more than adequate at the 60 Hertz house power frequency, and still be very poor at the much higher frequencies you will be operating. House power electrical grounds are occasionally found to provide an adequate RF ground, but this seldom occurs.

Some amateurs greatly overrate the RF grounding capability at cold-water pipes. Even if your house has good metal piping, it very seldom provides an adequate RF ground. When a station ground is attached to a cold-water pipe (usually with a C-clamp), normally the task of just that one section of pipe is to function as the RF ground, because each pipe is quite well insulated from the rest of the pipes and fittings by sealant and dirt at each joint. A number of water pipes are made of materials that are not good conductors of RF. Good RF grounds can be obtained by soldering or clamping a suitable ground line to copper tubing used to supply water to lawn sprinklers. There should be no water in it when a ground lead is soldered to such copper tubing.

It can be effective to bury pairs of quarter-wave dipoles in the ground to function as an RF ground. This amounts to burying a dipole antenna for each band to be operated. This system requires more space than most amateurs have available. It is usually easy to cut slits in a lawn for burying wires.

The majority of amateurs find that the simplest way to establish an RF ground is to install about an 8 foot long ground rod as close as possible to where the equipment is to be operated. However, those of us who live in poor ground areas have to work to establish good RF grounds. Use a heavy-duty (3/8 inch diameter minimum) ground rod with a steel center (for mechanical strength) and an outer copper

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- **Very compact** 6 x 9 ½ x12 inches -- can be placed conveniently out-of-way
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CIRCLE 2 ON READER SERVICE CARD

Andrea Testi, IK4WMG, lives in Bologna, Italy and has been licensed a little more than one year. Andrea has already worked more than 200 DXCC countries, 39 zones, and 900 callsign prefixes during more than 5500 contacts. He operates code most of the time using a Kenwood TS-450S with a 5-band Cushcraft vertical antenna. His other interests include archery, Alpinism, computers, Italian billiards, and motocross. Andrea lives about 15 kilometers from Marconi's home and laboratory.

coating (for electrical conductivity). Make the area where the ground rod is to be installed electrically conductive with table salt, or some similar electrically conductive material.

Once the RF ground has been established, use a piece of heavy-duty ground braid to interconnect the ground post (chassis) of the transmitter (or transceiver) to the RF ground. A piece of wire that is electrically a quarter-wavelength long can act as an insulator; consequently, no size of wire can be depended upon to function properly as an RF ground line at all frequencies related to the operation of an amateur radio station. It is best to use ground braid for all ground connections, and all other station equipment should be connected to the transmitter (or transceiver) ground post, where the external station ground is attached. Good ground braid is not cheap, and one way to get it at a lower cost is to strip the shield off old (scrap) coaxial cable. It is easy to strip shielding off scrap coax. Just use a razor blade (or a sharp knife) to slice the outer protective jacket of unarmored coax and the jacket can then be pulled off very easily. Then just loosen the shield off the inner conductor by bunching (pushing) it from one end towards the other end. It is easy to strip up to 100 feet of coax at a time, and the removed shield serves as an excellent ground line.

Ground braid can be purchased from electronic distributors, but the cost is high. The best way to make ground-braid connections is to flatten out one end of the ground braid and to open up an attachment hole (with a pencil or similar object) to fit the associated ground lug or screw. Once the correct size hole has been made in the end of the ground braid, solder the area around this hole using a heavy-duty soldering iron or gun. The soldered braid end, with the attachment hole, provides a very good electrical and mechanical connection. Station equipment must be connected to a single good ground point to eliminate any possibility of electric shock hazards existing between different pieces of gear. A good RF ground also provides improved station performance. As an example, your transmitter and receiver circuits bypass many kinds of energy to the chassis, and an RF ground is required to hold the chassis at (or close to) a zero voltage potential. A quick check of the effectiveness of your station ground can be performed once your rig is set up. With the transmitter loaded to the antenna, and the key closed in code mode, observe the final RF amplifier collector (or plate) current as you touch the transceiver's bare chassis with one finger. If this current does not vary when you touch the bare metal, dampen the finger with saliva and repeat the check. If no current change is observed, and no RF heating is felt, the station ground is acceptable. If either occurs, the station ground needs to be improved. This check should be conducted near the low and high end of each band with each appropriate antenna.

Antennas

Monoband. It is preferable, but usually impractical, to erect a separate antenna for each band you intend to operate. Each antenna should be as high and as clear as possible from all surrounding objects. The antennas themselves should be as remote as possible from each other, or at least oriented at right angles to each other to minimize interaction. Don't worry if an antenna leg has to be bent to fit your available space. It can be bent with very little ill effect. However, don't bend the antenna back (180 degrees) on itself at any point.

Directional. The long-range (DX) performance of a good directional antenna such as a Yagi-Uda, delta loop, or quad is much better than the performance of an omnidirectional (nondirectional) antenna such as a vertical. Simply stated, a good directional antenna enables one to work stations that may not even be heard when using an omnidirectional antenna. The difference between using a direction-

al antenna with a low angle of radiation and using an omnidirectional antenna with a high angle (35 degrees or more) of radiation is roughly the same as the difference between flying or walking across our country. You'll probably reach your objective either way, but you'll be able to do it a lot easier and more often with the directional antenna.

Since they are physically shorter than 40 and 80 meter antennas, Novice band 10 and 15 meter antennas are easier to assemble and erect. If you can do so, it is advisable to install a rotatable and highly directional Yagi-Uda or quad antenna for one (or both) of these bands. The 15 meter band is open longer and it is more useful than 10 meters. These antennas are readily available. You can easily work states all around the country, plus countries all over the world, using a directive 10 or 15 meter antenna. A simple two-element, homemade Yagi-Uda (driven element, plus reflector) provides far better results than you can get from any nondirectional antenna. If you're really stuck for cash, just aim your homebrew beam at the continent you want to work most frequently and leave it there. You could also just aim it across the country for good contacts with your fellow American amateurs. Erect this antenna at least 10 feet above the top of your roof to get reasonably good results.

Dipoles. It can take a long time to complete the installation of a really good antenna system that provides optimum reception and transmission on the desired bands. Many beginners erect a simple and inexpensive antenna to get on the air while they are completing a much better antenna installation. It has been my experience that the first antenna erected by most newcomers is a 40 meter dipole. The 40 meter dipole is a reasonable choice in this situation, since it provides both 40 and 15 meter operation with a reasonably short (66 foot) length. The directivity of a dipole is not as pronounced as it appears to be in the textbooks. A dipole does have maximum reception and transmission capabilities broadside (fore and aft), but it is common to work stations off the ends of a dipole. The dipole antenna has a high fire angle when it is less than one-half wavelength above electrical ground, which can prevent you from contacting DX stations. This high angle (about 37 degrees) increases to about 50 degrees when a dipole is positioned about one full wavelength above electrical ground, which is about 131 feet for the 40 meter band. However, a second lobe develops at about 17 degrees when the dipole is raised to the wavelength height, and this lower lobe provides good long-range (DX) opportunities. It is normal for an amateur using a low dipole to think there is something wrong with the receiver when other amateurs are heard working stations not being heard.

Despite its shortcomings, the dipole is still a useful antenna. It is inexpensive and easy to install, and it does let you get on the air with minimum delay. An 80 meter Novice band dipole is 126 feet 6 inches long. Since 6 inches of wire should be allowed to make connections at each end of both sections (to the insulators), each half should be cut to 64 feet 3 inches. Select your coax to most nearly match your feedline length requirement and do not coil up extra coax; either drape it loosely or (preferably) cut it off.

Drooping Dipoles. This antenna is commonly referred to as an "inverted Vee." Re-

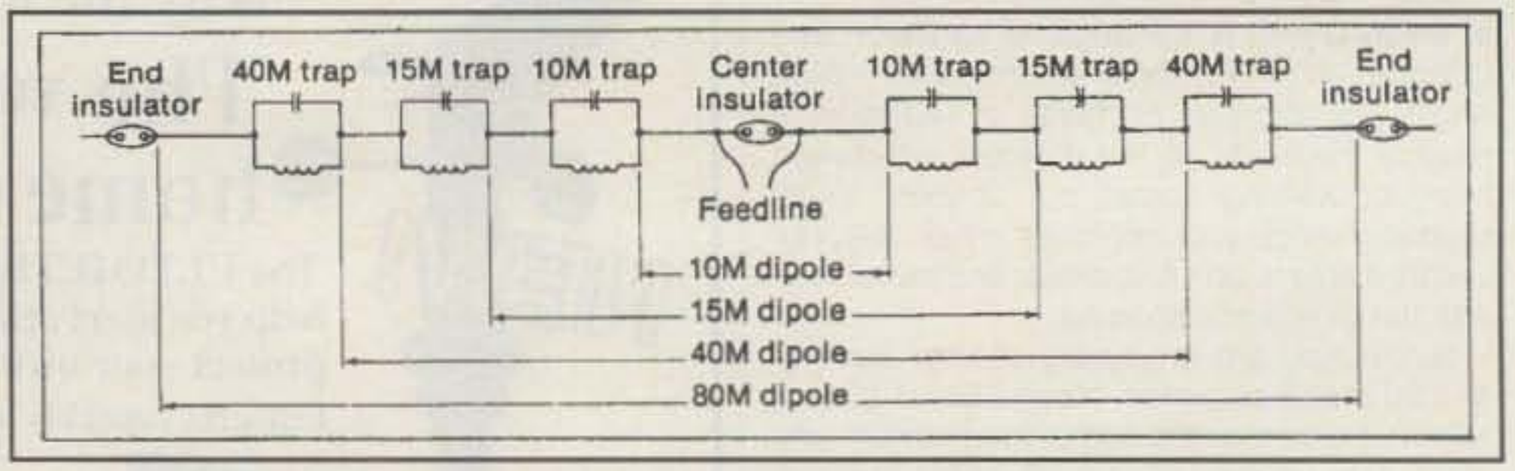

Fig. 1– The trap dipole antenna.

gardless of what it is called, it is popular with amateurs because it just requires one high point of attachment. The center insulator is secured at a high point, and the two end insulators are attached to convenient low points. Simply stated, a dipole works against its mirror image (in the ground), and it is most efficient when the entire antenna is up as high as possible and clear of all surrounding conductive objects. However, if this is the only antenna you can erect immediately, you will find that it performs satisfactorily.

Sloper. If just one high point is available, attach one end of the dipole to that point and attach the other end of it to a convenient low point. A sloper usually performs better than an inverted Vee antenna.

Folded Dipoles. The folded dipole antenna is a higher impedance version of the standard dipole antenna. It often is made from 300 ohm (TV type) twinlead with the same twinlead used as the feedline. The dimensions are 1.3 percent shorter than those of regular dipoles. Remember that modern transceivers are designed for 50 ohm input/output, and they do not have antenna impedance matching capability. Folded dipoles can be used with 50 ohm transceivers in conjunction with an impedance matching balun. Special low-loss high-power handling 300 ohm twinlead is available from some suppliers. It is more efficient than standard TV twinlead.

Harmonic/Trap Antennas. Harmonic antennas are more efficient than the extremely short mobile antennas, but they are not as good as individual full-length antennas for each band. If you use a harmonic antenna, you must be extremely careful to minimize the harmonic output from your transmitter because the antenna will accept and will efficiently radiate any harmonic energy it receives. A common harmonic antenna operates on 40, 15, and 10 meters. If you're using such an antenna on 40 meters, any third (15 meters) or fourth (10 meters) harmonic energy would be accepted and radiated. The operation of these antennas is easily understood once you realize that the traps serve to electrically cut off each antenna to a particular length.

Fig. 1 shows a typical 4-band trap dipole antenna. The short innermost segments on each side of the center insulator are resonant at 28.15 MHz, as are the 10 meter traps at the outer ends of these two wire segments. The 10 meter traps serve to electrically cut off the antenna to just the resonant length of the 10 meter dipole. When 15 meter energy is applied, the 10 meter wire segment, the coil of the 10 meter trap, and the 15 meter wire extension resonate to 21.15 MHz. As before, the 15 meter traps electrically cut off the antenna at the overall resonant 15 meter length. The same action occurs on 40 meters; the 10 meter wire segment, 10 meter coil, 15 meter wire segment, 15 meter coil, and 40 meter wire segment combine (on both sides of the center insulator) to form a dipole which is electrically resonant at 7125 kHz. Again, the 40 meter traps electrically cut off the antenna from the remaining wire segments. Eighty meter action is basically the same, except that there is no need for 80 meter traps, since the antenna terminates at the ends of the 80 meter wire segments. The 10 meter wire segment, 10 meter coil, 15 meter wire segment, 15 meter coil, 40 meter wire segment, 40 meter coil, and 80 meter wire segment combine (on both sides of the center insulator) to form a dipole which is electrically resonant at 3700 kHz.

Windoms. This is a particularly useful variation of the dipole antenna. It provides better performance than a dipole with no increase in size. A single Windom provides capability to use several bands using one transmission line. The G5RV is another popular version of the dipole antenna.

Verticals and Ground Planes. Vertical antennas require the least flat-top space of any standard antenna. When radiating dipoles are added to the base of a vertical, the resultant antenna is called a ground plane. Ground-plane antennas are more efficient than verticals, and they provide a low angle of radiation which provides good long-distance (DX) communications. Vertical antennas are very susceptible to automotive ignition interference, and proximity to heavy traffic can make them much less useful than horizontally polarized antennas.

Mobile Whips. It is a waste of time to look for a miracle antenna which will mount on your windowsill and provide efficient operation on *all* bands. No shortened antenna radiates the transmitter's output as efficiently as a full-size antenna. Despite their high costs, mobile antennas are not as efficient as a simple random length of antenna wire located as high and clear as possible, and used in conjunction with an antenna tuner.

Material. The most suitable antenna wire is copperweld, which has a steel center for structural strength and a copper outer coating to provide excellent electrical conductivity. This wire holds its length very well, which is more than can be said for the standard copper wire often used by amateurs. A major problem related to using copperweld is that it is usually just available from the best suppliers. Due to the stiffness of copperweld, it is not advisable to use larger gauges (10, 12, and 14). I have found that 16- and 18-gauge copperweld are satisfactory for use in amateur antennas. It is not good to use multi-stranded copper wire to construct antennas. A major problem related to using this copper wire is that it will stretch as the antenna is subjected to strain, and this

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lowers the frequency at which the antenna resonates. Soft-drawn copper wire is more prone to stretching than hard-drawn copper wire, but both will stretch in our applications.

Another reason not to use multi-stranded wire is that it has a higher inductive characteristic due to the individual strands being wound around the conductor's center. Adding inductance to an antenna increases its electrical length, which means that an antenna constructed from stranded wire will actually resonate below the intended frequency.

Use heavy-duty RF insulators when building antennas, not the lossier power-line insulators. Take care not to kink the antenna wire or to nick it with tools.

One dipole can be used on several bands when it is used in conjunction with the antenna tuning device popularly known as the *Transmatch*. The Transmatch changes the electrical length of the existing dipole to make it resonant at any desired operating frequency. However, the arrangement causes RF energy to be present in the radio shack, which can result in RF interference to susceptible equipment.

Random Wire Antennas And Tuners

The simplest first antenna to install is the end-fed random wire used in conjunction with a standing-wave-ratio (SWR) meter and a random-wire tuner. This combination provides reasonable performance on all bands. The length of a random-wire antenna is not critical, but it should total at least 70 feet (end-to-end) if it is to be used on 80 meters. The random wire does not have a transmission line, and its useful radiating length starts at the antenna tuner's antenna post connection in the radio shack. Since no transmission line is attached to a random-wire antenna, transmission-line cost and RF feedline loss are eliminated.

A short piece of coaxial cable (or any other suitable transmission line) and an SWR meter are connected between the transceiver's antenna connection and the antenna tuner's input, if an SWR meter is not built into the transceiver. The random wire is attached directly to the antenna tuner's output terminal and it is strung outside, wherever it is easy to erect. As is true with any antenna, do not allow any part of the random wire to double back on itself, which means it cannot be erected in two opposite directions. If one part of the random wire is erected east to west, no other part of it should be erected west to east. Also, if the wire is erected to a great height where it leaves the station, it should not later be run from a high to a low point. The random-wire antenna can provide satisfactory results on several (or all) bands, even when it is a relatively short and scarcely visible (very thin) piece of wire.

It is easy to use a random-wire tuner and an SWR meter to change the electrical (not physical) length of a single wire antenna to have it match the desired operating frequency. Tune the transmitter to provide a low-power output at the desired frequency. Set the SWR switch to forward position and adjust the SWR gain control to get a full-scale SWR meter indication. Then set the SWR switch to reflected position and simply adjust the antenna tuner controls to obtain the minimum possible SWR meter indication. It is usually possible to attain an apparent one-to-one (perfect) ratio. After the antenna tuner has been adjusted properly, transmitter RF output can be increased to the desired level. Neither the SWR reading nor the antenna-tuner control settings are altered by increasing RF output power. As optimum antenna-tuner control settings are determined for each band, they should be recorded, because they can be used each time you shift bands in the future. Antenna control settings will vary from season to season, or between wet and dry days, but they will not change very much. The antenna tuner must be connected to a very good RF ground, or it is possible to lose more power in a poor ground path than is being radiated from the antenna. In this application the RF ground is attached to the antenna tuner instead of the transmitter/transceiver. If the existing meter system simultaneously displays forward and reflected RF powers, antenna adjustment is faster and easier.

As is true with all antennas, the random wire should be erected as high as possible and clear of nearby metallic objects such as rain gutters, rain drain pipes, telephone lines, and electric power lines. If you must erect an antenna close to a metallic (conductive) surface, try to do so at a right angle to minimize undesirable results. Use good RF insulators to support and position the antenna wire, taking care not to make a loop in the antenna as it passes through the eye of each insulator. Solder all antenna connections, including those at end insulators. Failure to solder an antenna connection will result in noise being heard whenever wind or vibration causes the antenna to move. If you want to convince yourself of this noise source, just listen to your receiver while someone else strikes any metal object against your antenna. Do not leave any loose metal-to-metal points in any type of antenna, or you certainly will subject yourself to unnecessary noise whenever the wind blows.

A longwire antenna is at least 2½ electrical wavelengths in regard to the lowest frequency at which it is to be used. It is used in the same way a random-wire antenna is used.

Antennas for 40 and 80 meters should be erected where they will be clear (as possible) of metal objects, and not parallel and in close proximity to metallic objects such as buildings and wires. If a directional antenna is erected, the 40/80 meter antenna can be attached to its mast/tower at the center or at one end. If this is done, it is better to attach one end of a dipole (typical) antenna near the high point of the mast/tower and to attach the other end to a convenient (usually lower) point. The resultant sloper works better than the inverted Vee, and its maximum current (center) point is clear of the mast/tower and its associated directional antenna.

Basically, do not use mobile or gimmick antennas in your fixed station installation. Erect as much radiating surface as possible, and get it as high as possible.

Summary

This concludes the third part of this five-part article. The next part covers the 10 meter band, baluns, balanced antenna tuners, transmission lines, accessories, desk or table, lighting, clock, headphones and speakers, code factors, and telegraph mills.

73, Bill, W6DDB

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BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

A Companion Receiver For February's 6 Meter FM Transmitter

Last month I referred all of you to a previous column for a receiver design to match the tiny micro-power 6 meter transmitter described. However, after sending the column to *CQ*, I felt that a better decision might have been to offer a complete companion 6 meter micro-power receiver. Since these types of circuits are so popular, and my readers send so much mail asking for additional details, I have decided to "finish the job" this month. Here then is a companion 6 meter micro-power receiver.

The receiver to be described, like last month's transmitter, uses a single chip—in this case the Motorola MC3367—for all functions other than a speaker driver. The design is single conversion for simplicity, but the technical specifications are quite impressive. Input threshold sensitivity is 0.2 µV (for 3 dB of limiting) and 0.6 µV for 20 dB (S+N)/N. Operating voltage goes down to 1.1 volt and maximum operating current required is about 3 ma, making a AAA penlight cell an ideal, long-life power source. The chip contains an on-board voltage regulator, low-battery detection circuit, and an Enable pin to reduce current drain even further (0.5 µA) in a standby mode. The receiver can be made crystal controlled or tunable as you wish.

Figs. 1 and 2 are schematic diagrams of the 6 meter receiver. As you can see, most components are contained within the chip. The two 455 kHz IF filters are of the type used in AM transistor radios and can even be eliminated if desired by replacing them with 0.1 µF capacitors. For best selectivity, however, you had better leave them in. Remember this is only a single conversion receiver. Since the IF is at 455 kHz, the crystal frequency should be 455 kHz lower than the desired operating frequency. If you wish to manually tune the receiver, replace the crystal with a series resonant LC combination. To utilize the Enable pin, connect pin 16 to ground instead of Vcc.

Tuning of the receiver is quite simple. Add an antenna and adjust the 0.7 µH coil and 455 kHz tuned circuit (L1/C1) for maximum recovered audio with a weak signal. If everything has been built correctly, you should be able to achieve an output of 0.5 to 0.8 volts into 600 ohms—enough to drive a small earphone. An outboard amplifier for a speaker can also be used to boost the audio higher if desired. Such a stage undoubtedly will draw more current than the entire receiver.

c/o CQ magazine

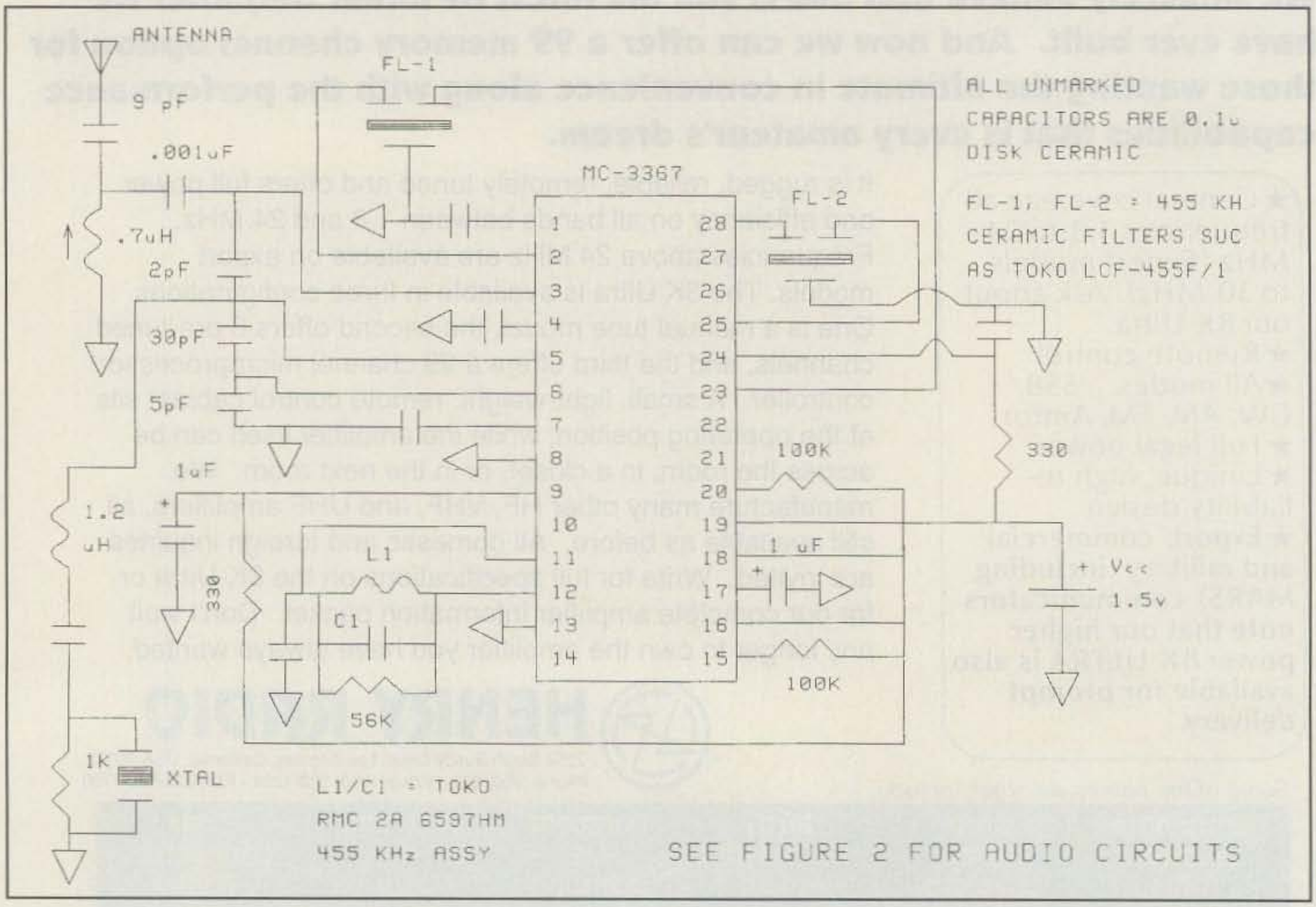

Fig. 1– Schematic diagram of a simple 6 meter receiver.

The construction is straightforward, but good RF techniques should be used. Keep all leads as short as possible and use good-quality ceramic bypass capacitors. The MC-3367 is supplied in a 28-pin surface-mount package, so those of you who are familiar with these types of components may wish to build the entire receiver using surface-mount devices. If you do, the result truly will be tiny. For the utmost in miniaturization, you could even use a button cell for power.

Further details on the MC-3367 can be gotten from Motorola Semiconductor, P.O. Box 20912, Phoenix, AZ 85036. The 455 kHz IF filters and other inductors are available from Digi-Key, as are most of the other components.

I would be most interested in seeing a photo of any transceiver built using these or similar chips. Considering the correspondence I received when I described previous circuits of this type, I think many of you will experiment with these chips. Please enclose the photo of your results and I will certainly print it in a future column for all to share.

73, Irwin, WA2NDM

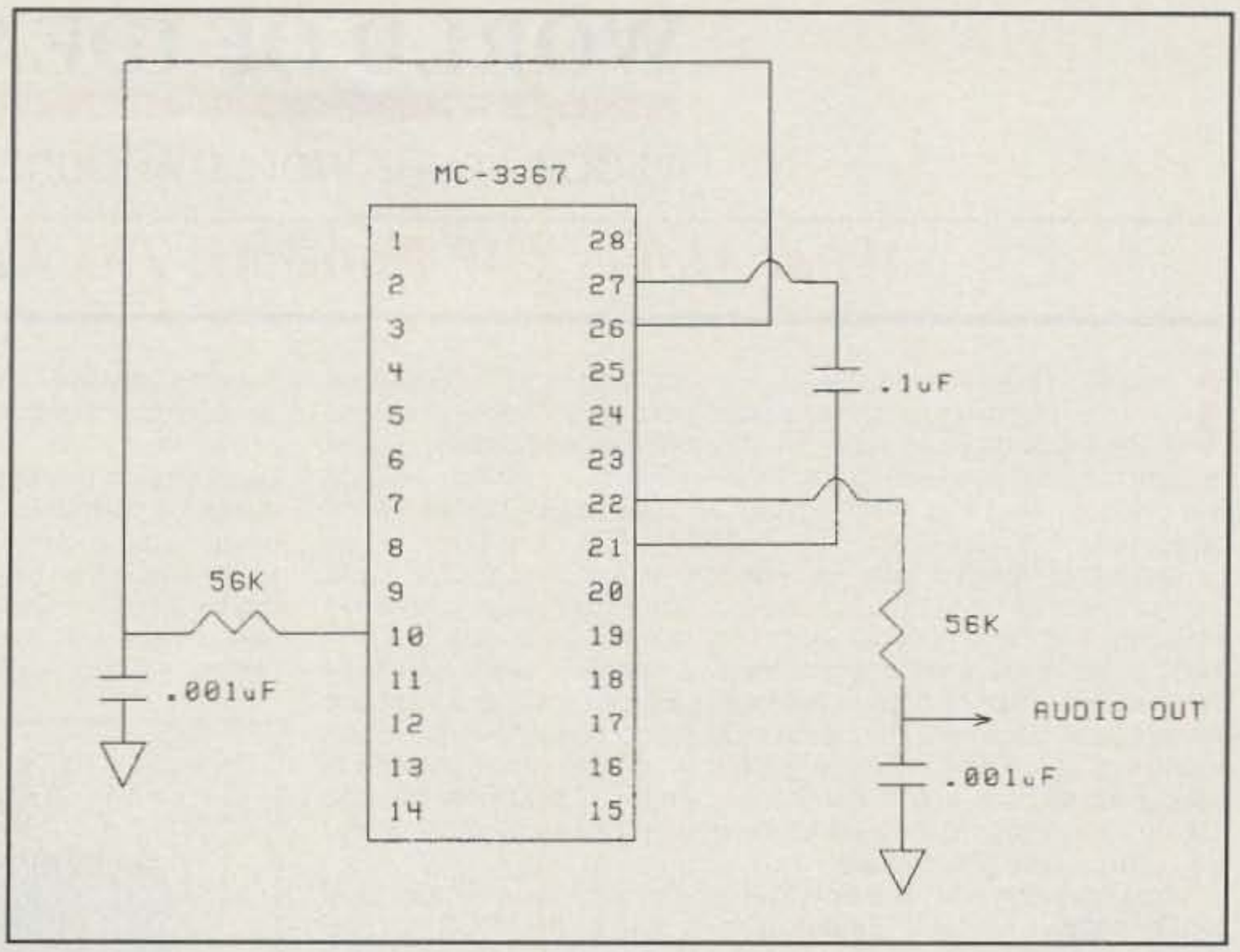

Fig. 2– Schematic diagram of audio output stages.

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

What Makes CW Fun? All The Keys! Part II

If last month's column didn't leave you reelin' and rockin' over CW fun with some of today's fancy new paddles and keys, check out the collection of rare gems and unique oldies in this month's column. There is something for everyone to admire—even phone operators using a key only for tuning their rig and checking antenna SWR (what a sheltered life!).

Yes, friends, amateur radio's enthusiasm for collecting, studying, and using keys of all types is truly endless. That is the main reason why I included "The Emporium" as part of my new self-published "Keys II" book. It lets us share views and notes on a vast number of keys (many never seen outside of locked collections), plus it serves as a keys and parts exchange guide. Yes, and I'm proud to report both book and emporium are off to a rollicking good start. A respectable number of keys, parts sources, and "hunters" already have SASEs on file. Looking for (or want to cash in on) a particular key, bug, or paddle? Possibly I can help you (SASEs, please!).

What are today's most wanted items? Opinion varies by individual and by season, but I find German classics such as the Mouse key, the Junker, and the Novaplex bug are hot. Last season's hot item was the Vibroplex Model 4, or Blue Racer. Then, too, vertical and right-angle bugs are always in demand, until folks realize that the true meaning of "rare" is "expensive." Oh well, we often hear "the difference between men and boys is the cost of their toys." Enjoy! Now on to more notes.

Many of you have asked for an index to my past columns featuring keys. I still have not slowed down long enough to compile one, but NV2C has saved the day. I'm sure that everyone will join with me in thanking him for the "Ingramography" shown in fig. 1.

One additional tidbit of keys news warrants mention at this time. During eras past The Electric Specialty Company of Cedar Rapids, Iowa produced a bug in kit form—a bug that became known as the "Cedar Rapids Special." Although not of Vibroplex quality, these kit bugs (and replacement parts for same) are now sought by many CW enthusiasts and collectors interested in American-made keys. Good news: Doug Seneker, NØWAN, of 505 E. Center, Mt. Vernon, MO 65712 recently discovered and purchased all of Electric Specialty's original (remaining) stock and has a small inventory of parts available for sale to other Cedar Rapids devotees. Doug says he is low on bases, but has a large number of hard-to-find dot contact springs (they also fit other unusual-brand bugs) and many other pieces—including everything but bases for the little-known Electric Specialty paddle (which is similar to a Brown Brothers paddle). Congratulations, Doug, on rescuing Electric Specialty from unnecessary extinction. Now whip up some bases so more of us can get a Cedar Rapids bug going! On to this month's keys!

4941 Scenic View Drive, Birmingham, AL 35210

"INGRAMOGRAPHY" *(Compiled by NV2C)*
***CQ* Magazine, May 1985 – March 1996**

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Fig. 1– Okay, friends, here it is: a complete index to all of my previous "Keys" columns here in CQ magazine. Special thanks to NV2C for this "Ingramography."

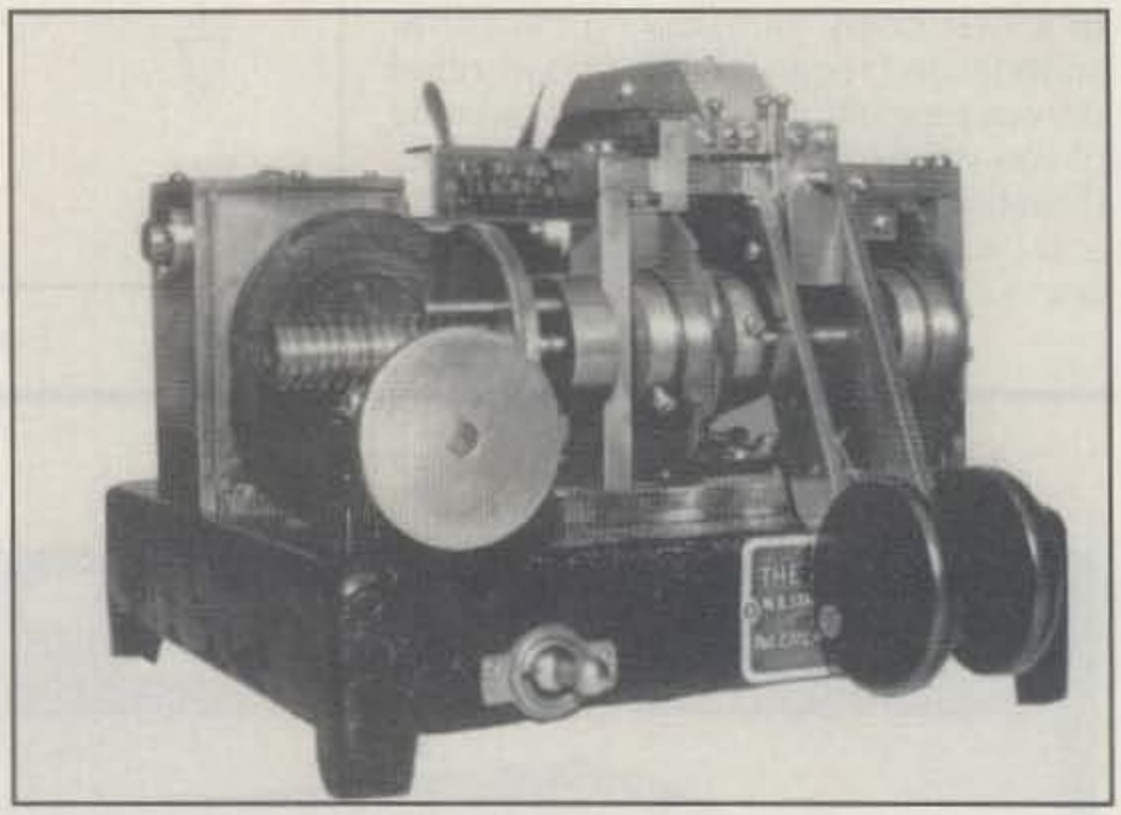

Photo 1– Every CW devotee's dream—the legendary Starkins motorized bug made in 1909. Drive wheel attached to enclosed motor on left side turns main shaft positioned across middle of key. Discs (with cutouts for dots and dashes) ride on shaft, and are released to rotate by related arm and fingerpiece. See full details in text. (Photo courtesy master collector Gil Schlehman, K9WDY.)

Starkins Bug

Although this rare and exotic delight (photo 1) is featured in my new book *Keys II: The Emporium*, I simply could not resist including it in this month's column for everyone to admire. This is the unbelievable, but true Starkins motorized and fully automatic bug made in 1909, and it presently resides in the private collection of Gil Schlehman, K9WDY. Special thanks to Gil for sharing views of his heartthrob with the world.

The bug's motor is enclosed in a box on the key's left-rear area. It turns a gear reduction system which turns a 2 inch diameter disc outside the box. A small disc presses edgewise against the outside wheel and turns the main drive shaft (which is positioned full width across the bug's center). A pair of discs with short or long cutouts corresponding to dots and dashes are mounted on the drive shaft: one is to the left of the dot lever, and one is to the right of the dash lever. A pawl above each disc holds it stationary until its respective lever is moved. The related pawl then moves sideways, freeing the disc to make dots or dashes.

Notice the levers operate completely independent of each other; there is no iambic action. Hit both levers simultaneously, and a solid "key down" carrier results. Sending good code thus requires good finger coordination (my kind of bug!). Now study the small driveshaft disc with its edge pressing against the (previously mentioned) outside wheel. This disc's position can be shifted left or right so it "rides" near the wheel's edge or middle, and thus changes code speed (while maintaining the 3:1 dot/dash ratio cut into the discs).

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The "gearshift" for speed selection is the tiny pair of metal "ears" visible above the bug's middle rear area. A scale in front of those "ears" is calibrated from 5 to 35 words per minute. No doubt about it: the Starkins is a CW classic!

The Shawplex Bug

Would you believe in a shoe company making bugs? Yep, and they did a quite respectable job of it to boot (no pun intended!). Evidently, one of the company's officials was an amateur dedicated to stamping out slow fists—oops, that one slipped out!).

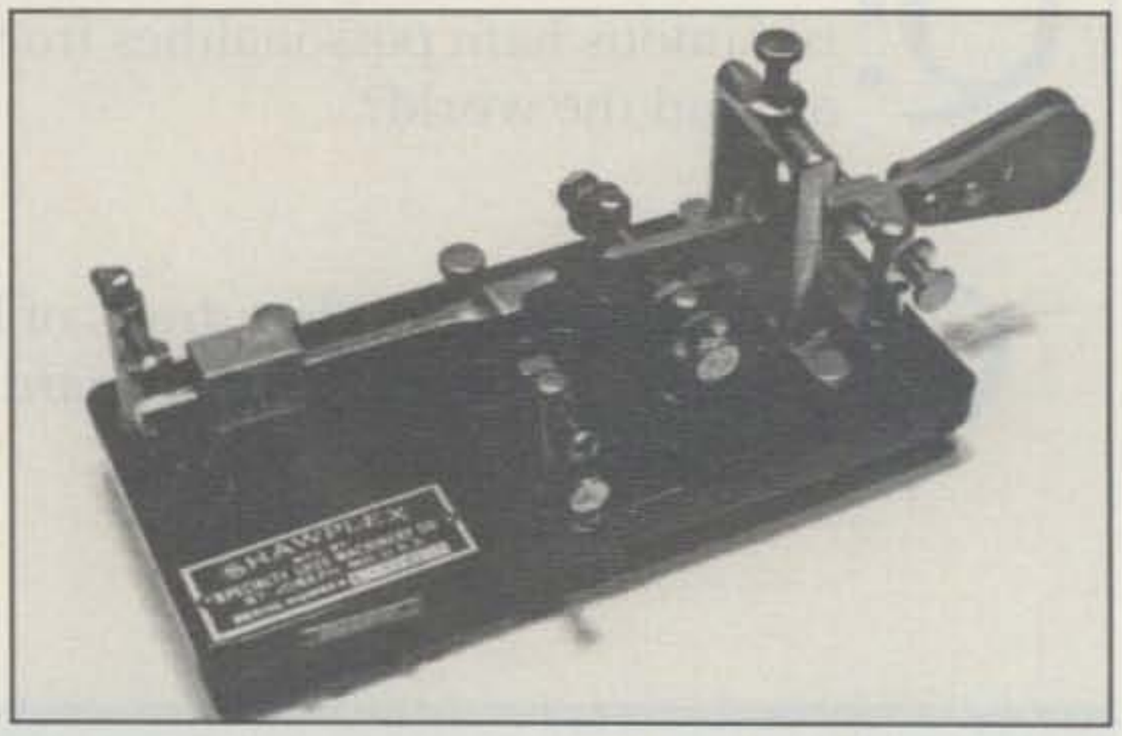

Photo 2– Whip out your magnifying glass and admire the smooth workmanship of this Shawplex bug made by the Specialty Shoe Machinery Co. of St. Joe, Missouri. It is a real kicker! (Key owned and photographed by Gil, K9WDY.)

This is the Shawplex bug (photo 2) made by The Specialty Shoe Machinery Company of St. Joe, Missouri. The key was made in 1919. It has a clean and well-polished look, a square pendulum, and a rear damper bracket like that used on a Vibroplex Model "X." It also has a dot tension spring fitted over the dot travel-setting screw and adjusted by a knurled nut threaded over the travel-setting screw as with (later date) Speed-X bugs. It is interesting how variations in designs evolved and migrated between different manufacturers. A very limited number of Shawplex bugs were produced and only a few made it to market, so they are obviously rare items. This one is like new, and part of K9WDY's extraordinary collection. Thanks for the view, Gil.

The German Novaplex

Our next featured item, also extracted from *Keys II* and part of the K9WDY collection, is the historically famous German Novaplex shown in photo 3. This semi-automatic key was made during WWII/1940s, and it is a highly sought item among collectors worldwide. The mechanism is nickel plated and the base is brown bakelite. It has a single horizontally positioned rear screw for a damper, uses a single molded fingerpiece for operating comfort, and I understand it handles well at any speed. Possibly that is due to the bug's thick pendulum taking full advan-

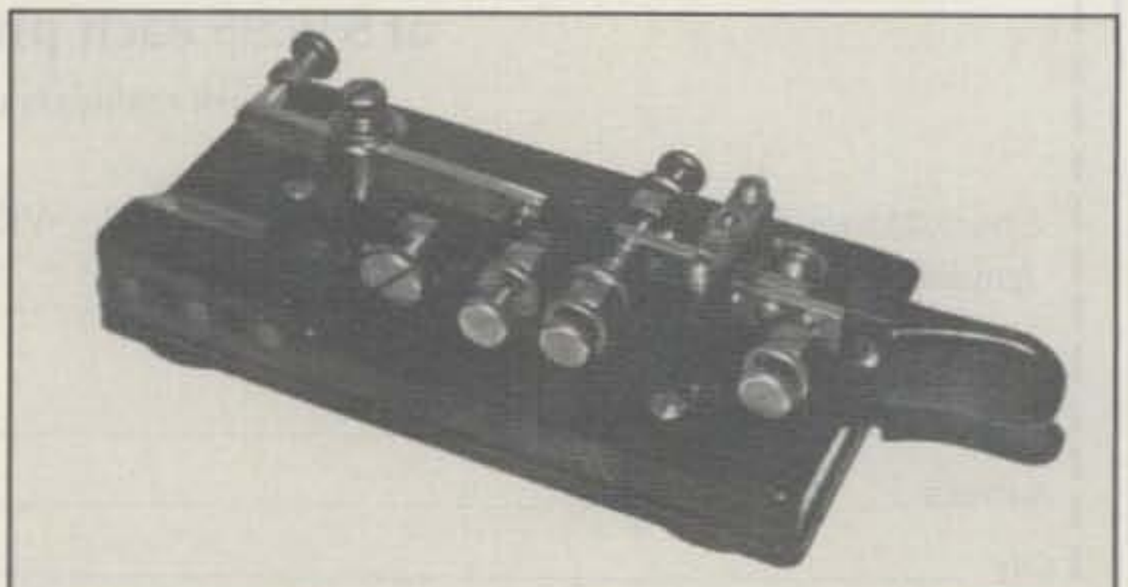

Photo 3– Many CW enthusiasts have heard of it, and few have ever seen it. What is it? The rare and historically significant German Novaplex bug shown here. Item was used for specialized communications during WW II era. (Photo courtesy Gil, K9WDY.)

tage of the (vibrating) mainspring's flexing ability. That reasoning makes sense, as the dot contact is permanently mounted to the pendulum rather than being attached to a "U" or horseshoe-shaped dot contact spring as in most bugs. In many ways the Novaplex reminds me of the CW equivalent of a Porsche automobile: both are low-slung and wide-footed German classics.

Mouse Keys

Continuing our theme of famous German CW instruments, let's now focus on this pair of like-new mouse keys (photo 4) owned by Peter Doudera, OK1CZ. I met Peter on 30 meters and learned he is a fellow key collector plus the chairman of the OK QRP Club. Not only does Peter have some admirable keys, but copies of the OK QRP Club's newsletters he has shared with me have been filled with neat circuits and ideas. I thus plan to include more views from Peter's end in future columns.

Photo 4– Two fine mice! Two popular varieties of German mouse keys are the half-knob and full-knob versions shown. Protective covers have been raised so you can study their mechanisms. The value of these collector's prides is rising every month. (Photo courtesy Peter, OK1CZ.)

The mouse keys were reportedly designed for mobile use in military vehicles and tanks. Peter says the smaller "half knob" version (left) was also used by German paratroopers during the war. The keys have a swing-up cover that protects a rear pivoting and quite precise mechanism. Arm travel/gap is set by the screw and locknut closest to the fingerpiece, and tension is set by the screw near the arm's middle. The key's contacts are located right below the gap adjustment, and the raised covers are painted in a speckled pattern. These are true German classics!

Pump Key/Hand-Crank Device

Photo 5 shows a combination pump key and hand-crank device for sending messages and numbers prerecorded on a length of 35mm film.

Photo 5– You are familiar with push-to-talk. Now meet crank-to-send! This little device was loaded with a prerecorded "Morse message on film," and used with a small spy transmitter. The faster the user turned the handle, the faster it sent CW. Note built-in key for sending impromptu messages. (Item owned and photographed by Peter, LK1CQ.)

It is rumored to have been rescued from a Russian parachutist spy transmitter/receiver set. Film with light and dark areas corresponding to Morse code is loaded into the device before jumping, then the crank is turned at a steady rate to transmit. (I bet the troopers had a ball with this one while tumbling towards the earth!) This little cranker is also from the collection of OK1CZ. Unusual, for sure!

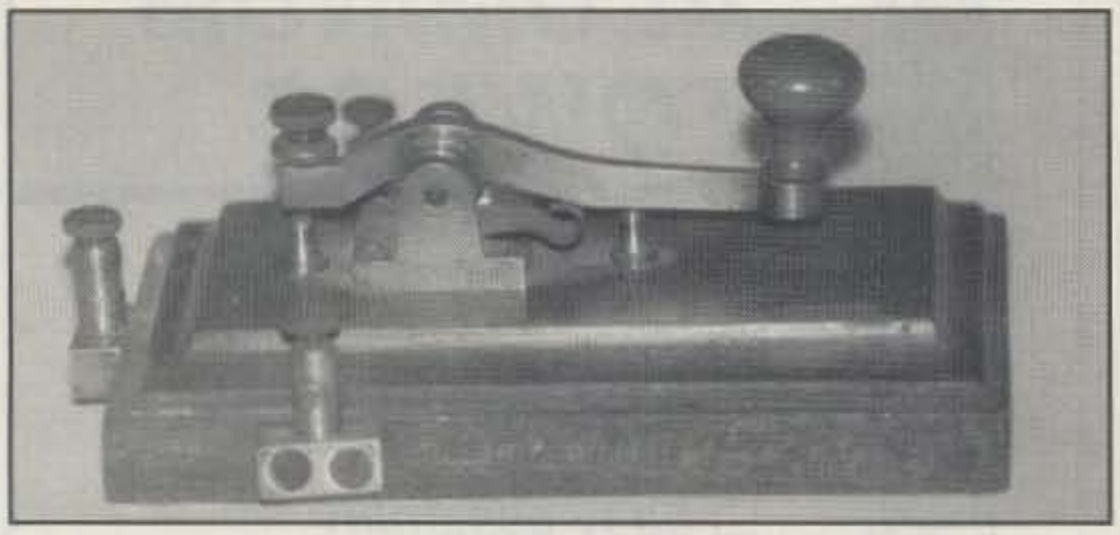

Photo 6– Sometimes old-time keys from opposite areas of the world bear surprising resemblances. Such is the case here. This Austro-Hungarian variation of the Camelback looks similar to the famous U.S. Chubbock key of the same era. (Photo courtesy OK1CZ.)

19th Century Hand Key

Here is a genuine old-time pumper (photo 6) with an interesting history. It is a 19th century hand key used on railway and landlines in the Austro-Hungarian empire. The mechanism is brass with smooth, flowing lines resembling a modified camelback. It has contacts for both "make" and "break," it sits on a beveled wood base, and it has a small and highly polished knob. This item is also part of Peter's (OK1CZ) collection, and is a nice piece of European history anyone would appreciate owning.

Photo 7– Another collector's pride is this famous WW II vintage German "Junker" (which is anything but junk!). This particular Junker saw action at DAN Norddeich Radio—Germany's globespanning marine communications station. (Photo courtesy Neil Spencer, W4PC.)

WW II "Junker"

Returning to classic German keys and switching to the collection of Neil Spencer, W4PC, we now spotlight this authentic WW II "Junker" (photo 7). The mechanism is quite precise in adjustments, and has contacts for both "make" and "break." It sits on a brown bakelite base, has a skirted knob, and is marked "DRP Junker" on the bottom of its base. This particular key is historically significant, as it was used at DAN Norddeich Radio, the largest German coastal station for communications with ships around the world. Speaking of marine communications, I should also point out that although the U.S. Coast Guard recently ceased using CW (and monitoring the international distress frequency of 500 kHz), ships and coastal stations worldwide (including the U.S.) still use CW. Why? It is still the least expensive and most reliable means of general information exchange. No hype—just fact!

DAN Single-Lever Paddle

This unusual single-lever paddle (photo 8) was also used at DAN, obviously at a later date when electronic paddles came into vogue. It has

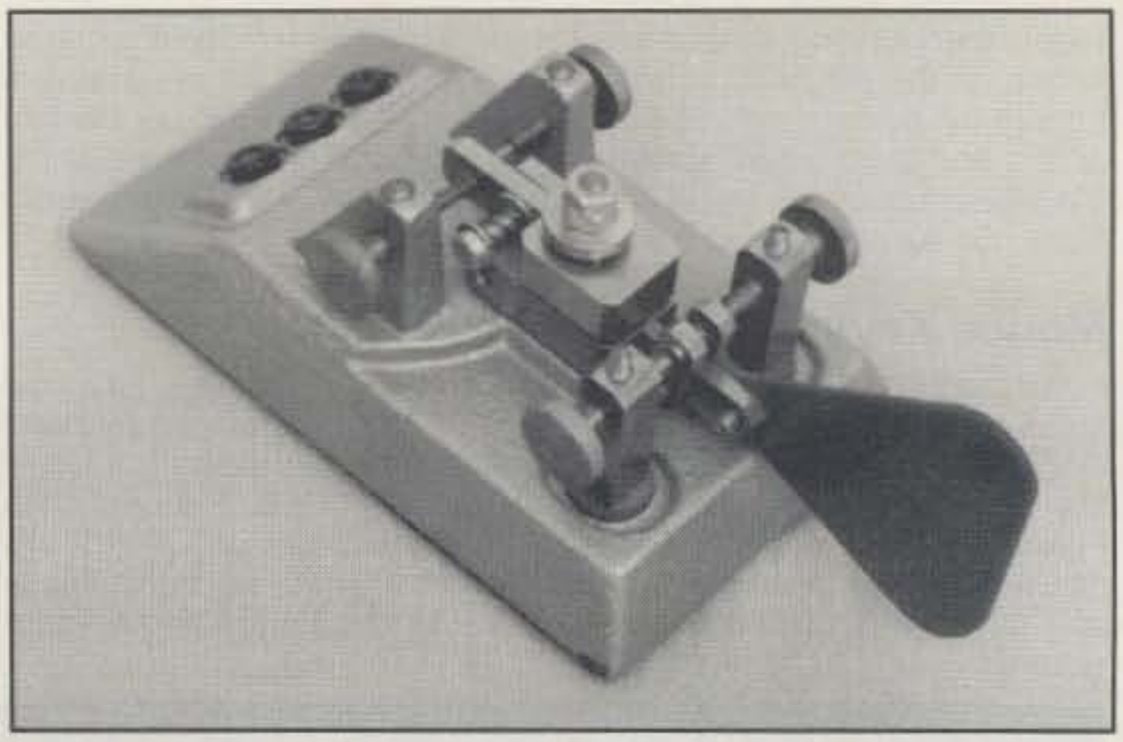

Photo 8– Unusual and quite attractive German-made single-lever paddle also used at DAN during more recent times. Item has brass mechanism with bright-red fingerpiece and insulators, and sits on a gray-green base. (Photo via W4PC.)

a center-pivoting, all-brass mechanism mounted on a heavy gray-green base, a bright-red fingerpiece, and matching red plastic insulators under its dot/dash contact mounting posts. The main arm is separated into upper and lower sections and split at the back. A rear tension spring lets the arm move against the left stop screw when making dots yet remain steady against the right stop screw when the fingerpiece is moved in the opposite direction to make dashes. Arm return action is provided by the spring. Intriguing! This rare item also comes from the collection of Neil, W4PC.

Early Herr Schurr Key

Since many of our readers presently own one (or more) of the popular German handmade Schurr keys or paddles, this item should be quite interesting. It is an early version Herr Schurr key with a diamond-polished brass mechanism mounted on a cherrywood base and fitted with a smooth cherrywood knob (photo 9). The exact dates when Schurr turned out this key from his basement workshop are unknown, but Schurr's remarkable style and quality are obvious regardless of the time. The key is approximately 2.5 by 5 inches long, and it has a press-fitted pivot pin through the arm that has sharp tipped ends which mate with concave-end screws on a split mounting frame. Schurr's famous large "lifetime" tension spring is also noticeable between the split mounting frame and the arm's knob. This key is also in the W4PC collection.

While on the subject of Schurr keys, I should also pass along some recently received information from Jack Ray, K4MZW, of the Electronic Switch Company, Inc. (8491 Hospital Dr., Suite 328, Douglasville, GA 30134; telephone 770-920-1024). Jack reminds us his company is the North and South American distributor for Schurr keys, and is presently shipping them all over the world. Contact Jack directly when you want

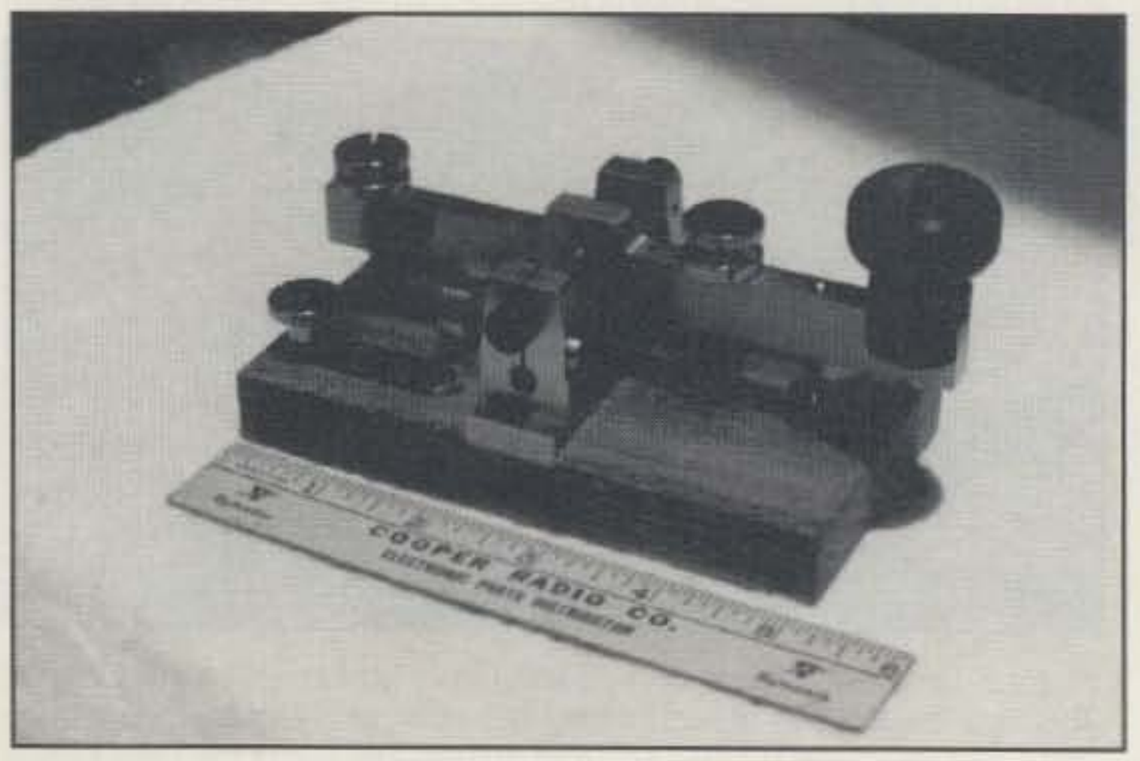

Photo 9– Early model Schurr key. Item possibly was made when OM Schurr was still relatively unknown. (Photo thanks to W4PC.)

a Schurr key or paddle fast. Jack also distributes Fritzel antennas, so hopefully I will be including more details on those European aerials in future columns.

The "Bathtub" Key

Next up is an unusual pump key that absolutely captured my heart, and the heart of XYL WB4OEE. In fact, we talked (ex) owner Neil, W4PC into selling it to us prior to the recent sale of his complete collection. That's right: this fantastic collection of almost 100 keys, bugs, and paddles recently changed hands, and *Keys II* readers with envelopes on "Emporium file" had an opportunity to buy the package.

Photo 10– Captivating British-made Bathtub key (so named because of its appearance). Item reportedly was used on British aircraft during WW II. Two top screws (in front of knob) are binding posts for key cable. (Photo via W4PC.)

This British-made item (photo 10) is called a "Bathtub" key (mainly because the bottom part of its enclosure looks like a bathtub), and I understand it was used on British bombers during WW II. The key has a brown bakelite case with waterproof grommets, and a wire snap at its knob end that moves back to release the top cover and access the mechanism. The wire snap can also be moved forward to lock the key in transmit—a function I understand was used for sending a homing signal if the plane went down at sea.

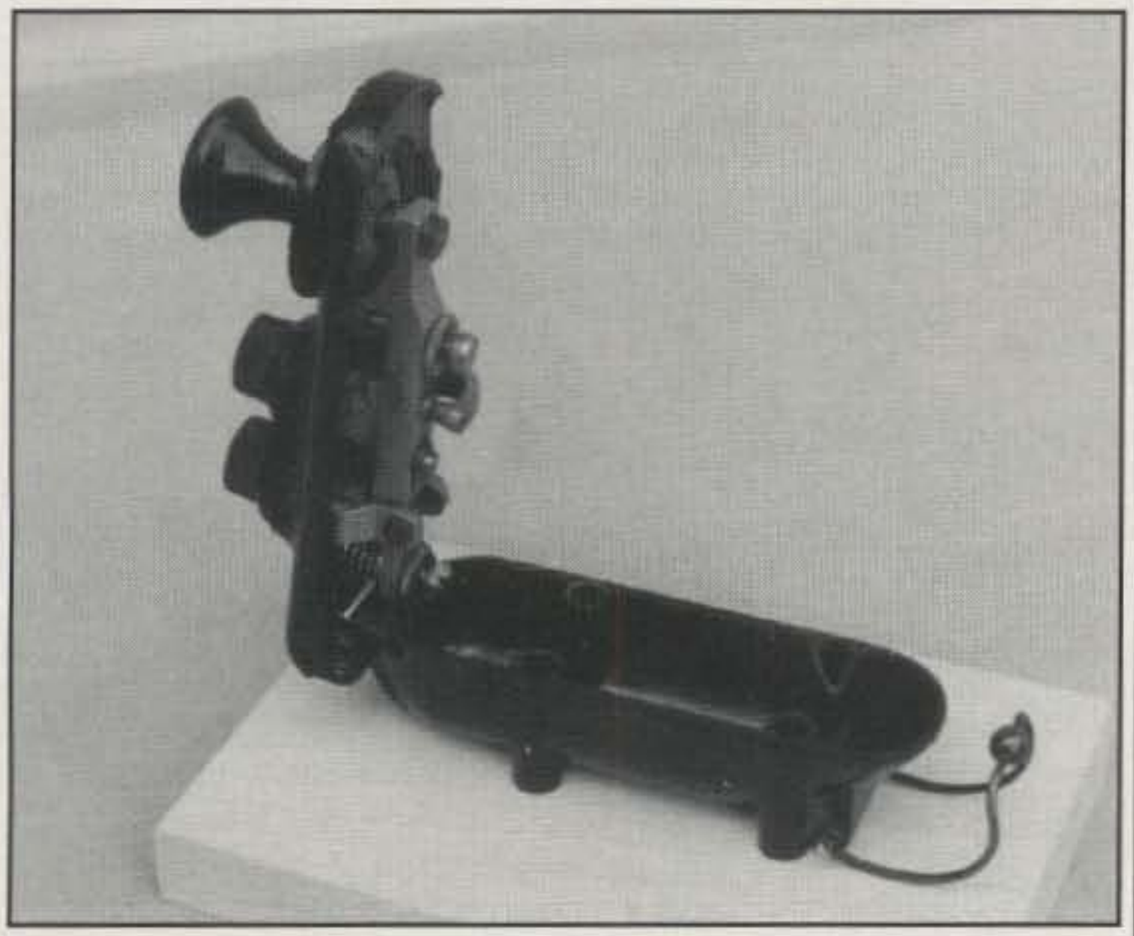

Photo 11– Interior view of Bathtub key. Mechanism is mounted upside-down on lid. Rubber grommet passing rod from knob to arm is also visible in this photo.

The interior view of the Bathtub key (photo 11) shows its mechanism is attached to the lid "inverted style," and the base has four holes for bolting to a desk or table. The main arm pivots from the rear (almost), and keying contacts are in the middle area. A set screw between the

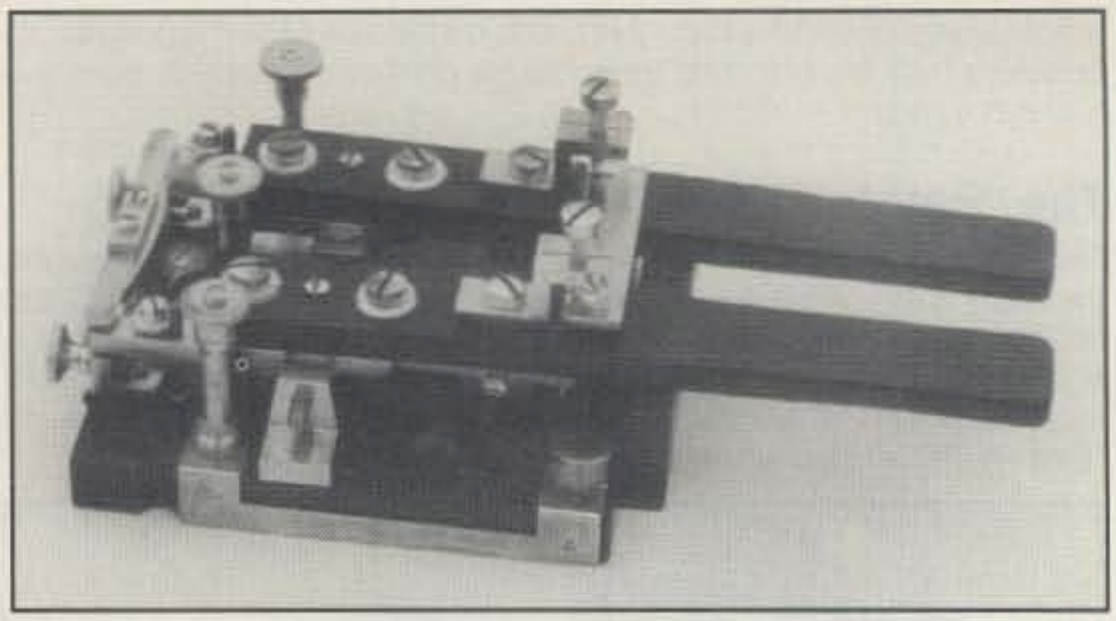

Photo 12– A non-chirping cricket! This twin-lever delight was used on the British Lancashire and Yorkshire Railway during past times. (Photo courtesy D. Wyn Davies of Wales.)

key contacts and the knob adjusts arm travel. The British think of everything in their keys: this one even has a dummy contact for the arm travel screw to hit on "break" to produce the traditional "click-clack" sound of a big key during use!

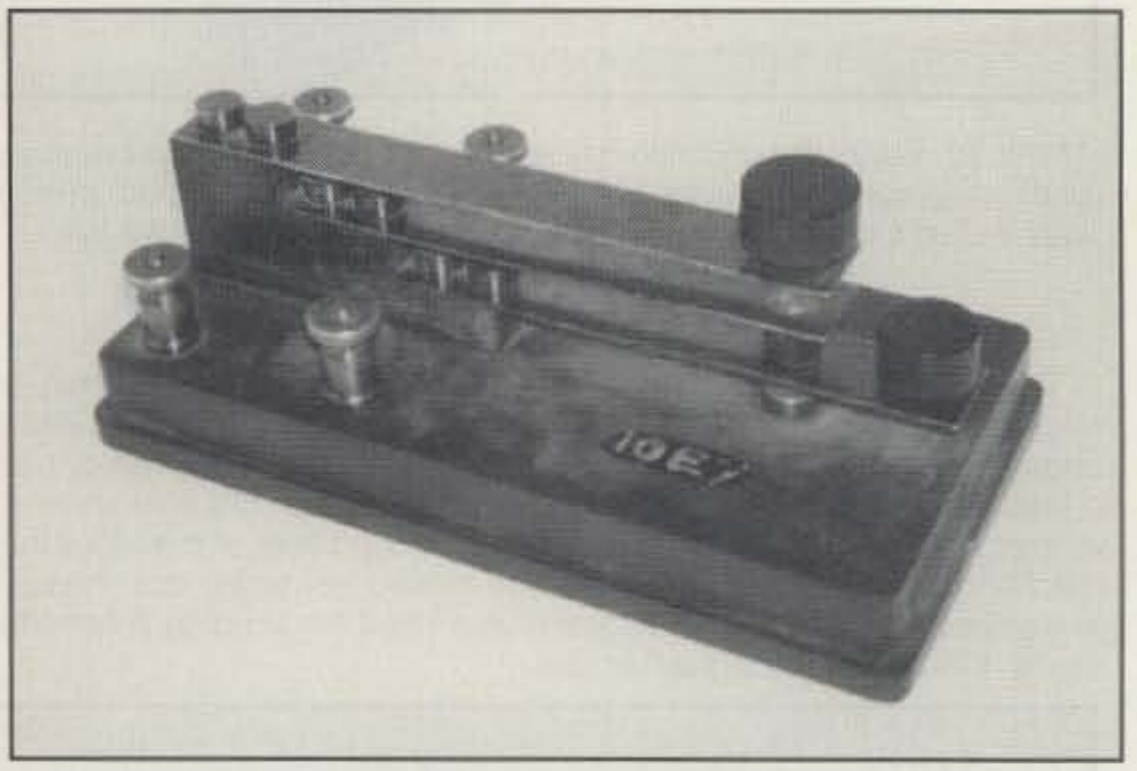

Photo 13– Piggy-backed crickets! We have heard tales that using uncommon keys could warp one's fist (and sense of humor), but the statement was not taken seriously until seeing this critter. Owner Jake, NØCYR, is looking for background information on this key.

Twin-Lever Key

This unique twin lever key (photo 12) belongs to D. Wyn Davies, a nice friend and quite knowledgeable collector of Morse instruments in Wales (U.K.). The key was used with a single-needle telegraph system on the Lancashire and Yorkshire railway during past times. The two finger-operated levers move metal arms fitted with rear contacts which, in turn, mate with contacts on the rear crossarm. Screws on and beside the levers set gaps and tensions. The more I study this item, the more I visualize wiring it for cricket paddle use with a modern keyer. Now that should add some excitement to daily CW activities!

Eberback & Son Key

While on the subject of cricket keys, here is a variation in design worthy of attention (photo 13). The two levers are mounted vertically rather than horizontally. Now that should prove challenging to use! This little tyke belongs to Jake, NØCYR, and is stamped "Eberback & Son Co., Ann Arbor, Mich." on its bottom. Do any of our readers recognize or have more information on this item?

Australian "Clipsal" Key

Photo 14 shows another key in the D. Wyn Davies collection. Wyn did

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not supply specific details on its history, but the view begs to be shared. I understand it is an Australian "Clipsal" key, and it looks a mite small (ere it has an oversized knob skirt for clumsy fingers!). Notice the key has contacts for both "make" and "break" like a telegraph test key. Fascinating!

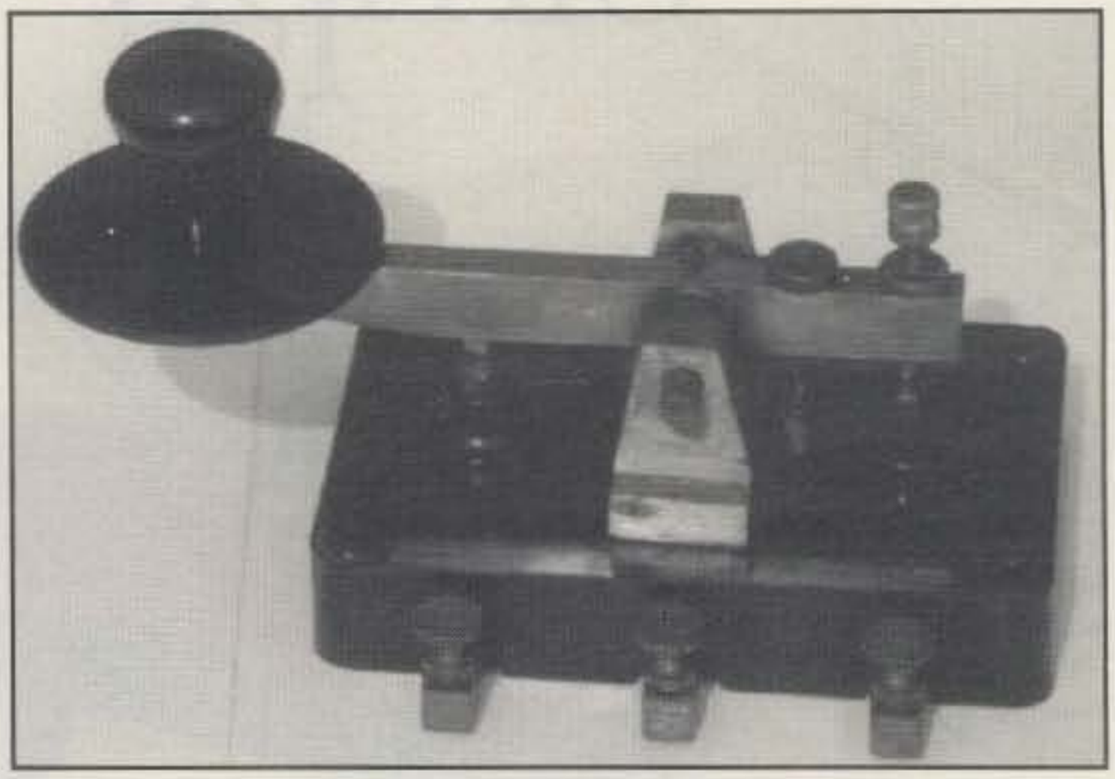

Photo 14– Unusual three-terminal Australian "Clipsal" key. Details on item are sketchy, but it is photogenic! (Photo courtesy D. Wyn Davies.)

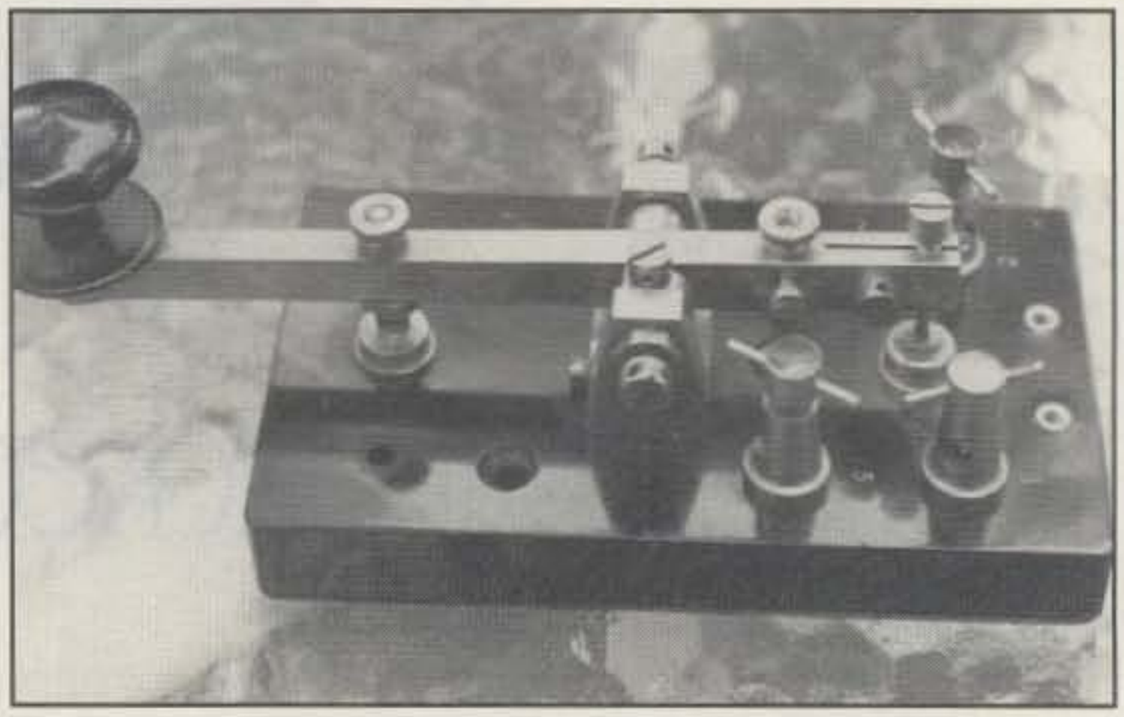

Photo 15– Smart-looking "mystery key" looks and handles great, but lacks distinguishing marks or name tag. If you recognize this item, Bob, W4NZR, would like to hear from you.

"Mystery" Key

Concluding our keyvues is another mystery item (photo 15), this one belonging to Bob Smeltzer, W4NZR. Bob says the key handles very well, but it lacks a nameplate or markings. He asks if anyone recognizes it. I notice the key has both "make" and "break" contacts like a lineman's key, a split-end arm like a Far East item, and a pivotal assembly with British influence. Now that's a puzzle worth solving!

More Treats Coming

We have pushed available space to the limit! Sincere apologies if we did not include your favorite key. Send me your key's information and photo, and we will include it next time.

Stay tuned, as our upcoming columns will open some new (and I mean new!) dimensions in QRP fun for all licenses. They are blowouts!

73, Dave, K4TWJ

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No other amateur handheld compares to the hot new FT-10/40R – the first amateur HT ever to be rated MIL-STD 810! Its built to tough, military spec commercial radio standards inside and out. The FT-10/40R is packed with more than 10 exclusive features not found on any other HT. Important, useful, exclusive features add real value to the FT-10/40R, and it's priced right! All this – and the FT-10/40R is small enough to pocket, too!

For manufacturing excellence, breakthrough design, and value, no one can touch Yaesu. And, no other radio can touch the FT-10/40R for exciting features, commercial-caliber toughness, and performance. Compare for yourself!

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BY KARL T. THURBER, JR., W8FX

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Book Revue—Part II

Despite our book roundup last month, we've *still* got a tall stack of reading matter to share with you. With that in mind, we'll again depart from our usual "antennas, accessories, and software" format to cover some of these interesting amateur radio, shortwave, electronics, and computer pubs.

More Reading Material

LowFERS, MedFERS, *Scrapbooks*, and More. Ken Cornell, W2IMB, is the unofficial dean of the so-called LowFERS and MedFERS operators, those hardy radio amateurs who dare to reach new lows in amateur operating—that is, lows in terms of frequency and power, not in terms of skill. What are we talking about?

LowFERS is an acronym that stands for Low Frequency Experimental Radio Station; MedFERS stands for Medium Frequency Experimental Radio Station. Both relate to stations authorized by the FCC's Part 15 low-power radiation device regulations. The two terms were coined by Ken, who for years has operated the longwave (LW) beacon station "KEN" on 187.5 kHz and who operates the mediumwave (MW) beacon (also "Ken") on 1652 kHz.

The 160–190 kHz band is the more active of the two low-band regions. In fact, since about 1950 a small but enthusiastic group of experimenters has been communicating on the license-free 1750 meter band, from 1874 to 1578 meters, or 160 to 190 kHz. LowFERS have racked up a surprising record, with many QRP beacon reception reports and QSOs to 1000 miles or more.

Of course, 1750 isn't an amateur band at all; no operator or station license is required. But FCC rules governing this type of operation set forth some tight requirements. First, the power input to the final amplifier can't exceed *one watt*. Second, all emissions below 160 kHz or above 190 kHz (in other words, outside the 1750 meter band) must be suppressed by 20 dB or more. Third, the length of the antenna, transmission line, and ground lead combined can't exceed 15 meters, or about 50 feet. Wow!

This last requirement is a tough one. It means that at 160 kHz transmitting antennas are only about 1/123 wavelength! These FCC restrictions make LowFERS operation challenging. Fortunately, however, there aren't any stipulations as to emission type, so you can use SSB, AM, FM, RTTY, CW, and other modes.

Ken has self-published *The Low and Medium Frequency Radio Scrapbook* for over 20 years, and he recently issued the 9th edition. It's a 93-page compendium of detailed information on, and construction projects for, these two bands. The *Scrapbook* offers basic LW and MW information and equipment designs for reception and transmission. Antennas are covered, too.

The book has a useful general introduction to the 1750 meter band, details on operating LW and MW beacons, and a new chapter on earthquake and geophysical monitoring. The 9th Edition *Scrapbook* is $17.50 book rate or $18.75 via first-class mail.

A second, brand new scrapbook also is available from Ken. It's the *Active Antenna Scrapbook*, a 29-page booklet that has almost anything you'd want to know about "active antennas"—short vertical antennas that have a built-in preamplifier. The booklet has circuits for several broadband and remotely tunable, LW and MW active antennas plus coil-winding data and techniques. Included are designs for regenerative preamplifiers and reprints of articles from the Longwave Club of America's "The LOWDOWN" newsletter that deal with active antennas and ferrite loops. The booklet is $10 postpaid.

Incidentally, Ken also is championing the creation of a true LW amateur band, and some time ago the ARRL submitted a request to actually create such a band at 160–190 kHz. The request has been languishing, however, making its way through several government agencies besides the FCC. Also, Ken now considers the most desirable range to encourage transatlantic communications to instead be 140–150 kHz, to avoid a very real conflict with the European LW broadcast band from about 150 to 285 kHz.

For more information on the two *Scrapbooks*, or to discuss the ongoing LW amateur band proposals, contact Ken Cornell, W2IMB, at 225 Baltimore Ave., Point Pleasant Beach, NJ 08742 (908-899-1664). Checks for *Scrapbooks* should be payable to Ken Cornell.

The Low Band Monitor and Compendium. Sticking with the low bands for a while (but not *quite* as low as 1750 meters), we'd like to draw your attention to the *Low Band Monitor*, which

289 Poplar Drive, Millbrook, AL 36054

The dean of LowFERS and MedFERS hobbyists working the so-called FCC "Part 15" QRP bands, 160–190 kHz and 510–1705 kHz, is Ken Cornell, W2IMB. LowFERS is an acronym that stands for Low Frequency Experimental Radio Station; MedFERS stands for Medium Frequency Experimental Radio Station. The terms were coined by Ken, who has for many years operated the LW beacon station "KEN" on 187.5 kHz and who now operates a beacon with the same ID on 1652 kHz, under FCC Part 15 rules. (W2IMB photo)

Most equipment used on the LowFERS and MedFERS bands is homebrew, and some easily constructed transmitting and receiving gear is described in The Low and Medium Frequency Radio Scrapbook *offered by Ken Cornell, W2IMB. Shown here is an experimental LowFERS converter with a regenerative mixer and varactor tuning. It uses a short vertical whip antenna. (W2IMB photo)*

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Whether you're mountain climbing in the Sierras or bicycling across the U.S., as an amateur you not only expect maximum performance from your antenna, you demand it. And no other dual band antenna on the market can out perform Larsen's portable Kūlduckies.™

With an outstanding transmit range and durable construction, our portable antennas offer superb performance for dual band handheld radios. Larsen's Kūlduckie antennas operate as a 1/4 wave at UHF and a loaded 1/4 wave at VHF. Construction elements include a brass wound steel flexible core radiating element. And our loading coils are housed in sturdy polycarbonate plastic for greater durability.

Our KD3 2/70 and KD4 2/70 are designed to provide excellent performance for simultaneous use of VHF and UHF frequencies. Frequency range is 144-148 MHz on VHF and 440-450 MHz on UHF. And each is factory preset to guarantee optimal performance with no tuning required.

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Frequency	144-148/442-448
Electrical	Loaded 1/4 wave at VHF and 1/4 wave at UHF
Impedance	50 ohms
Gain	Unity
VSWR	1.5:1 or less
Power	25 watts
Connector	KD3 2/70 TNC Male KD4 2/70 BNC Male

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bills itself as "the voice of the Low Band Propagation Research Society." The monthly publication, entering its fourth year, is dedicated to the low-band (160 and 80 meter) DXer and features antennas, propagation, product reviews, DXpeditions, contests, awards, operating tips, and more. Twelve monthly issues is $24 (domestic) via third-class mail, or $28 first class. Canada and DX subs are more.

Also offered is the *Low Band Monitor's Limited Edition Compendium*, which features articles selected from the first two years of the *Monitor*. The 210-page *Compendium*'s pages are three-hole punched to fit a standard ring binder. It's $20 plus $4 via Priority Mail postage in the U.S.

For more information, contact Lance Johnson Digital Graphics, P.O. Box 1047, Elizabeth, CO 80107 (303-646-4630).

***The Quad Antenna* de W4MB.** We've overlooked sharing with you one not quite brand-new antenna book from CQ Communications. That book is Bob Haviland, W4MB's still-current 1993 classic, *The Quad Antenna*. It's considered to be one of the most comprehensive, authoritative guides you can find on the construction, design, and performance of quad antennas.

Bob's 159-page treatise shows you how to easily build a quad antenna. Its 13 chapters, two appendices, and an index cover a variety of quads, loops, and related designs. Included are circular, octagonal, rectangular, Delta, and square loops; two- and multi-element quads; and quad feed systems; plus general quad concepts, mechanical design, design variations, and optimizing techniques.

The book is $15.95 plus $4 s/h from CQ Communications, Inc., 76 N. Broadway, Hicksville, NY 11801-2953 (1-800-853-9797).

Passport to World Band Radio. The 1996 version of this complete annual shortwave guide by Lawrence Magne is a "must" for shortwave listeners (SWLs). Amateurs like me who are SWLs at heart also will enjoy it. The 528-pager is a comprehensive, quick-access annual guide to international broadcasting. At its heart are the famous "Blue Pages," in which worldwide shortwave outlets are presented comprehensively by frequency in grid-chart format showing station name and location, power, beginning and ending times of transmission, languages used, and target areas.

The book has a "How to Listen" section and a buyer's guide that includes Larry's hard-hitting but respected receiver reviews. The guide is included in a "What to Listen With" section that offers information on how to choose a radio and includes test reports on over 100 popular receivers.

Passport is published by IBS North America and is available at major radio booksellers. In addition, its editors also offer a series of in-depth Radio Database International White Papers® that include reviews of selected premium receivers. These are $5.95 each, postpaid from Passport RDI White Papers; FAX them at 215-794-3396 for a list of available papers. The White Papers are from IBS North America/Passport RDI White Papers, Box 300, Penn's Park, PA 18943 (215-794-8252).

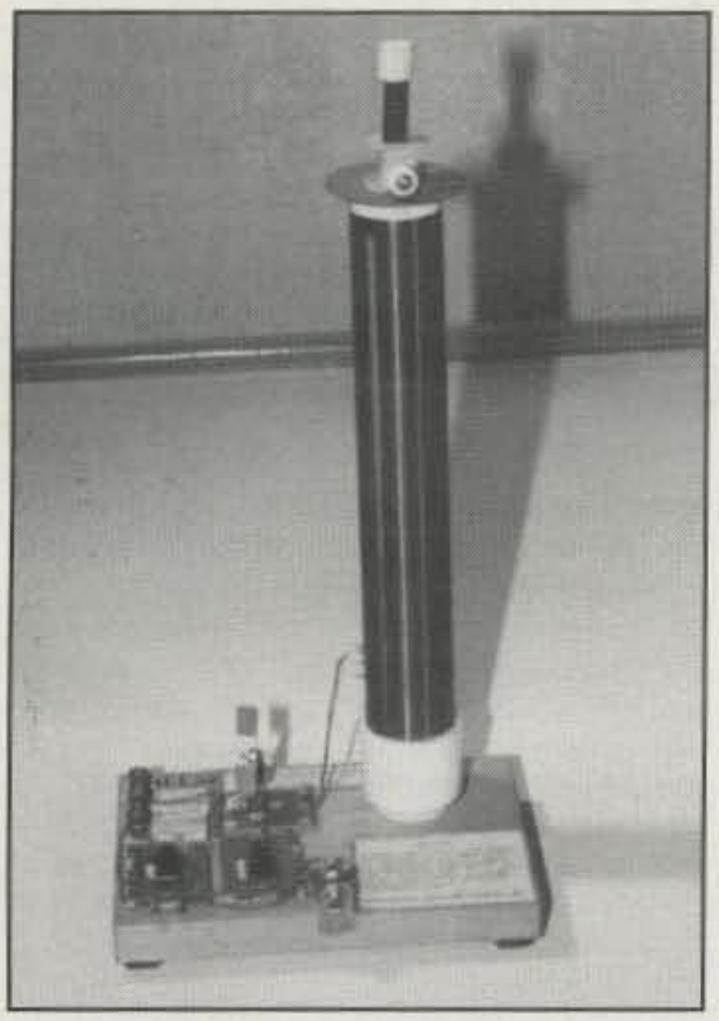
A DXers Technical Guide. Currently in its second edition, this 120-page International Radio Club of America (IRCA) book answers questions on receiver and antenna theory and performance, receiver accessories, and radio modifications. Although the focus is on the mediumwaves, it's also of interest to SWLs. It's $6 for IRCA members; $8 for others. Contact the IRCA Bookstore, Attn. Phil Bytheway, 9705 Mary NW, Seattle, WA 98117-2334.

"The Universal Radio Sales-Alert." "The Universal Radio Sales-Alert" is not a particularly well-known publication, but it nevertheless is a handy "poop sheet" published by Universal Radio every 10 days or so. It includes listings of used equipment, demos, closeouts, new products, and special sales. You can use it to obtain current new and used equipment pricing and availability info. Contact Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113 (1-800-431-3939).

***Electric Radio* Update.** Still going strong, published by Barry R. Wiseman, N6CSW/Ø, *Electric Radio* is devoted to older, tube-type receivers and transmitters. While *ER* appeals to all amateurs, it wins special approval from those (like your columnist) who were first introduced to amateur radio in the 1940s, 1950s, or 1960s. Each issue explores vintage radio gear and the people who produced it. Issues provide information on equipment modification and repair, and there's a classified ad section.

According to Barry, *ER* is for those who appreciate older tube-type equipment. He hopes that the magazine will stimulate the collecting of, and interest in, vintage radio equipment. *ER* provides information regarding the modification, repair, and building of equipment, and it works toward a greater understanding of amplitude modulation (AM) and the problems this classic radio mode faces.

Each 5½" × 8½" issue of *ER* runs about 40 pages. Domestic subscriptions currently are



Much of the transmitting equipment for the 1750 meter band is rather unusual in appearance and often is characterized by its large coils. Here is a LowFERS transmitter, circa 1975, which was designed and built by Ken Cornell, W2IMB. The prominent enameled wire tank coil is ferrite rod tuned. (W2IMB photo)

$28 by second-class mail and $38 via first-class mail. Canada and overseas are more. Contact *Electric Radio*, P.O. Box 57, Hesperus, CO 81326 (303-247-4935).

Four Computer Books from Macmillan. I'm increasingly impressed with the depth and scope of coverage of the several book labels (imprints) issued by Macmillan Computer Publishing USA. Several excellent Macmillan books on the Internet have crossed my desk recently. I'll briefly share these with you.

First up is *The Internet CD Tutor* by Dee-Ann LeBlanc and Robert LeBlanc. It is an interactive Que book/CD-ROM package that probably is the best way to learn how to use the Internet and at the same time get all the software you need. There are numerous video and voice segments on the CD-ROM that guide you step-by-step through using most of the Internet's major resources. The CD-ROM has multimedia clips to go with the lessons, plus connection and communications software. The 384-page workbook contains additional information and quizzes. It's $39.99.

Second is *net.search*, a Que book by William Eager and others. It addresses one of the biggest problems in using the Internet: how to *find* stuff. It offers detailed instructions to guide you through finding anything and everything—tracking down people, information, software, documents, graphics, and more. The book covers major Internet resources, such as the World Wide Web, USENET, Gopher, WAIS, FTP, E-mail, and more. It's $24.99.

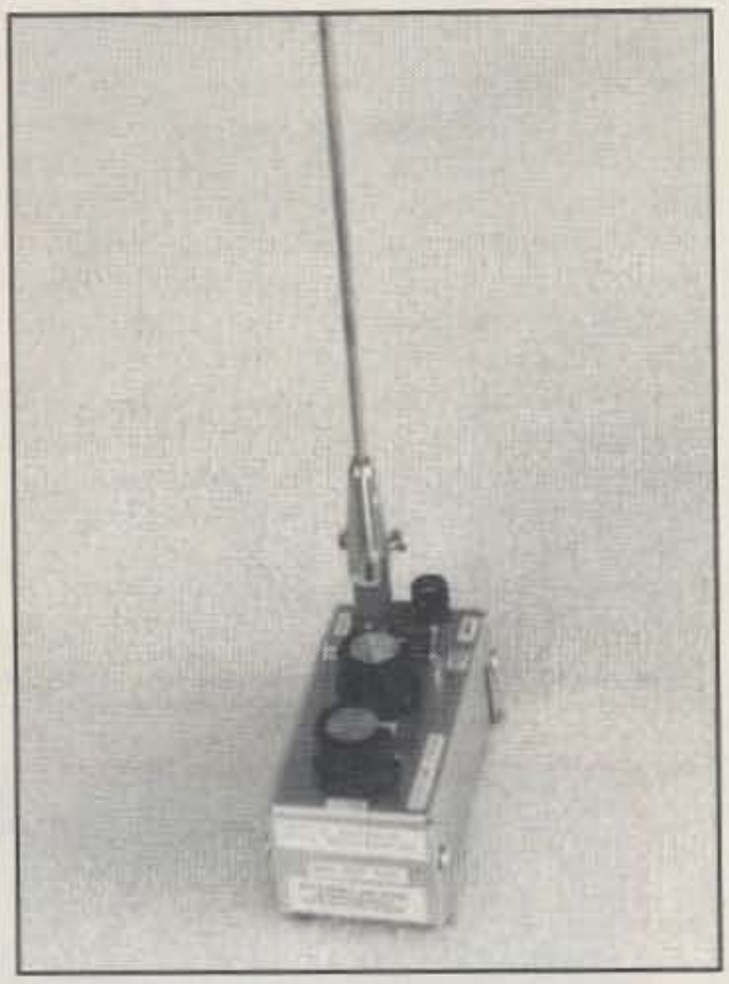
Next is *The Internet Business Guide*, 2nd edition, by Rosalind Resnick and Dave Taylor. You'd be surprised at how many amateur radio related Web sites now are "up" on the net. There must be dozens. Some of the sites, though, could take a few pointers from this 470-page, $25 Sams.net Publishing book. It offers advice on setting up a Web home page, getting the best deal on Internet access, customer support, protecting your system from crackers and vandals, working with "digital cash," etc.

Last, but certainly not least, is *Publishing on the World Wide Web for Macintosh®*, a good book for you Mac mavens. Greg Holden's 534-page Hayden book is a nice resource if you want to learn about "cyberspace publishing" on the Web. It's an easy-to-read, nontechnical presentation, one which accommodates those with only a basic understanding of the Internet and the Web. It shows how to use your Mac to properly organize and publish information and design professional Web pages; it also explores the dos and don'ts of Web marketing and advertising. It's $30.

Contact Macmillan Computer Publishing USA, 201 West 103rd St., Indianapolis, IN 46390 (1-800-858-7674) for a catalog. You can also go online and check out the Macmillan Information SuperLibrary™ Web site at the Web URL (Universal Resource Locator) address http://www.mcp.com/. You can download valuable Internet software tools from the MCP site or use the company's Gopher site (gopher.mcp.com) or FTP site (ftp.mcp.com). The publisher also maintains the MCP Forum on CompuServe.

Antenna Notes

MFJ-66 Dip Meter Adapter. Most of us are aware of the variety of excellent SWR Analyzers™ offered by MFJ Enterprises. The MFJ-



Active antennas are described in Ken Cornell, W2IMB's new "Active Antenna Scrapbook," a 29-page booklet that has almost anything you'd want to know about "active antennas," short verticals that have a built-in preamplifier for increasing signal-to-noise ratio. Shown is a MedFERS (MW) regenerative tabletop active antenna by Ken. He asserts that regenerative preamplifiers, somewhat out of vogue today, are capable of excellent LW and MW performance. (W2IMB photo)

66 Dip Meter Adapter lets you turn your MFJ SWR Analyzer into a sensitive and accurate dip meter just by plugging in a coil. This capability lets you save time and eliminate much of the guesswork involved in winding coils, measuring capacitance, and calculating the velocity factor and electrical length of coaxial cable. The $19.95 unit also can be used to determine resonant frequencies of tuned circuits and check the Q of coils. A set of two coils covers the range 1.8–170 MHz, depending on your particular SWR Analyzer.

On the other hand, if what you really want is a dedicated Grid Dip Meter (GDM), MFJ also offers the MFJ-201, a new product that covers 1.5 to 150 MHz in six bands. The $119.95 GDM is a modern-day version of the classic "jack of all RF trades" vacuum-tube based GDM long favored by amateurs.

The GDM, which has been used in radio shacks for more years than most of us have walked the earth, determines RF circuit or antenna resonance. It uses a tuned RF oscillator and meter to indicate absorption of energy from the unit's resonant tank circuit by the circuit under test. The frequency at which this indication occurs is the resonant frequency.

The GDM is a dual-mode instrument you can use in an active (oscillating) mode or in a passive mode, depending on whether the circuit is active or passive. The GDM also serves as a wideband signal generator since it typically covers the spectrum from LF through UHF. An instrument such as the MFJ-201 also can double as a simple audio generator.

For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (1-800-647-1800).

Woodhouse Communication Specialty VHF Antennas. Jerry Buchanan, K8WPI, of Woodhouse Communication, notes that everyone and their brother seems to be making antennas these days. Thus the question arises whether the amateur community is ready for another manufacturer. Jerry thinks so, asserting that Woodhouse is interested in providing quality products and services for amateurs in the form of tough, highly wind-resistant specialty VHF antennas.

The Pro Line and Pro Line+ VHF antennas are not made for DX or EME, but rather are full-band antennas for simplex or repeater operation designed to be put up and left alone. Yagis for 2 meters and 440 MHz are offered, along with a 136–139 MHz circularly polarized array, the APT-4X4 Yagi, for use with non-amateur polar orbital satellites. A brand-new antenna is the APT-2CP, another non-amateur 136–139 MHz antenna. It offers dual, balanced driven elements for uniform performance in the circular plane; its driven elements are fed by a delay line to offer true circular polarization.

Descending to HF, the firm also offers the innovative Outbacker™ Resonance Guide, known as the OBRG. This is a handy device to help you with the task of tuning the "top stinger" on the Outbacker OB-series all-band HF mobile antennas. An optional "out-of-band" chart also is available.

They also offer a series of educational videos on HF and "no holes" VHF mobile installation, plus other topics. Each video has examples of dos and don'ts, illustrates critical components or aspects of the project, and presents the tools and techniques required to successfully create the finished product or task.

For a set of spec sheets, application notes on satellite DXing, and pricing information, contact Woodhouse Communication, P.O. Box 73, Plainwell, MI 49080-0073 (616-226-8873).

CUBEX Quad Update. Some time ago we profiled the rugged quad antennas from CUBEX, whose motto is "You can't say Quad better than CUBEX." The firm, which has been in the antenna business for about 40 years, offers complete quads and quad kits.

Today CUBEX offers various complete 2-, 3-, and 4-element quads in the MK II, III, and IV series, covering three or five HF bands, depending on model. Virtually everything is included, and you're offered a choice of feedline connections. Key features include high gain, a tight turning radius, light weight, low windload, and usability with a small antenna rotor. CUBEX offers a new all-fiberglass 2 meter, 4-element quad, the CUBEX Yellowjacket, for under $35.

For the do-it-yourselfer, CUBEX offers the Skymaster Fiberglass Quad Kits. These kits are offered in 2-, 3-, and 4-element models and are furnished less boom and wire. The kits include a complete instruction manual with detailed information and design data necessary for constructing and installing these 2- to 4-element quads of CUBEX design.

CUBEX also offers the quad builder a complete line of hardware and parts. Components include spiders, fiberglass arms, elements, boom/mast couplers, matching transformers, arm clamps, booms, Dacron® polyester rope, and other necessary goodies.

For a flyer, contact CUBEX Quad Antenna Company, 2761 Saturn St., Unit E, Brea, CA 92621 (714-577-9009).

Surplus Antennas from Fair Radio Sales.

A mail-order firm that offers "classic" radio surplus is Fair Radio Sales, in business since 1947 with what it touts as "the world's finest electronic surplus." Most of its 36-page catalog is devoted to military, government, and commercial radio surplus, and it's a real gem. Hardware is king, but manuals for surplus equipment, some Tektronix manuals, and vacuum-tube data also are available.

Although I've never been to their retail outlet, I regularly peruse their catalog, which has the effect of taking me back to the "good old days" of radio surplus and is suggestive of the dusty-bin, old-time stores of "Radio Rows" around the country.

Their most recent catalog shows an unusual variety of interesting antenna surplus. Items on hand include an 8 ft. dish for 1700–2400 MHz; several loops, including one for VLF and LORAN-C use; a 225–400 MHz dipole; an impedance matching unit; a heavy-duty counterpoise; several mobile antennas, including new Hy-Gain 760-series units; antenna insulators; antenna mast sections; and base and mobile mounts.

For a free catalog, contact Fair Radio Sales, 1016 E. Eureka St., P.O. Box 1105, Lima, OH 45802 (419-223-2196).

The MFJ-66 Dip Meter Adapter lets you turn your MFJ SWR Analyzer into a sensitive and accurate dip meter just by plugging in a coil. It also can be used to determine resonant frequencies of tuned circuits and measure the Q of coils. A set of two coils covers 1.8–170 MHz, depending on your analyzer. Here it's shown installed on an MFJ-249 HF/VHF SWR Analyzer. (Photo courtesy MFJ Enterprises, Inc.)

Software Notes

RCSI Windows Control for Scanners. Radio Control Systems, Inc. (RCSI) has announced a Windows-based scanner control software package known as ScannerWEAR™ SoftControl. As a top-of-the-line package at $99, the software has memory banks with 100 channels per bank that include signal frequency, mode, and description. Data logging to file includes a date and time stamp, signal strength, tone, number of "hits," and location (the latter if the software is used in conjunction with the PerCon FCC CD-ROM databases, reviewed recently.

You can scan multiple groups, banks, or search ranges at the same time, and the program lets you set up a unique "birdie control file" for your particular scanner. Several AOR, Radio Shack, and ICOM receivers and scanners are supported. A less costly package, ScannerWEAR SoftControl STD, offers Windows-based scanner control to meet basic scanning needs; it's $39.

For more information, contact Radio Control Systems, Inc., 8125-G Ronson Road, San Diego, CA 92111 (1-800-560-7234).

WJ2O Logging Software Update. We first discussed Dave Farnsworth's WJ2O Master QSO Logging Program in December 1990, and we followed with an update in July 1993. Over the years Dave's logger has developed a number of impressive features and enhancements that we should bring to your attention.

Some of the features of this DOS-based logger include the ability to log all QSOs in one main database, easy identification of DXCC country or zones, step-by-step menus with help on each menu, QSL tracking and printing, global editing, a packet window, partial call search, a net operations module, beam headings, an adjustable DXCC file, data import from at least 16 file or logbook types, and the ability to print a variety of reports. An 11-chapter, 50-page manual is included.

Dave has developed an innovative, foldout, do-it-yourself "Logging Software Report Card" with his program's features listed; there's space for you to write in the features of three competing loggers to make your own comparisons. The program is $59.95 and is available from Dave Farnsworth, WJ2O, P.O. Box 16, McConnellsville, NY 13401 (1-800-944-WJ2O). The manual alone is offered for $12.95. Specify disk preference.

We Get Letters

Once again we're rapidly running out of space, so we'll wrap up this month's column shortly. However, we would like to take the time to acknowledge some of the many folks who have written, FAXed, or otherwise communicated with your columnist over the past several months. A tip of the hat goes to Tony Japha, N2UN; Gopan Madhavan, VU2GMN; Don Bell, KI5YT; John H. Davis, KD4IDY; Tony Lacy, G4AUD; and Don Johnson, W6AAQ, to name just a few of them.

Short Bursts

A Propagation Note. Time indeed flies! This coming June, *CQ* celebrates the 50th anniversary of its propagation column, certainly one of the longest running columns in any amateur radio publication. The column first appeared in the June 1946 issue, being written by the late Oliver P. ("Perry") Ferrell. His column inaugurated propagation forecasts to serve the needs of amateurs and SWLs, as opposed to those of broadcasters and the military.

George Jacobs, W3ASK, succeeded Perry in March 1951 and has served continuously since. As George once put it, "Whatever the situation, there was my crystal ball and typewriter, and a deadline never missed." George has written his longstanding column in his travels across five continents and in over two dozen countries. These statistics are particu-

larly noteworthy, as his stewardship extends over five sunspot cycles!

I've been associated with *CQ* magazine for 16 years this month, for some 192 "Antennas and Accessories" columns. That doesn't stack up for much against George's record (although in my defense, my columns are longer than his). In George's 45th year as Propagation Editor, and some 540 columns later, we'd like to salute him and wish him many more years of good propagation!

Intelex HT Mounting Hardware. As we slowly retire our 10- and 15-year old clunker automobiles and replace them with new vehicles, we notice how very small the interiors now tend to be and how difficult it's becoming to mount radio gear in, on, and around the dashboard. The problem is magnified with handi-talkies (HTs), which often require a variety of ingenious mounting and antenna installation solutions.

Recently we profiled Transel Technologies (123 East South Street, Harveysburg, OH 45032; 1-800-829-8321). Transel sells a variety of HF, VHF, UHF, dual band, cellular, and scanner mobile antennas, brackets, mounts, and other accessories. Many of these products are unique and are designed specifically with HTs and the small vehicle in mind.

Now we have a catalog from another supplier, Intelex, Inc., which specializes in automobile HT mounting hardware. The variety of hardware offered is quite broad. There are several types of HT cradles, a suction mount, and gooseneck mounting hardware. Intelex also offers a number of specialized mobile accessories, including microphones, battery chargers and packs, antennas, and antenna mounts.

For an eight-page flyer, contact Intelex, Inc., P.O. Box 533, 144 West Eagle Road, Suite 122, Havertown, PA 19083.

Lookng Back Five

Five Years Ago in Antennas and Accessories. Now you know what the column looks like in March 1996. But what were the hot topics of discussion in March 1991? This column was a follow-up potpourri called "More This and That."

Antenna-wise, we discussed the 2 meter, 5-element Max-Gain Quagi by Max-Gain Systems; the MAX series of ground-plane verticals for 146, 220, and 440 MHz from Cellular Security Group (not to be confused with the Max-Gain Quagis); the TENNADYNE Eagle Log-Periodic Dipole Array (LPDA) for 14 to 30 MHz; International Communications Engineers, Ltd. (ICE) filters, preamps, tower parts, and lightning protection devices; the US Towers crank-up tower catalog; an update from DX Engineering featuring their 40 and 6 meter monobanders; ribbed, Hi-Q antenna insulators from Van Gorden Engineering; and a new Mirage/KLM catalog of amplifiers, preamps, and antennas.

Turning to software, we featured Tom Dandrea, N3EQF's LOG-EQF shareware logbook software; the KD7P Amateur Radio Logbook Management System from Bob Winters, KD7P; the KBØZP Contest Log shareware from Larry Kebel; FDLog! for the Macintosh PC, a contest logger and dupe checker by Bill Gausman, WWØJ's System One Control; and PC Librarian Version 2, an archive management utility from United Software Security, Inc.

Rounding out the column was a call for help in submitting software to your columnist. We stressed that we enjoy checking out new shareware and freeware software, and hope that readers will continue to submit their programs for possible mention in the column. However, we noted the need to include printed documentation with any software you might send to me.

This last point bears re-emphasizing today as hardcopy docs seem to be fading away. Include *complete printed documentation*; please don't expect me print out the docs. Also include ordering and registration details, specs, price, and other necessary information the reader might need. If you send us software for mention in the column, please limit it to an IBM PC compatible version. That's all we can handle, although we can write up and mention Macintosh, Amiga, and other PC software.

We also noted in the same column that it will be hard to give software authors personal feedback; we must limit our feedback to that which we can provide through the published column. In many cases, space limitations mean we won't be able to fully evaluate the software. We may have to just briefly alert you to the "high points" of the software and how you can get it.

Wrap-Up

That's all for this time, gang. Next time more "Antennas and Accessories" topics of current interest. See you then.

Overheard: The larger the island of knowledge you're standing on, the longer the shoreline of wonder.

73, Karl, W8FX

BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

QRP Transmitters—Some Design Tips

In recent years I have been asked some interesting questions in letters and on the air about QRP transmitter circuits that were published under my byline. A typical question is "Why did you use that particular part value at Q2?" Questions are also asked concerning why a certain network was used in some part of the circuit. This month we will examine a typical QRP CW transmitter circuit and explain the design philosophy, step by step. This information will be useful to you when you develop circuits of your own, or when you troubleshoot existing QRP transmitters.

The Oscillator Stage

Fig. 1 shows a complete circuit for a 2 to 3 watt CW transmitter that operates from a 12 volt power supply. The oscillator is set up as a VXO (variable crystal oscillator). The operating frequency is decreased over a range of 8 to 10 kHz by adjusting C1. The amount of frequency shift is dependent upon how "rubbery" your particular crystal may be (plated AT-cut crystals are best) and the inductance value selected for RFC1. The larger the inductance the greater the frequency shift, at least up to a point where the VXO becomes a VFO, thereby causing frequency drift to become a consideration. If you remove C1, R1, and RFC1 and then connect Y1 to the junction of C2/R2, the result will be a fixed-frequency Pierce oscillator. R1 is optional. It should be used only if the VXO exhibits frequency jumping or produces a chirpy signal. Use the highest resistance value that cures the problem.

C2 and C3 are feedback capacitors. Their values may be chosen experimentally to ensure rapid VXO starting (oscillation) and minimum chirp when Q1 is keyed via Q4. The value of R4 also affects the quality of the CW note. RFC2 must be resonant with the stray circuit capacitance, somewhat below the operating frequency of Y1 in order to ensure Q1 oscillation. Generally, a 1 mH RF choke is satisfactory for operation at 3.5 MHz and higher. Practical parts values for 7 MHz operation are assigned at Q1 and throughout fig. 1.

The Buffer/Amplifier

Q2 in fig. 1 functions as a buffer and amplifier. Without Q2 the power amplifier, Q3, would reflect a direct, changing load to Q1 when the transmitter is keyed. Q2 is biased for class A (linear) service. There are two reasons for this: (1) the harmonic output from Q2 is lower than for class C operation because Q2 operates in a linear manner, and (2) less input power is required to drive a linear amplifier than is needed for a similar amplifier operating in the class C mode. A pi network is used at the output of Q2 for two reasons. This network operates as a low-pass filter to attenuate harmonics before they reach Q3. Also, it matches the Q2 collector to the base of Q3. This is a transformation from 288 to 20 ohms, based on 250 mW of output from Q2. Use only enough driving power to cause Q3 to produce 2 to 3 watts of output power. Increasing the resistance of R8 will lower the Q2 output power. If you wish to raise and lower the output power periodically, such as when you want to operate at the milliwatt level, you can install a 1000 ohm potentiometer between R8 and ground. Be sure to bypass both resistances to ground by means of C7 if this is done. RFC3 is located on the output side of the Q2 collector network because that is the low-impedance end of the circuit. This enables you to use a low-value inductance at RFC3, which in turn reduces the DC resistance of the choke. This minimizes the voltage drop across RFC3 because a smaller choke has fewer turns of wire. Q2 is keyed along with Q1 by virtue of keying transistor Q4.

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The Final Amplifier

Q3 in fig. 1 operates in class C and has +12 volts applied to it, even during key-up periods. The Q3 base has no forward bias supplied to it. The base is returned to DC ground through RFC4. In order to aid stability it is wise to lower the Q of RFC4. You can do this by slipping an 850 μ, ferrite bead over one of the choke pigtails, as shown. Alternatively, you may omit the bead and connect a resistor in parallel with RFC4. Values from 27 to 56 ohms are commonly used as de-Qing shunts. Some of the drive power is dissipated in the resistor, so use the highest resistance value that prevents Q3 self-oscillation.

Zener diode D1 is shunted from the Q3 collector to ground to protect the transistor from unsafe positive-going RF and DC voltage spikes that may occur. In effect, D1 keeps Q3 safe no matter what the antenna SWR may be. It clamps at its rated voltage if self-oscillation should occur and cause high levels of peak RF voltage to be present at the collector. A 27 or 33 volt, 400 mW diode is suitable for D1. This diode should be rated for at least twice the supply voltage because the RF collector voltage increases to 2× the V_{CC} value during CW operation. This diode does not conduct during normal amplifier operation.

The Q3 collector impedance is 24 ohms for an output power of 3 watts ($Z_{ohms} = V_{CC}^2/2P_O$, where P_O is the anticipated output power). C12, C13, and L2 form a pi network that transforms 24 ohms to 50 ohms. C14, C15, and L3 (FL1) are included to enhance harmonic suppression. This low-pass network is designed for a 50 ohm bilateral impedance. It has a cutoff frequency of 8.1 MHz and a loaded Q of 2.

Q3 can be any transistor that has a gain of 10 to 12 and an f_T of at least 100 MHz. If you want to cut the cost for this transmitter stage, you can use six or eight 2N2222A or 2N4401 transistors in parallel. If you elect to go this route, use the circuit in fig. 2. Please note that 1 ohm resistors are included at each emitter. These resistors balance the transistor collector currents. Without these "ballasting" resistors it would be possible for one, two, or more transistors to "hog" most of the current and burn out. This can happen if matched transistors (equal AC betas) are not used.

No matter what device you select for Q3, be sure to use a heat sink. This will keep the transistor cool. In this regard, heat-sink overkill is better than having too small a heat sink. The cooler the transistor case the less likely is excessive junction heating—a condition that can cause thermal runaway and rapid destruction of the device. Ideally, the case of Q3 should only be warm to the touch after a sustained key-down period of three to five minutes. If you opt for a cluster of 2N2222s or 2N4401s at Q3, surround them with a close-fitting homemade heat sink. Flow epoxy cement into the heat sink. This compound, even though it is a mediocre heat conductor, will help transfer the heat to the metal cooling element.

Keying Circuit

Q4 in fig. 1 is a PNP DC switch. Key clicks are minimized because the key breaks a smaller magnitude of DC current than would be the situation if direct +12 volt or emitter keying were used. Furthermore, waveform shaping is relatively easy with this type of circuit. The C21, C22, and R11 values may be juggled to get rid of the sharp leading and trailing edges of the keyed waveform. Q4 conducts when you close the key, which in turn allows DC current to flow from the power supply to Q1 and Q2. R10 reverse biases Q4 to cut it off during key-up periods. The I_c maximum rating for Q4 must be somewhat greater than the combined key-down current of Q1 and Q2. Almost any PNP transistor that satisfies this requirement may be used at Q4.

Optional Regulator

The fig. 1 circuit contained in dashed lines provides an option you may want to include in your QRP transmitters. It allows you to use a low-cost 14 to 18 volt AC wall transformer to permit operating the rig from a 120 volt AC outlet. The transformer should be rated at 400 mA or greater. D6 is included to elevate the U1 DC output to 12.7 volts. This increased voltage compensates for the voltage drop across D7 (0.7), which functions as a gating diode. D7 is used to prevent external DC voltage from reaching U1, via J2. The addition of the rectifier and regulator circuits makes it an easy matter to use the fig. 1 transmitter at home, or afield where commercial power is not available. U1 is a standard three-terminal regulator IC.

Capacitor Values

You may wonder why 0.1 µF capacitors are used for coupling and bypassing rather than, say, 0.01 µF units. Effective coupling and bypassing occurs only when the X_C (capacitive reactance) of the capacitor is 10 or less. If not, RF energy can migrate from stage to stage and cause unwanted self-oscillations.

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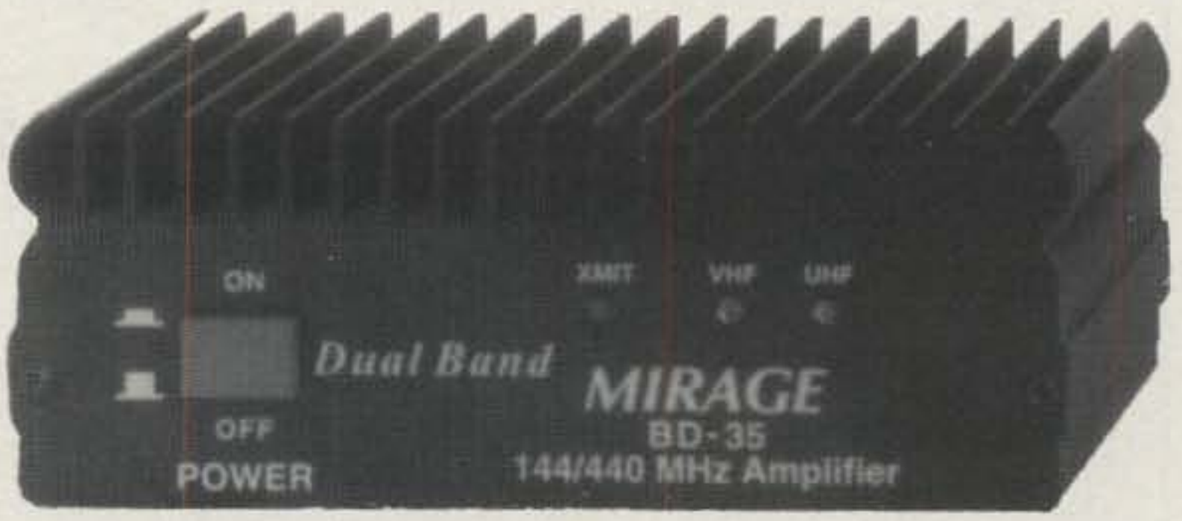

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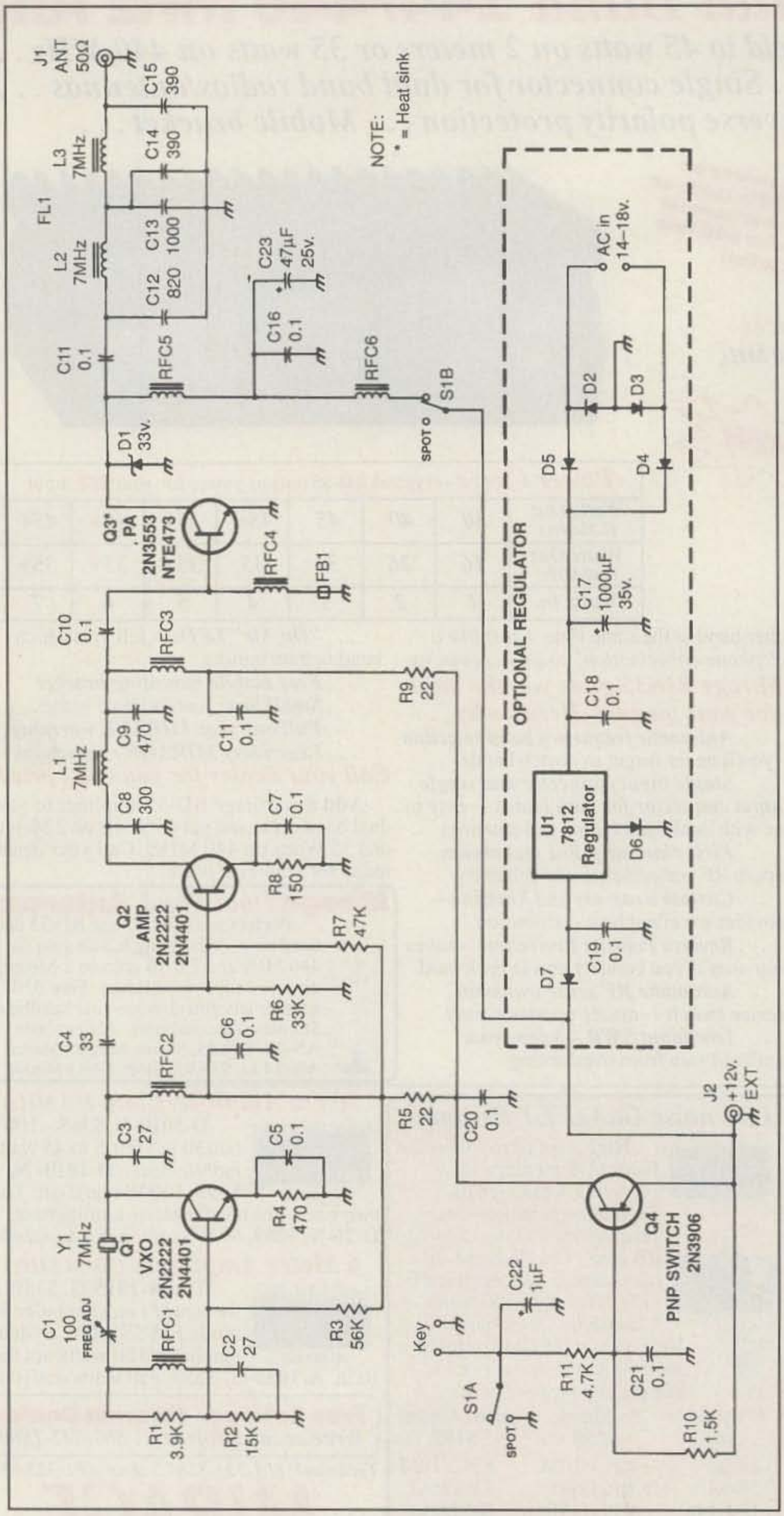

Fig. 1– Schematic diagram of a practical 40 meter QRP transmitter for text discussion. A PC-board pattern is not available. Capacitors are in pF and are silver mica or polystyrene, except those with decimal values, which are disc ceramic and are in µF. Polarized capacitors are electrolytic or tantalum. Resistors are 1/4 watt carbon or carbon-film types.

Parts List

C1—100 pF air variable or ceramic trimmer.
D1—33 volt, 400 mW, or 1 watt zener.
D2-D7—1 amp, 50 or 100 PRV rectifier diode.
FB1—Miniature 850 μ_i ferrite bead.
L1—1.68 µH toroidal inductor. Use 23 turns of No. 26 enam. wire on an Amidon T37-6 core.
L2—0.685 µH toroidal inductor. Use 15 turns of No. 26 enam. wire on a T37-6 core.
L3—0.65 µH toroidal inductor. Use 14 turns of No. 26 enam. wire on a T37-6 core.
Q3—See text.
RFC1, RFC4—Miniature 22 µH RF choke.
RFC2—Miniature 1 mH RF choke.
RFC3—Miniature 220 µH RF choke.
RFC5, RFC6—5 µH toroidal choke. Use 10 turns of No. 24 enam. wire on an Amidon FT-37-61 ferrite toroid.
U1—Three-terminal +12 volt regulator IC.

Furthermore, effective emitter bypassing is essential if the stage is to deliver maximum gain. Too small a capacitor value can cause unwanted "degeneration." This not only lowers the gain, but can encourage amplifier instability. The 0.1 µF capacitors should be disc ceramic or "match head" types.

The 47 µF electrolytic capacitor (C23) on the V_{CC} line to Q3 is used as a bypass for VLF and audio energy. It is not uncommon for some transistors to self-oscillate at these lower frequencies because of the tremendous gain they exhibit in this part of the spectrum. RF power transistors can quickly self-destruct because of unobserved VLF or audio self-oscillation.

The pigtails on all capacitors should be cut as short as practicable in the interest of circuit stability. Mount them snugly against the PC board. Long capacitor leads introduce unwanted inductive reactance (AC resistance). This can make bypassing less effective.

Other Considerations

The stages in any RF circuit should be laid out in a straight line in order to minimize feedback between them. This is especially important when all of the stages operate on the same frequency. Unwanted positive feedback, which causes instability, can be transferred from one stage to the others by means of stray inductive or capacitive coupling between the tuned networks and other RF-active components. Be sure to physically separate the input and output circuits of each stage by a reasonable distance, but without creating long PC-board conductors. Wide conductors are better than thin ones if you want to minimize their inductive reactances (desirable).

Decoupling networks (C6/R5, C11/R9, and C16/C23/RFC6) are used in the fig. 1 circuit to prevent RF energy from migrating from stage to stage along the +12 volt bus. This practice is essential for minimizing feedback.

Closing Comments

I hope this article has answered some of your questions about why certain circuits are used and how they function. It is not uncommon to see a homemade transmitter that consists of selected bits and pieces of circuitry that the builder has copied from various published designs. These "crazy quilt" circuits seldom operate in a quality manner. From a practical standpoint, each transmitter stage must be

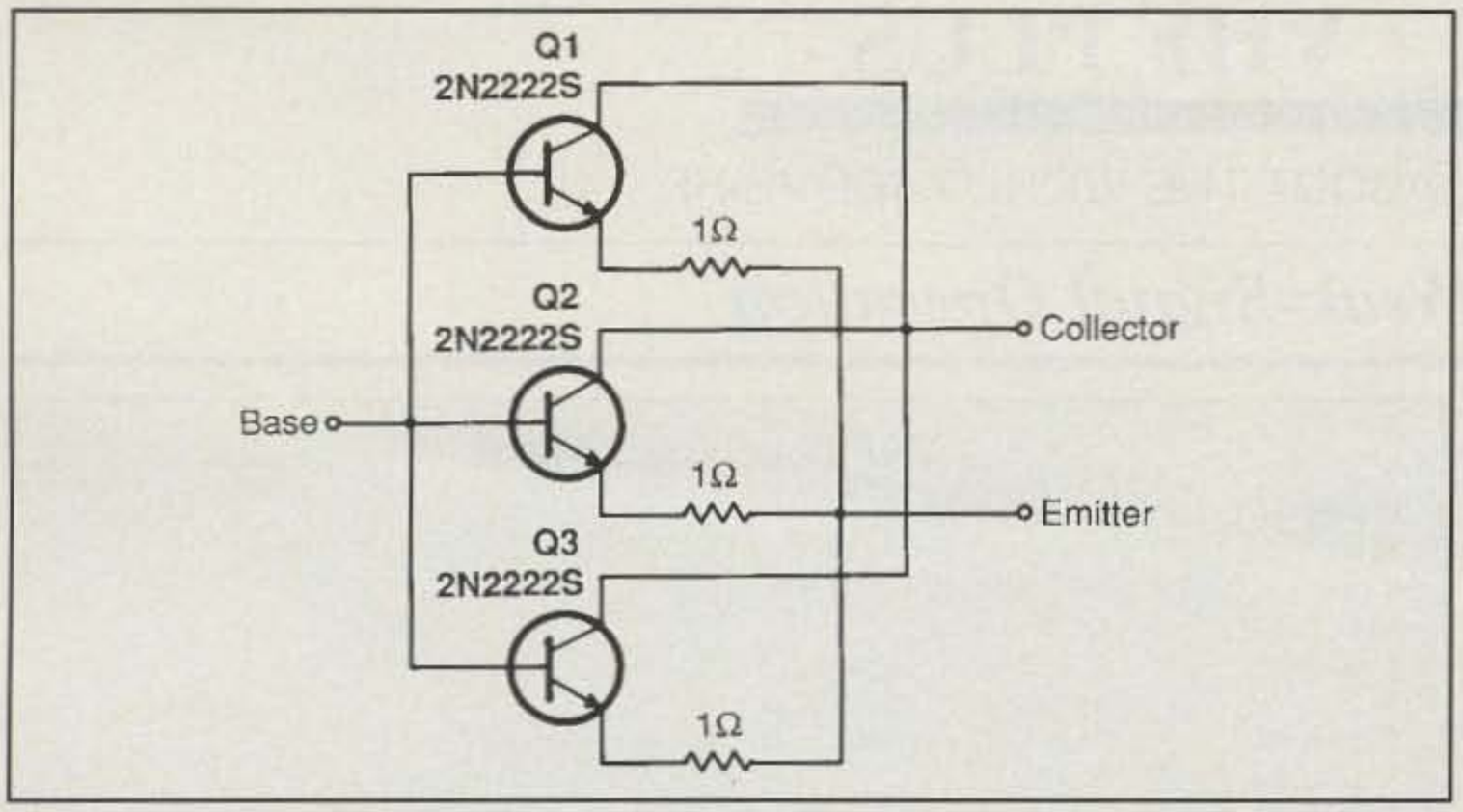

Fig. 2– Method for using several small-signal RF transistors in parallel to produce 2 or 3 watts of power. A 1 ohm resistor is used in each emitter lead to balance the collector currents and prevent burnout of any individual transistor (see text).

designed with specific objectives in mind. Also, step No. 1 requires that the output amplifier set the stage for the rest of the circuit. Once it is finalized, you can design the preceding stage, which must generate the RF energy required to drive the final amplifier to its rated output power. Each low-level stage must be designed to deliver ample drive power for the stage that follows. All of the resonant networks and RF transformers must be designed to provide a reasonable impedance match between the stages, plus between the final amplifier and the load presented by the antenna system. This is necessary because maximum power transfer occurs only when unlike impedances are matched. Clearly, this aspect of design is anything but casual.

Transistor impedance-calculation information and network design data are available in *The ARRL Handbook*, *W1FB's Design Notebook*, and *W1FB's QRP Notebook*, all of which can be obtained from The ARRL or from your favorite amateur equipment vendor.

73, Doug, W1FB

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Weak-Signal Operation

The other evening after the Oklahoma City Autopatch Association meeting I was having a conversation with my friend Linda Miller, N1LPN, about new amateurs and their operating interests. What I heard from her in a way was not surprising, particularly because we shared the same observations. We agreed that after a few months of operating on the local repeater, many new amateurs are tired of the "thrill" of talking across town and want to work stations farther away.

In recent columns I have discussed some basic principles relating to the VHF+ frequencies. This month, in attempt to answer questions generated by these amateurs who want to explore other operating possibilities on the VHF+ frequencies, I will discuss weak-signal operating.

The term "weak signal" is somewhat of a misnomer because it implies that all this specialist of the VHF+ frequencies does is spend time looking for weak signals. While as you will read shortly that is somewhat the case, often the "weak signals" heard can be quite loud. Nevertheless, this specialist is looking for the challenge of copying signals much weaker and oftentimes thought impossible to hear on the VHF+ frequencies. To give you examples of weak-signal operations, let's look at each of the bands of the VHF+ frequencies and see what the weak-signal operator is looking for.

6 Meters: This band is sometimes thought of as the last of the HF bands and sometimes as the second VHF band because it so often shares characteristics of both HF and VHF propagation. Throughout the year, but in particular during extended periods twice a year, the VHF+ operator experiences sporadic-*E* propagation. Signals from single-hop sporadic-*E* propagation can be quite loud. This propagation makes it possible to complete contacts in the 1200 to 1300 mile range, and sometimes much farther, depending on whether or not it is single-hop or multiple-hop sporadic-*E*. Occasionally, multiple-hop sporadic-*E* propagation can make possible contacts in distant (5000 miles) parts of the world.

Almost every day of the year tropospheric-scatter propagation exists. Also, almost every day meteor scatter is present, although it is better during the months of July through December. Additionally, meteor-scatter propagation is better in the early morning hours. Each of these two forms of propagation permits contacts upwards of 1200 to 1300 miles or more. Signals from tropospheric scatter are often weak, but signals from meteor-scatter propagation can burst through very loudly for a few seconds up to a couple of minutes.

Auroral propagation is occasionally present, mostly in the northern latitudes. Amateurs in these areas have been known to make contacts using auroral propagation in excess of 2500 miles by propagating their signals along the auroral oval (the edge of the auroral event). Often, signals via auroral propagation are weak and watery sounding.

During peaks in the sunspot cycle *F2* propagation is present. How often this propagation exists depends on how high and how long the peak in the sunspot cycle is. When it is available, this mode of propagation permits contacts 6000+ miles or more. Related to *F2* propagation is transequatorial, or TE, propagation. This form of propagation permits contacts between stations equidistant from each other across the equator. Signals via these two forms of propagation are mostly weak, but sometimes can be quite loud and intense. I once watched my "S" meter for a half hour while a station from Australia kept the needle at the 20+ dB mark during that entire time.

Bouncing signals off the moon on this band has been around for some time, and it is enjoying a resurgence following the decline of the sunspot cycle. Those weak-signal operators who are hooked on worldwide communications find that EME communications is about the only way left to make these kinds of contacts. Signals from the moon are mostly quite weak, and you need high power and big antenna arrays to regularly communicate via this mode. This is principally the form of propagation that earns the weak-signal operator the reputation for chasing after that "weak signal."

2 Meters: Originally designated an experimenter's band, this band has become the workhorse for the repeater operator. Nevertheless, the weak-signal operator makes very good use of this band to make many weak-signal contacts.

Occasionally during the peaks of sporadic-*E* activity on 6 meters this band also will enjoy such propagation. However, it is short lived and only rarely will permit contacts in excess of 1300 miles. As on 6 meters, signals can be quite intense. Occasionally, when sporadic-*E* is dying out on 6 meters, propagation via field-aligned irregularities, FAI, pops up. Signals via this mode of propagation are weak and watery.

Tropospheric propagation is a regular event on this band. As a repeater operator you occasionally may be exposed to this form of propagation when you hear stations from distances of 150 or more miles coming through your repeater. You know that these signals can be fairly loud into your repeater. They also can be consistently loud to the weak-signal operator, although often they are weak but steady.

Meteor-scatter propagation is quite popular on this band. Contacts around 1000 miles or so can be made regularly. Meteor-scatter enthusiasts know which show occurs when and plan their activities accordingly. Signals from meteor scatter are often weak, but occasional pings can last for a fraction of a second to as long as a minute or so.

Auroral propagation is present on this band, but not like on 6 meters. Contacts in the area of 500 to 800 miles are possible. The signals are weak and buzzy sounding.

While *F2* has never been reported on this band, TE propagation has been documented, although on very rare occasions. Signals are very weak, and sophisticated equipment is necessary to work this mode of propagation.

Bouncing signals off the moon is quite popular on this band. As on 6 meters, signals are quite weak.

125 cm: Following the loss of the bottom 2 MHz of this band a few years ago, weak-signal activity, which had a designated portion of that lost section, almost ceased to exist. Because of so much uncertainty, weak-signal operators lost interest and quit the band. However, as of February 1, 1993 the FCC has designated the bottom 150 kHz as experimental, thus paving the way for a resurgence of activity by the weak-signal operators.

About once every ten years or so someone reports contacts via sporadic-*E*. It is very rare, indeed. When it occurs, though, signals are weak to fairly strong, but they do not last long.

Tropospheric propagation occurs quite regularly. Signals are moderately strong. Meteor-scatter contacts are made on this band, but with more difficulty than on 2 meters. Signals are weak and the propagation lasts for fractions of a second to just a few seconds. Auroral contacts are possible, but much less often than on 2 meters. As on 2 meters the sig-

VHF PLUS CALENDAR

March 1	Moon Apogee.
March 2–3	European EME contest, first weekend. *(See text for rules.)*
March 3	Good EME propagation.
March 5	Full Moon.
March 10	Poor EME propagation.
March 12	Lowest Moon declination.
March 17	Moon perigee. Moderate EME propagation.
March 19	New Moon.
March 23–24	European EME contest, second weekend. *(See text for rules.)*
March 24	Poor EME propagation.
March 26	Highest Moon declination.

**EME propagation predictions courtesy W5LUU.*

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nals are weak and buzzy sounding. Transequatorial contacts have been documented, but only on very rare occasions. Contacts via the moon can be made anytime. However, because of the uncertainty of the future of weak-signal operations on this band, this mode of propagation has fallen into disuse.

70 cm: This is a very popular band for the weak-signal operator, principally because of tropospheric and EME contacts. Tropospheric propagation occurs regularly. Signals are moderately strong. Meteor-scatter contacts are made, but with much more difficulty than on 135 cm. Auroral contacts have been made, but rarely. Transequatorial contacts have been documented, but are very rare. EME contacts are made quite often and are still very weak, but somewhat louder than on the lower bands.

33 cm: This is another band that has a clouded future because of uncertainty. As of this writing, several services are vying for frequency allocations within this band. Because of this uncertainty only weak-signal operators and amateur television enthusiasts make regular use of it. However, even that use is not as frequent as it could be.

Tropospheric propagation occurs regularly. EME contacts have been made and are quite possible, but owing to the lack of activity are not often made.

23 cm: This band enjoys a lot of popularity with the weak-signal operator. Tropospheric contacts are made regularly when the band is open and EME contacts are made all the time.

13 cm: This band also has a clouded future. With threats of frequency auctions and commercial interests vying for a part of it, major portions of the band appear possibly lost to amateur radio communications. Nevertheless, with the threat there is a growing interest in amateurs occupying the band as a way of protecting their interests. Additionally, as commercial equipment becomes increasingly available to the amateur radio operator, this band will gain in popularity. As it is now, only weak-signal operators who build their own equipment or put together their own kits are on this band. Tropospheric operation is regular when the band is open. EME propagation is quite possible, although only a handful of operators are regularly pursuing it.

9 cm: Again because of the lack of equipment, only a few weak-signal operators use this band. Tropospheric propagation is the principle mode of communication. EME contacts can be made, but few have the equipment to do so.

5 cm: This band also suffers from lack of activity because of lack of equipment. Tropospheric propagation again is the principal mode of communication. EME contacts can be made, but only a very few have the equipment.

3 cm: Owing to the availability of surplus RADAR transmitters and detectors and Gunnplexers, this band is quite popular for short-range contacts. Occasional "over the horizon" is possible. There is an increasing interest in EME contacts. They have been made by about two dozen people.

1.2 cm and above: The 1.2 cm band is increasing in popularity with those operators who first started out on 3 cm. Again, homebrew equipment is being used for short-range contacts. It is, however, the highest band where any regular experimental communications are taking place. Propagation is affected by factors such as water vapor and oxygen.

Experimental work is being done on 47 GHz

by operators in Europe. Experimental work is also being done on 145 GHz by operators in Europe and a couple in the US (Tom Williams, WA1MBA, and Jim Mead, WB2BYW). Above this band, except for LASER, no regular or experimental work is taking place.

LASER: Occasionally LASER experimental work takes place, but not on any regular basis. It appears that the only challenge exists when someone has broken someone else's record. Then the equipment is brought out and a new record is attempted. The only regular LASER communication takes place during contests, and then principally for increasing one's score with multipliers from this operation.

The Challenge to You: As you can see, weak-signal operation is challenging at varying levels. One of the challenges is to make contacts that someone at sometime has said or is still saying are impossible. There are millions of megaHertz of spectrum available, and the weak-signal operator is the explorer of them. Techniques developed by weak-signal operators for use of the VHF+ frequencies have been used by all the above operations and much of the commercial and military applications on the VHF+ frequencies.

Want to get in on the fun of working DX on the VHF+ frequencies? Below is a report of some of the weak-signal activity that took place in late December on both 6 and 2 meters. Also following is mention of a new and inexpensive radio for the 6 meter band.

Four Days in December

It appears that when Santa Claus was making his rounds early last Christmas, his sleigh and reindeer stirred up meteor dust from a previously unknown comet, the Christmas Comet. For four days, beginning Christmas Day, 6 meters and at time 2 meters experienced phenomenal sporadic-*E* openings. Several hours of double-hop openings were reported on 6 meters, and openings lasting upwards of an hour were reported on 2 meters. While it is too early to tell about the repeatability of this phenomenon (i.e., next Christmas), it was something that was thoroughly enjoyed by the VHF+ operator this past year. Among the DX reported were CO2s, KK, OJ, and QQ; P43AS; V31PC; and numerous XEs.

The following is a list of operators who sent in reports: Ken Ramirez, KP4XS/W4, EM84; Dave Hockaday, WB4IUY; Dave Gaytko, WD4KPD; Pat Dyer, WA5IYX, EL09; Jay Kesterson, KØGU; Tim Marek, NC7K; Bill Hudson, WAØKBZ; Dale Parfitt, WA2YPY; Dave Bernhardt, N7DB; Mike Sanders, KSØF; Robert Brown, N7STU, DM07; Rich Westerberg, NØHJZ; Ron Klimas, WZ1V; Rick Kissell, WB9GYT; Pete Petri, WA5JCI; Larry Horlick, VE8HL; Andy, VE9DX; Dave Batcho, N5JHV; Jim Weber, WDØBQM; Wes Stewart, N7WS; Ed Parish, WA2SCA; Larry Lambert, NØLL; Mike Smith, VE9AA; and Steve Rutledge, N4JQQ, EM98.

Current Contests

European EME Contest: (The following is from the Internet) Sponsored by REF and DUBUS, this contest is intended to encourage worldwide activity on moonbounce. Multipliers are DXCC countries plus all W/VK/VE states. Please note that this multiplier is new this year. This change is intended to give equal chances for stations from North America, Europe, and Oceania.

The rules reward random QSOs, but do not penalize skeds on 2.3 GHz or above.

1. *Contest dates and periods:* The contest takes place during two full weekends—144 and 1296 MHz on the first weekend, and 432 MHz and all other bands on the second weekend. Each leg of the contest begins at 0000 UTC on Saturday and ends at 2400 UTC on Sunday.

2. *Bands and dates:* First leg 144 MHz and 1296 MHz, 2–3 March 1996; Second leg 432 MHz, 2300 MHz and above, 23–24 March 1996.

3. *Categories:* QRP—144 MHz, <100 kW EIRP; 432 MHz, <400 kW EIRP; 1296 MHz, <600 kW ERP; >= 2300 MHz, no separate QRP/QRO categories.

QRO—EIRP equal to or greater than stated above. PRO—non-amateur equipment or antenna. PRO stations will not be ranked.

4. *Exchange:* Callsigns, TMO or RST.

5. *Scoring:* 100 points for each random QSO completed; 10 (ten) points for each sked QSO completed on bands below 2.3 GHz; 100 points for each sked QSO completed on 2.3 GHz or higher bands.

6. *Multipliers:* Each DXCC country (except W/VE/VK), plus *each individual state* worked in W/VK or province worked in VE. Multipliers count only if worked by *random* (except on 2.3 GHz or above). States and provinces can be determined after the contest using address lists in recent newsletters or in DUBUS.

7. *Total per band:* Sum of points multiplied by sum of multipliers.

8. Final score for multiband entries: (Total sum of points on all bands) * (total sum of multipliers on all bands)

9. *Classifying:* Top score defines one winner per band and one for multiband class. Multiband stations will also be classified on each separate band worked. There are no separate multi-operator classes. Multi-operator and QRO stations will be highlighted in the general classifications.

10. *Reporting:* Copy of the log for each band with details on points, multipliers, and total points. The following information *must* also be included:

a. Output power, transmit cable loss, antenna type, and gain.

b. Working category: QRO/QRP, mono-/multi-operator.

c. Name(s) and signature(s) of all operators.

d. Locator/state.

Other information is welcome: comments, conditions, grid locator, station details, photographs, etc.

11. *Awards:* A certificate will be sent to each entry. All (multi-)band winners will receive a trophy.

12. *Logs:* Log entries *must* be postmarked no later than 30 days after the end of the second leg (i.e., in the mail by 9 May) and sent to the following address: DUBUS Verlag EME Contest, P.O. Box 500368, D-22703 Hamburg, Germany; Fax (++49)40-8508972, and E-mail dubus01@ibm.net

13. *Referee:* Responsible for rules and general questions is Ian White, G3SEK, 52 Abingdon Rd., Drayton, Abingdon, Oxon OX14 4HP, England; telephone (++44)1235-531559, E-mail g3sek@ifwtech.demon.co.uk

Good luck in the contest! For REF: Philippe Martin, F6ETI; for DUBUS: Rainer Bertelsmeier, DJ9BV.

WSWSS Planning Meeting

The following is from David Peters, KI6FF, of the Western States Weak Signal Society: "We have a meeting scheduled for 9 March at 1:00 PM at the M² facility in Fresno. There will not be any technical sessions, just organization and club business, installing new officers, etc. All interested people are welcome. For more information call WSWSS Secretary/Treasurer David Peters, KI6FF, at 714 891-0208 or E-mail at ki6ff@aol.com; or Mike Staal, K6MYC, at M² at 209-432-8873.

"For those who are interested, I have a few of the 1995 conference proceedings left. They are $15 postpaid. Please send a check made out to WSWSS to: David Peters, KI6FF, 14291 Middletown Ln., Westminster, CA 92683.

"I now have a WSWSS homepage with the address http://users.aol.com/ki6ff/index.html Check it out for the latest information on the WSWSS.—*73 de David, KI6FF.*"

North American VHF Directory New One Now Available

Tim Marek, NC7K, reports that a new *North American VHF Directory* is now available. At the time of this writing the price had not been set, but it is estimated to be around $12. It will be 64 pages long and include over 5000 listings of VHF+ operators throughout North America. Among items to be included are grid locators, phone numbers, and possibly Internet addresses. Tim says that a few copies of last year's edition are still available for $5.00 a copy. For your copy of either issue contact Tim at 360 Prestige Court, Reno, NV 89506, or call 702-972-4722.

The Magic Band Strikes Again

Shep Shepard, W7HAH, sent me the following note: "I have a question that I would like to hear some comments on. Several days ago I received a packet of QSLs from the 7th district QSL bureau. One of the cards was from a shortwave listener in the Netherlands, "NL213." On his card he states that he heard me on 6 meters on August 12, 1994 at 0808 UTC. At that time I was calling WB7QBS/KL7 (CO46) on 50.135 MHz during the *Perseids* meteor shower. My heading toward him was approximately 345°. My antenna system is an 11-element M² at 65 feet with a beamwidth of 30°. My amplifier is an 8877 running at 1500 watts output. My questions are: What would be the propagation for him to hear me? What might be the total distance in this case and why? We are at a low point in the sunspot cycle. This type of over-the-pole propagation should not be happening."

To date Shep has received some correspondence ranging from "the report is not credible because information about the QSO was gleaned from public information" to "it's plausible."

On the latter, Bob Magnani, K6QXY, wrote Shep the following: "Could this be some form of over-the-pole propagation? I've looked at the path on a globe, but it would fit better if W7HAS was bearing north. I wonder what direction the SWL station was beaming? Some of the KL7s believe that signals enter the auroral curtain and can be bent and travel around. *[Editor's note: There was an aurora going on at that time.]* This might explain the bent path, or could it be back scatter(?) over that distance?" Additionally, Paul Kiesel, K7CW, wrote Shep saying, " . . . that there is a good possibility that this phenomenon occurs if there are multiple ionized layers within the aurora, because it has to do with the propagation of waves along interfaces of layers of different densities. In other media, if signals enter the interface between these two layers at just the right angle, called the critical angle as described by Snell's law, they will be propagated along the interface."

Regarding the former, Shep writes that as far as he knows, exact times and frequencies are never printed in publications reporting VHF activities. Therefore, the time indicated on the SWL's QSL card of 0808 UTC would only be known to Shep and anyone whom he had told. Therefore, as far as Shep is concerned, he believes the report to be authentic. What is your opinion? Was it the magic and mystique of the 6 meter band once again entertaining us with wild propagation? Drop Shep a note at 561 Groff Lane, Stevensville, MT 59870, and let him know your opinion.

Sable Island Slated

Mike Smith, VE9AA, reports that he has obtained the callsign CY0AA for an operation on Sable Island. Mike says that the DXpedition is planned for seven to ten days in late June if everything comes together. They are planning to charter air transportation to the island because sea transportation is too dangerous. Mike says that the one airline that has permission to fly to Sable charges $2250 Canadian one way. He estimates that it will take four trips to haul everything in. In all, the DXpedition is expected to cost in excess of $15,000 Canadian. They are hoping to raise money for the operation, but as of this writing they have not started soliciting funds.

The operation is expected to be on all bands, from 160 through 6 meters, with the possibility of 2 meters, depending upon the added cost. While it is an all-band operation, they will concentrate on the WARC bands and 6 meters. Among the operators slated for the operation are WA8JOC, W9EOH, VE9AA, and possibly VE1FZ and VE3XPM.

Here is a chance to work a rare but easy country. If you are interested in backing this group, contact Mike at 131 Smith Road, Geary, NB, Canada E2V 2G3, phone 506-357-1900.

New MFJ 6 Meter Rig

It looks like 6 meters is suddenly becoming very affordable. After more than a year in development, MFJ has finally started producing their model 9406, a single-band 6 meter rig. The rig is portable and operates on USB and CW (with the added CW adapter). It is really designed for only the CW and SSB portion of the band, as its frequency coverage is 50.000 to 50.300 MHz. Power out is 10 watts PEP and approximately 8 watts CW. The rig includes a six-pole ladder filter (the same one used in their 20 meter portable) which has a 6 dB rejection at approximately 2.4 kHz. It also includes a speech processor.

This rig was designed and built by Rick Littlefield, K1BQT. Rick lives in New Hampshire, where he contends with big guns such as

KM1H, K1WHS, and W1JR. In spite of this handicap, he has been able to hold his own with this radio, while working into Europe during the summer openings and working down into the rest of the states during other times of the year. The selling price is $249.95. Options include the CW board for $39.95, and a microphone for $10.00.

MFJ also sells two 6 meter antenna tuners: the 906, which has a cross-needle SWR/wattmeter and a bypass switch, for $79.95; and the 903, which does not include these items, for $49.95. Both models will handle up to 100 watts on FM and 200 watts on SSB.

For ordering of any of these products, contact MFJ directly at P.O. Box 494, Mississippi State, MS 39762 (phone 800-647-1800 or FAX 601-323-6551) or contact your favorite amateur radio dealer.

Silent Keys

Frank Jones, W6AJF, became a Silent Key in November at the age of 92. Frank was most well known in the *CQ* family as the author of the book *VHF for the Radio Amateur*, which was published in 1961 as part of the old Technical Series. (*Attention Old Timer: Do you still have your copy? It is now a collector's item.)* The book contained many of his eqipment designs. In the commercial world Frank was known as the designer of the old radio telephone system for the Oakland Bay Bridge. Our thanks to Bob Townsend, K6OHE, via the "West Coast VHF-er," for this report.

Ed Bristol, W1RJA, passed away suddenly from a heart attack on 1 December. Ed was instrumental in forming the North East Weak Signal Group. He had been active on the VHF+ bands for over 30 years. He is survived by his wife, Rae, K1LXD. Our thanks to Ron Klimas, WZ1V, for this report.

Tereapi Kingan, the wife of Stuart Kingan, ZK1AA, was involved in a freak accident where she fell out the window of their home just before Christmas. She succumbed to her injuries on Christmas Day. Thanks to "The 50 MHz DX Bulletin" for this report.

And Finally

"It's still just a hobby!" This thought pops into my mind every once in a while when I think about controversies that have affected different aspects of the hobby of amateur radio. This past year the most controversial aspect of the hobby has been the rover issue. So much discussion about it was generated that a separate reflector was created on the Internet. The controversy even had its victims, with at least one of the ARRL's Contest Advisory Committee members resigning over the issue.

Late last year, however, the League announced new rules for their contests. For a short while the controversy flared again among those who thought that their particular issue hadn't been addressed. Most, though, became committed to trying out the new rules in the January VHF SS contest. It is interesting to me to note callsigns of some people who said that they never would operate rover again surfacing on reports of proposed rover operations. Additionally, others were reported planning on trying rovering for the first time.

Quietly, the controversy seems to have died out. That's for the good. Unfortunately, when friends find themselves on opposite sides of an issue, they tend to take it personally and trash the friendship. Now that this controversy seems over, bridges have to be rebuilt. Friendships need to be re-established, particularly with a resolve never to let something such as a hobby come between these friends.

Throughout the rover controversy I refrained from reporting on it because I felt that there was little positive to report on. I am hopeful that with the controversy seemingly over, more energy will be given toward positive activities in the hobby, thereby giving me much more to report in this column.

If you have something positive to report, please let me know. The most efficient way is via the Internet using one of the two addresses shown at the beginning of this column. You can also mail your report to me at the address also shown at the beginning of this column. If you have some immediate news, you can call me at my dorm room number, 214-768-5282, during the week or at my home number, 405-528-6625, in Oklahoma City on weekends. Bear in mind that if you call me at my dorm number, you might get one of the other three roommates, none of whom know much about our wonderfully crazy hobby, so be patient with them if they don't understand your language. Just tell them to have me call you back. For now, 73 and hope to work you on one of the wonderful VHF+ bands. Until next month . . .

73, Joe, N6CL

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

CQ 1995 Contest Survey—Final Results

This month I'm happy to present the results of our *CQ* 1995 Contest Survey. This survey has become a tradition of sorts, so much so that I can't remember how many we've done without looking it up.

As has always been my goal, I've tried to ask questions that are especially relevant or even a little controversial at the time. The rapid growth of E-mail communication has made this task both easy and difficult. It's easy because I can monitor what people are talking about to get a pulse on what interests you. It's also hard because you're already discussing issues that make a survey of this type somewhat obsolete.

With each survey I find myself learning something new about contesting's participants. At the very least, my suspicions are confirmed in many areas. For example, we are an incredibly adept group of computer users. The fact that 28% of us are engineers doesn't hurt. An amazing 96% of your responses indicated use of a computer in the shack. I guess that explains why over two thirds of your responses this year were sent to me via E-mail.

The average age of the respondents this time was 43.4 years old. This was disturbing to me for two reasons. First, the number keeps increasing, and second, my age (40) is getting closer to that number!

There is a lot of good reading ahead this month, so let's get on with the results.

Calendar of Events

Feb.	**23-25**	**CQ WW 160 Meter SSB Contest**
Feb.	24-25	U.B.A. CW Contest
Feb.	24-25	North Carolina QSO Party
Feb.	24-25	RSGB 7 MHz CW Contest
Feb.	24-26	YLRL YL-OM CW Contest
Feb.	25-26	Winter QRP QSO Party
Mar.	2-3	ARRL SSB DX Contest
Mar.	9-10	QCWA SSB QSO Party
Mar.	10-11	Wisconsin QSO Party
Mar.	12-13	CLARA HF Contest
Mar.	16-17	Bermuda Contest
Mar.	16-17	Russian DX Contest
Mar.	16-18	Virginia QSO Party
Mar.	23-24	Alaska QSO Party
Mar.	**30-31**	**CQ WW SSB WPX Contest**
Apr.	6-7	EA RTTY Contest
Apr.	27-28	Helvetia (HB9) Contest
May	4-5	ARI International DX Contest
May	**25-26**	**CQ WW WPX CW Contest**

Survey Results

1. What aspect of your station is most in need of technical improvements or new products?

Amateur radio operators love antennas, and contesters certainly are no exception. We are a "tinkering" group who never passes up the opportunity to experiment and try something new in the backyard. One observation about your answers to this topic was in part a question of perception and in part a real problem. Many of you indicated frustration, especially in the areas of rotators and amplifiers. For example, one respondent asked, "Can someone please build a low-cost 'SB-220' type amplifier for $1000?" or "Is it no longer possible to build reliable rotators? I spend more time fixing them than anything else in my station!" Still others questioned the hype about DSP. The amateur industry has come a long way in receiver technology (especially on a price/performance basis), but contesters are most certainly a demanding group.

Antennas—86 (37.7%)
Rotators—28 (12.3%)
Autoband switching—21 (9.2%)
Antenna switching—18 (7.9%)
Amplifiers—18 (7.9%)
Receiver/DSP—16 (7.0%)
Computer Upgrade—15 (6.6%)
Other—26 (11.4%)

2. What changes in your contest strategies (station design, operating, antennas) have resulted from the current sunspot minimum?

Expanded low-band operation is the obvious answer to this question. However, as you can see by the following summary, there have been a number of other operating/station changes that you've made in response to the current solar minimum. What's interesting is that many of these changes will serve you well when the sun wakes up in a few years. Here's the list:

•Increased focus on low bands.
•Use of second radio as single operator.
•Making sure spotty high-band openings are not missed.
•Building beverages that work!
•Maximizing low-band antennas.
•Stacks on at least 20 meters.
•Putting QRP aside for a few years.
•Maintaining an attitude that the solar minimum is not the "end of the world."
•Continuing to call CQ, even if there are less answers at times.
•Spending more time in domestic contests.
•Staying high in band on 20 meters.
•More off time in 48-hour contests.
•Downsized 10/15 meter antennas; upsized 40/20 meter systems.
•Making sure to catch odd openings.
•Paying more attention to propagation charts/ forecasts.
•Doing more searching and pouncing; emphasize the station's strengths.
•None

3. Do you currently use a computer in your contest shack?

It seems that unless you live on a deserted island with an uncharted IOTA number, you have a computer in the shack these days. Some of you who have the market data may want to compare the processor breakout of contesters to that of the general marketplace. My guess is that the numbers are relatively the same when looking at it from an installed base standpoint. I did ask the question, however, "Where are the Pentiums?" And when it comes to the Macintosh, Apple is a distant third on a list of two with contesters.

Yes—218 (95.6%)
No—10 (4.4%)

(a) If yes, please answer the following (if more than one, list the fastest, biggest):

CPU type
286—9 (4.1%)
386—27 (12.4%)
486—160 (73.4%)
Pentium—10 (4.6%)
Other—12 (5.5%)

Primary Operating System
DOS—162 (74.3%)
Windows—21 (9.6%)
WIN95—14 (6.4%)
OS/2—7 (3.2%)
Other—12 (5.5%)
Average Disk Capacity—592.5 MB

(b) If yes, for what functions other than contest logging do you use your computer (check all that apply):

I was not surprised by the number of packet users in our midst. If anything I thought the number might seem a little low. Clearly, anyone who has a computer is using it for E-mail. And I guess we're still comfortable turning our rotators the old-fashioned way?!

Packet—169 (77.5%)
VFO/Radio Interface—143 (65.6%)
Rotator Interface—11 (5.0%)
Daily Logging—149 (68.3%)
QSLing—157 (72.0%)
Antenna Modeling—97 (44.5%)
E-mail—194 (89.0%)

4. Please list your top 5 favorite contests in order of interest.

Rather than bogging you down with a priority list of everyone's fifth favorite contest, I focused on the top two. There were some predictable, albeit not absolute, trends behind the results. East coast U.S. stations love the CQ WW. DX stations are not in love with the ARRL DX Contest. West Coast stations prefer domestic contests. Some of us simply like them all! While the CQ WW contests won the vote of everyone's favorite, there was much more division when you looked at number 2 or beyond. In other words, the results did not indicate preference for the CQ WW SSB as #1 and CW as #2, for example. Rather, your responses indicated that you hang your hat on one of the WW modes as your favorite and very often prefer another contest altogether as your second choice. Interesting, indeed!

#1 Favorite Contest
CQ WW SSB—63 (27.9%)

c/o CQ magazine
Internet: p00259@psilink.com
Compuserve ID: 71301,424

CQ WW CW—57 (25.2%)
ARRL CW SS—25 (11.1%)
ARRL DX CW-18 (8.0%)
ARRL June VHF—12 (5.3%)
NCJ CW Sprint—12 (5.3%)
Other—39 (17.3%)

#2 Favorite Contest

CQ WW CW—31 (13.7%)
ARRL DX SSB—29 (12.8%)
ARRL DX CW—25 (11.0%)
ARRL CW SS—22 (9.7%)
ARRL SSB SS—18 (8.0%)
CQ WW SSB—17 (7.5%)
CQ WPX CW—16 (7.1%)
ARRL 10M—14 (6.2%)
Other—54 (23.9%)

5. Do you think that contesters show any more/less regard for their fellow "on-the air" amateurs than other operating groups (e.g., DXers, net operators, etc.)?

Okay, I know this was a poorly worded question. Most of you, however, got my point. Contesters have always had a reputation for being bulls in a china shop when it comes to concern for their on-air fellow amateurs during a contest. And while we're hardly alone in this area (listen to any DX pileup operating split), at least we're honest enough to admit our shortcomings based on your responses. In reading your input, I categorized your answers as a "yes" if they indicated that we are less "offensive" in our operating style than other groups. The opposite was classified as a "no." One thing is for sure: the debate will rage on!

Yes—88 (40.4%)
No—110 (50.4%)
Same—55 (25.2%)

6. Outside contesting, what other areas of amateur radio do you actively participate in?

Despite the feelings of some amateurs, contesters are real hams, too! Frankly, I expected a much higher number of responses saying something along the lines of "contesting—what else is there?" Much to my delight, however, contesters are extremely active in many aspects of amateur radio beyond their primary passion. If you use this survey as a measure, the level of involvement by contesters in our hobby is as broad as the hobby itself! Take a look at the following list.

•Packet (non-PacketCluster)
•DXing
•Writing
•VHF Weak Signal
•Packet System Operator
•VEC
•Elmering
•Homebrewing Equipment
•Ragchewing
•RTTY/Digital Communication
•Awards Chasing
•IARU Political Involvement
•Skywarn
•Club Activities
•ARES
•Microwave Experimenting
•ARRL Field Service
•Antenna Design
•Traffic Handling

7. How would you rank your abilities in the following categories (be honest!).

This was a fun question, because I honestly didn't know what to expect for answers. A fair comment/question from a few of you was whether the comparison was with other contesters or with the amateur population at large. I was viewing the topic in the absolute sense: Are you good or are you not? Amazingly, not a single response indicated outstanding or poor capabilities across all categories.

(a) Operating:
Outstanding—50 (22.0%)
Good—136 (59.9%)
Average—29 (12.8%)
Poor—12 (5.3%)

(b) Computers:
Outstanding—76 (33.4%)
Good—99 (43.6%)
Average—33 (14.5%)
Poor—19 (8.4%)

(c) Technical:
Outstanding—43 (18.9%)
Good—70 (30.8%)
Average—90 (39.6%)
Poor—24 (10.6%)

(d) Mechanical:
Outstanding—28 (12.3%)
Good—81 (35.7%)
Average—88 (38.8%)
Poor—30 (13.2%)

8. In a few words, describe your most memorable contest story/experience.

There were just too many good stories to completely summarize here. Because I received so much input on this question, I'm going to experiment with a new feature entitled "Memorable Contest Experiences" that will run from time to time in this column. If you weren't able to share your story via this survey, feel free to drop me a line on the subject.

The wide range of answers to this question

Engineer/Programmer	64	Service Manager	1
Teacher/Professor	12	Machinist	1
Retired	10	Architect	1
Information Systems Manager	9	Insurance Agent	1
Technician	9	Analyst	1
Consultant	9	Massage Therapist	1
Student	7	Technical Director	1
Management	7	Dentist	1
Business Owner	6	Diplomat	1
Sales/Marketing	6	Technical Analyst	1
Physician	6	Welder	1
Civil Service	5	Railroad Conductor	1
Broadcasting	4	Investment Banker	1
Military	4	Production Supervisor	1
Project Manager	4	Real Estate Appraiser	1
Police Officer/Chief	3	Real Estate Agent	1
Journalist	3	Business Development	1
Laywer	2	Actuary	1
Mechanic	2	Petroleum Landman	1
Entrepreneur	2	Boiler Plant Operator	1
Purchasing	2	Carpenter	1
Pilot	2	Writer	1
Chemist	2	Radio Systems Supervisor	1
Accountant	2	Social Worker	1
Scientist	2	Electrician	1
Firefighter	2	Printer	1
Quality Manager	1	Manufacturing Director	1
Geophysicist	1	Bus Driver	1
Investment Adviser	1	Other	13

← *Table I– Summary of respondents' professions.*

Table II– Geographic response analysis. ↓

Call Area	# Responses	HP	1
W1	21	JA	1
W2	15	KH2	2
W3	23	KL7	1
W4	28	KP2	1
W5	14	KP4	1
W6	18	LU	3
W7	18	ON	1
W8	11	PA	1
W9	9	PY	2
WØ	26	TI	1
VE	6	UT	1
DX Country	**#Responses**	VK	3
DL	5	VS6	1
EA	1	XE	2
F	1	ZS	1
G	4	8P6	1
GM	2	None indicated	3
HB9	1	Total	230

varied from very serious comments to some that could make you laugh out loud. Here are two examples:

"During the middle of a DX contest I was called by a guy on 20 meters with what seemed to be a 'bogus' callsign. After working my way through the QRM, I discover that he was a Desert Storm U.S. Serviceman using a borrowed radio. His message was not just a contest exchange, but also a request for me to call his wife and tell her that he was safe and alive. I still get Christmas cards from him! And yes, I did take credit for the YI multiplier!"—*K1KP*

"I was working the county hunters contest as a mobile and stopped under a tree on a hill to 'run' Union county. Suddenly surrounding my van were several officers with enough weaponry to win any war. It turned out that I had parked on the grounds of a maximum security State prison."—*KN4Y (I guess that brings new meaning to the term "policeman" on 20 meters!—ed.)*

9. Briefly describe something that someone you know (or yourself) has contributed in the past 12 months to positively impact the sport of contesting.

The answers to this question made me feel very good about my fellow contester. There are so many folks doing good things in the contest community. Few ever receive or even desire publicity. Here are some of the highlights from your responses.

•K1EA and others' continued improvements to computerized contest logging.

•N6TR's introduction of the kid's SquINT contest to encourage contest interest and participation.

•WN4KKN's continued support for creating and maintaining the Internet Contest Reflector (and other similar efforts like his).

•The willingness of so many to offer their stations as a training ground for new contesters.

•K3EST's *CQ WW Handbook*.

•N6AA/N6TR log-checking software used by the CQWW Contest Committee.

•The continued service of so many volunteers in the administration of contests such as the CQ, NAQP, Sprints, etc.

•The efforts in organizing the upcoming WRTC '96 events.

10. What do you consider the main reason(s) why larger numbers of new contesters are not entering into our ranks?

The answers to this question were not unlike the answers one gets when asking about long-term amateur radio growth in general. Here's a sample of your responses, and they summarize how you feel about this critical area.

•Cost of entry into contesting is becoming increasingly prohibitive.

•Low solar activity.

•Antenna restrictions.

•Poor reputation of contesting in some amateur circles.

•Lack of widespread "marketing" of contesting to new amateurs.

•Growing social phenomenon that "winning is everything"; if I can't win, I don't want to play.

•There seems to be more emphasis on just the results and not the camaraderie that one can enjoy within contesting.

•There are not enough "Elmer" contesters.

•Results take too long to be published; new contesters may lose interest by the time a report on their efforts is available.

•Success requires time—a premium in our society these days.

•Perception that contesting is nothing more than a battle between a few big guns.

Final Comments

As I begin the process of reporting the results of a given year's survey, I'm always impressed with the effort so many of you put into them. This year was no exception, and I thank you for your time and interest.

Please remember to provide any submissions for the June column to me by April 1. More and more of you are catching on, but as you can imagine, you can really help our workload (and accuracy!) by submitting your contest announcements to me on disk (using practically any data format) or via electronic mail.

73, John, K1AR

Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., Mar. 10–11

This popular party is a shorty, only 7 hours, and it is again sponsored by the West Allis Radio Amateur Club. The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

Classes: Single operator and multi-operator multi-transmitter, both fixed and mobile. Also Novice/Tech, single and multi-operator.

Exchange: RS(T) and QTH. County for Wisconsin; state or province for others.

Scoring: Phone QSOs count 1 point, 2 points for CW. Wisconsin stations multiply total QSO points by (U.S. states + VE provinces + Wisconsin counties) worked for their final score. DX contacts count for QSO points only. Others use total Wisconsin QSO points by the number of Wisconsin counties worked (maximum of 72).

Wisconsin mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 15 QSOs from each county).

Frequencies: CW—3550, 3705, 7050, 7125, 14025, 21150. SSB—3890, 7230, 14290, 28400.

Awards: Awards will be sent to the highest scoring single operator in each class in each state and province. *Wisconsin:* The top 10 single operator scorers in each class will receive awards, as will the highest multi-operator in each class and highest aggregate club score. A plaque will be awarded to the highest scoring single operator in the party. Logs with more than 100 QSOs must include a separate dupe sheet for each mode with their entry.

Complete rules and entry forms are available from the address below. Be sure to include an SASE with your request. Deadline for logs is March 31st. Send logs to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201.

CLARA & Family HF Contest

1700Z Tues. to 1700 Wed., Mar. 12–13

This is the 29th anniversary of the CLARA Contest. It is open to YLs and OMs around the world on phone and CW on all HF bands. Each station may be contacted twice per band mode.

Classes: Single operator, all bands.

Exchange: Name, RS(T), QTH (Canadian province/DXCC county), and CLARA membership status (Yes/No).

Scoring: CLARA-CLARA QSOs are worth 5 points; CLARA-YL QSOs are worth 3 points; CLARA-associate OM QSOs are worth 2 points; CLARA-OM QSOs are worth 1 point.

Multiplier: Canadian provinces and DXCC countries.

Final Score: Multiply total QSO points times multiplier.

Awards: A variety of trophies and certificates will be awarded to high-scoring CLARA members, non-members, and OMs.

Send your entries no later than April 15th to: Renee Devenny, VA3EZ, Box 149, Osgoode, Ontario, K0A 2W0, Canada.

Bermuda Contest

0001Z Sat. to 2400Z Sun., Mar. 16–17

This is the 38th year for this popular contest. It is open to all licensed amateurs. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands on SSB and CW. Cross-band or cross-mode contacts are not permitted.

You are limited to 24 hours out of the 48-hour contest period. Off times of no less than two consecutive hours must be clearly indicated on the log. Participation is for single operator stations only. Previous winners are no longer restricted from official entries in the contest.

Exchange: RS(T) only.

Scoring: Five points for each QSO. A station may be worked on SSB and CW, but you may not take credit for an additional multiplier. Final score is the sum of QSO points times the number of countries on each band multiplied by the number of different VP9 stations worked on each band. (Note: It's each VP9 station, not each parish).

Awards: Certificates will be awarded to the top-scoring station in each country (minimum of 100 QSOs and 3 VP9s). The overall world-wide winner will receive a trophy. *Note: The free trip to Bermuda for the top-scoring entrant will be provided this year by the Bermuda Department of Tourism. Also, accommodations will be provided by the Palmetto Bay Hotel.*

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be *received* no later than June 1st by the Radio Society of Bermuda, Box HM275, Hamilton HM AX, Bermuda. Enclose 4 IRCs for acknowledgment.

Virginia QSO Party

1800Z Sat. to 0500Z Sun., Mar. 16–17
1100Z Sun. to 0200Z Mon., Mar. 17–18

This is the 21st year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO multiplier credit. Also VA mobiles in each county change.

Exchange: QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

Scoring: Credit one point for each SSB contact; two points for CW; three points for working a VA mobile. VA stations multiply total QSO points by sum of US states, VE provinces, DX countries, and VA countries. Others multiply total VA QSO points by the number of VA counties worked (maximum of 95). Mobiles add to this the bonus points for Virginia counties in which QSOs were logged.

Frequencies: CW—1805 kHz and 50 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—1845, 3860, 7260, 14260, 21360, and 28360. Novice bands (10 kHz up from bottom of Novice sub-band and 28360).

Awards: Certificates to top scorers in each state, province, DX country, and VA county. Plaques: CW only, QRP only, club, VHF only, VA mobile, Novice/Tech, and top out-of-state station. Special certificates will be issued to stations working all 95 VA counties.

Logs: Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 15th to: Virginia QSO Party, Call Box 599, Sterling, VA 20167.

CQ World-Wide WPX Contest

SSB: Mar. 30–31 CW: May 25–26
0000Z Sat. to 2400Z Sun.

Complete rules were published in the January issue. The following are a few points to keep in mind. You may operate 36 hours out of the 48-hour contest period as a single operator station. Off-times must be a minimum of 60 minutes in length. Multi-op stations can operate the full 48 hours.

The definition of the prefix multiplier is spelled out in detail, but consider a prefix to be the letter/number combination which forms the first part of a call. The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the multi-operator, single transmitter category only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same time period is prohibited.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log. Note that contest logs may be submitted on disk (MS-DOS compatible) in standard ASCII or .bin, .res, .dbf, or .wks formats. To reduce the administrative burden, please label your computer entries with a unique name (e.g., N8BJQ.BIN).

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. **Be sure to indicate SSB or CW on the envelope.**

All logs go to: *CQ* Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Drive, Beavercreek, OH 45431 USA.

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

1995 In Review and A Look Ahead

While March may seem a strange time to reflect on the previous year, this column actually is being written on January 1, 1996, a day perfectly suited to such reflection. I hope you, the reader, will tolerate the long lead times of magazine publishing, and transplant yourself back to the first day of 1996.

The year 1995 was a very active one in DX. It saw a large number of major and minor DXpeditions, two countries added to the DXCC countries list, and a major controversy in the DXCC program resolved.

Despite declining sunspots, active DXers could catch more than half of the Top 50 Most Wanted countries in 1995. Seventeen of the Top 50 Most Wanted were on the air in a major fashion during the year (but one, 5A1A, does not yet count for DXCC). Twelve other Top 50 countries were on the air, available for a few dedicated and skillful DXers. Six of the Top Ten Most Wanted were on the air in 1995, but only two in such a way that an average DXer could gain DXCC credit: Bhutan and Burma. Andamans (VU2JPS), Macquarie Island (VKØWH), and Mount Athos (SV2ASP/A) now have resident amateurs, but remain extremely difficult to contact.

The year started with a major DXpedition to the South Georgia Islands, **VP8SGP**. The operation was successful enough to push South Georgia way out of the Top 20 Most Wanted, all the way down to 62nd position on the 1995 *The DX Magazine* annual survey.

The highlight of February was the 8000-contact operation of **A51/JH1AJT** from the number one Most Wanted country, Bhutan. JH1AJT did an end run around the licensing logjam at the Ministry of Communications (MOC) and obtained operating permission from another government agency. While some jealous so-called amateurs claimed that this operation would never count for DXCC, such credit came through immediately. With the regular MOC licensing stalled, perhaps other enterprising DXers can find similar loopholes in the Bhutan government and give DXers another significant shot at working the Most Wanted country.

A Top 30 country was on the air in February, when three German operators put Congo TN on the air as **TN2M** and **TN4U**. This difficult DXpedition dropped Congo from 27th to 48th Most Wanted. In March yet another Top 30 country came on the air in a big way. **3D2CT** and **3D2CU** made more than 30,000 contacts, despite losing a large part of their equipment and personal possessions when their landing boats capsized not once but twice during the difficult landing on the Reef. This operation pushed Conway out of the 25th Most Wanted position all the way down to 69th, the greatest drop in the 1995 survey.

At the same time, at the end of March, a group of Japanese and Malaysian DXers operated from the disputed Spratly Islands as **9MØA**. An attempt by some Philippines DXers to operate from one of Spratly islands had to be cancelled due to the presence of armed ships in the area. However, 9MØA was readily workable by most DXers. Look for the Spratlys to drop out of the Top 30 in 1996.

This is the QTH of SØRASD in Western Sahara. (KD7SO photo)

In April **BS7H** came on from Scarborough Reef. The first such operation did not count for DXCC credit, as it wasn't "land based." Adjacent to one of Scarborough Reef's numerous small islands the operators had erected a scaffold which did not meet DXCC accreditation criteria. This second operation was on the actual rock surface and was immediately approved as land based.

What is still unknown as I write this is for *which* DXCC country the BS7H operation will count! The ARRL DX Advisory Committee (DXAC) voted nine to seven *against* adding Scarborough Reef as a separate DXCC country, with most negative votes based on individual opinions rather than the DXCC country criteria rules. Then the ARRL Awards Committee voted unanimously in favor of making Scarborough a separate DXCC country. When the two Committees were unable to come to an agreement, the matter was turned over to the ARRL Board of Directors to resolve the issue. The Membership Services Committee of the Board voted five to two in favor of separate country status, and the full Board was slated to consider the question at its regular January meeting. The bet is Scarborough Reef will be a new DXCC country by the time you read this.

Jack, W4LCL, is active from central Java as YB2ARW.

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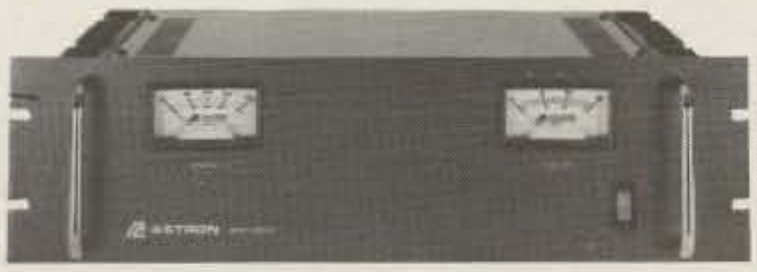
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES



MODEL RM-35M

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MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

VS-M AND VRM-M SERIES

MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 61 ON READER SERVICE CARD

The WPX Program

SSB

2522	LU3HBO	2553	EA7HDQ
2550	WN7J	2554	EA7ABW
2551	EA1MK	2555	EA7DUD
2552	EA1FFC	2556	EA6AU

CW

2878	JH8MWW	2897	WN7J
2896	DL3NEO		

Mixed

1706	WN7J	1722	EA1FFC

Mixed: 450 F-11556, WN7J, EA1FFC. 500 F-11556, WN7J, EA1FFC. 550 WN7J. 600 WN7J. 650 WN7J. 700 WN7J. 750 WN7J. 800 WN7J, VE6FR. 1000 JH1LPZ. 2250 W8UMR. 2300 W8UMR.

SSB: 350 LU3HBD, WN7J, EA1MK, EA1FFC, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 400 KM1I, LU3HBO, WN7J, EA1MK, EA1FFC, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 450 KM1I, LU3HBO, WN7J, JH6MIC, EA1MK, EA1FFC, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 500 KM1I, LU3HBO, WN7J, EA1MK, EA1FFC, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 550 KM1I, LU3HBO, WN7J, EA1MK, EA1FFC, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 600 KM1I, LU3HBO, WN7J, EA1MK, EA7HDQ, EA7ABW, EA7DUD, EA6AU. 650 KM1I, LU3HBO, WN7J, EA7HDQ, EA7ABW, EA7DUD. 700 KM1I, LU3HBO, WN7J, EA7HDQ, EA7ABW, EA7DUD. 750 LU3HBO, IK6JYY, AE4MJ, EA7HDQ, EA7ABW, EA7DUD. 800 LU3HBO, IK6JYY, DJ8WQ, AE4MJ, EA7HDQ, EA7ABW, EA7DUD. 850 LU3HBO, EA7ABW, EA7DUD. 900 EA7ABW, EA7DUD, EA7ABW, EA7DUD. 1000 EA7ABW, EA7DUD. 1050 EA7ABW, Ea7DUD. 1100 EA7ABW, EA7DUD. 1150 EA7ABW, EA7DUD. 1200 EA7ABW, EA7DUD. 1250 EA7ABW. 1300 EA7ABW. 1350 IK2AEQ, EA7ABW. 1400 EA7ABW. 1450 EA7ABW. 1500 EA7ABW. 1550 EA7ABW. 1600 EA7ABW. 1650 EA7ABW. 1700 EA7ABW. 1750 EA7ABW.

CW: 350 JH8MWW, WN7J. 400 JH8MWW. 550 K3WWP. 600 K3WWP. 1250 JN3SAC. 1300 JN3SAC. 1700 I7PXV. 1900 KS3F. 2050 G3VQO. 2100 W8UMR, G3VQO. 2150 W8UMR.

10 Meters: WN7J, EA7ABW, EA7DUD
15 Meters: WN7J, WA1FFC, EA7HDQ, EA7ABW, EA7DUD
20 Meters: WN7J, EA7HDQ, EA7ABW, EA7DUD
40 Meters: EA7ABW
80 Meters: EA7ABW
160 Meters: I1-21171

Asia: JA1-9894, WN7J, EA7ABW, EA7DUD
Africa: JA1-9894, EA7HDQ, EA7ABW, EA7DUD
No. Amer.: WN7J, EA7ABW, EA7DUD
So. Amer.: AE4MJ, WN7J, EA7ABW
Europe: DL3NEO, WN7J, EA1FFC, EA7HDQ, EA7ABW, EA7DUD
Oceania: JA1-9894, WN7J, EA7ABW, EA7DUD

Award of Excellence With 160 meter endorsement: W3AP
Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, I5ZJK, JAØSU, S51NU, K9XR, WØULU, HB9DDZ, F6HMJ, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, IN3NJB, WT3W, IN3NJB, S50A, UT5-186-2.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, KØJN, ZS6EZ, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, K9LJN, WT3W, IN3NJB, S50A, UT5-186-2.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

In May Kermadec, #11 on the Most Wanted list, was put on the air by Barry Fletcher, ZS1FJ, as **G4FMW/ZL8**. Barry managed to make about 6000 contacts on SSB in spite of having to return to his boat every night, a three-hour hike across the island! A major DXpedition is aiming at Kermadec in May of this year (more details in a future column).

The highlight of the month of May was the airing of what eventually would be the only two new DXCC countries to be added to the list in 1995. First, Martti Laine, OH2BH, and others

Necdet Caglar, TA2AP, is a CQ magazine reader in Eskisehir, Turkey.

The WAZ Program

Single Band WAZ

10 Meter SSB

485 ..... JA1XI

20 Meter CW

464 ..... JR1HFI

40 Meter CW

187 ..... JR1HFI

160 Meters

50 ..... OK1DOT – 38 Zone endorsement
82 ..... KX4R – 31 Zones

All CW

83 ..... LA9PHA 84 ..... KA1GJ

All Band WAZ SSB

4308	DL1SP	4311	KF9PL
4309	N4XR	4312	TU5EV
4310	CT1CFH	4313	IK4JPR

CW/Phone

7631	W3PLI (CW)	7634	N7MCA
7632	AC4CS	7635	WF2Y
7633	G3LUW		

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

staged a very limited demonstration of amateur radio for officials in North Korea. While **P5/OH1MA** worked only 16 different stations, the operation was accepted for DXCC credit. Since North Korea had been pre-approved for DXCC, awaiting only an accredited operation, the DXCC countries list gained a New One with this operation. A planned major DXpedition to North Korea is set for sometime in 1996.

The other new DXCC country added to the list last year was Pratas Island BV9. Early in 1995 the DXAC voted eight to seven *against* adding Pratas to the list, based on concerns over possible rocks between Pratas and Taiwan and doubts as to Taiwan's sovereignty. Based on some new charts that clearly showed the absence of intervening rocks, the ARRL Board of Directors asked the DXAC to reconsider the question of separate country status for Pratas before the usual two-year waiting period for such re-votes. The DXAC then voted twelve to four in **favor** of making Pratas a new DXCC country, and the Awards Committee unanimously agreed (see below for more details). **BV9P** put Pratas contacts in the logs of most serious DXers.

May also saw a major DXpedition to tiny Market Reef between Finland and Sweden under the callsign of **OJØ/OH8AA**.

In July some US amateurs operated from St. Paul Island signing **/CY9**. July also saw one of the two major DX disappointments of the year. Some Ukrainians managed to get permission

At the New Orleans International DX Convention, Rick Roderick, K5UR, pokes fun at potentia l new DXCC country Scarborough Reef.

5 Band WAZ

As of November 30, 1995, 427 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KA5W, 199 (26)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
RA3AUU, 199 (1)
UY5XE, 199 (27)
NN7X, 199 (34)
DL3ZA, 199 (31)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
I1ZXT, 198 (1, 1 on 40)
GM3YOR, 198 (12, 31)
OE6MKG, 198 (12, 31)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
YO3APJ, 198 (29, 35)

The following have qualified for the basic 5 Band WAZ Award:

VE5KX/WØ, 151 Zones
KN4RI, 155 Zones
DL3ZA, 199 Zones
LU9DBK, 160 Zones
AL7EL, 161 Zones

Endorsements:

DJ8WD, 181 Zones
K6FG, 184 Zones
G3LQP, 194 Zones
KE2PF, 160 Zones

987 Stations have attained the 150 Zone level as of November 30, 1995.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

to operate from Libya as **5A1A**. However, their documentation lacked some vital elements and the operation was *not* accepted for DXCC credit. (At press time the Ukrainians continued to express confidence that the missing paperwork could be obtained.)

In August DXers enjoyed a unique operation from Easter Island. **XRØY** showed what DXing in the next century may be like, with Internet access, daily availability of the logs, and immediate QSLing to many stations. As may be expected for such a dramatic leap in technology, there were a few bugs in the process, but the overall reaction of DXers everywhere was very favorable. Look for more DXpeditions to use these techniques in the future.

DXers enjoyed another surprise in September when Burma XZ came on the air as **XZ1X**. Actually, this was the second Burma operation of 1995, as it was preceded by a SSTV demonstration as **XY1HT** the previous month. The XZ1X demonstration was followed by two simultaneous, major DXpeditions to the former number one Most Wanted country in October as **XZ1A** and another **XY1HT** operation. DXCC desk administrator Bill Kennamer, K5FUV, was a member of the XZ1A DXpedition team and accepted the documentation on the spot! Look

for Burma to fall far down the Most Wanted survey in 1996 and expect more legitimate Burma operations in the future.

Kennamer went to Burma following his attendance at the first Beijing International DX Convention. This historic occasion showed how far China has come in amateur radio since it was the number one Most Wanted country in the 1970s. Representatives from North and South Korea were among the participants.

November was marked by the second major disappointment of the year. After more than a year of planning, the Heard Island DXpedition had to be postponed at least a year. When the operators arrived in Australia, they discovered that the chartered boat had seriously been misrepresented and would not be able to make the run to Heard safely. Rather than risk lives, they elected to cancel their operation with an eye toward another try near the end of 1996.

Wrapping up the year, the Argentine CW Group sponsored two DXers on a major operation from the South Orkney Islands. **LU6Z** made more than 10,000 contacts in the first two weeks of their three-month DXpedition. Band conditions were not good enough to permit many high-band contacts, but the operators cleaned up on 40 meters.

Some other noteworthy DXpeditions in 1995 include **R1MVI** from M-V Island, **CYØTP** from Sable Island, several Christmas and Cocos-Keeling operations, Knights of Malta in Rome, **3V8BB** from Tunisia, and many others.

In the no-credit category Gaza and Seborga top the list. The DXAC voted against adding Gaza to the DXCC list, saying it lacked sufficient sovereignty. Look for this issue to come up again as the Palestines assume more control over their affairs. And despite numerous operations under many different callsigns, the Principality of Seborga remains a curiosity but not a DXCC country. No application for separate country status for the Italian town has ever been submitted for review.

All in all, 1995 was a very good year for DXers and DXing. Two new countries (and maybe another soon), some dramatic changes in amateur radio activity in some previously very rare countries, resident amateurs in some of the Most Wanted countries, and a technological leap forward in DXpeditions add up to a banner year, even at the sunspot minimum. We hope that 1996 will be at least as good.

Speaking of 1996, this is a good time to plan to attend one of the many DX gatherings this year. The first major gathering is the 1996 International DX Convention April 19–21 at the Holiday Inn in Visalia, California. Pre-registration is $50 (by March 30) to Don Bostrom, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423. Don't miss the Friday evening cocktail party sponsored by DX Publications.

The biggest gathering of the year is, of course, the Dayton Hamvention, pushed back to May 17–19 this year in hopes of warmer weather. Among the major DX events at the Hamvention are the DX Dinner Friday night, the DX Forum at the arena on Saturday, and the many DX hospitality suites at Stouffers, including the Top DX Suite in the Judith Resnick room on the top floor. Stop by and say hello!

The 1996 New Orleans International DX Convention is August 30–31 at the Royal Sonesta Hotel on Bourbon Street in the historic French Quarter of New Orleans. Additional information is available from Wondy, K5KR, at 504-837-1485. This is an excellent, high-class gathering in a wife-approved location. Plan to attend this year.

Other DX gatherings include the W9DXCC convention in the Chicago area in early September, the Northwest DX Convention in July, the West Texas DX Bash, the New England DX Dinner, and several others. These are great opportunities to get QSL cards checked for award credit, learn new DX techniques, play with new radios, and swap DX stories with your fellow DXers. Include at least one such event in your 1996 planning.

DX News

Pratas Added to DXCC List. The ARRL DX Advisory Committee voted 12 to 4 to add Pratas Island, BV9P, to the DXCC Countries list for contacts made January 1, 1994 or later. The Awards Committee voted unanimously to accept this recommendation, putting Pratas on the current DXCC Countries List. The decision was made on the basis of DXCC Country Criteria Point 2(a), separation by water. QSL cards for Pratas will be accepted by the DXCC desk starting April 1, 1996. Cards received before that date will be returned without action.

Because of QSLing irregularities, the picture QSL cards from the January and March 1994 operations will *not* be accepted for DXCC credit. DXers with such cards should obtain a replacement card from manager KU9C.

YV5B Beacon. The Northern California DX Foundation and the International Amateur Ra-

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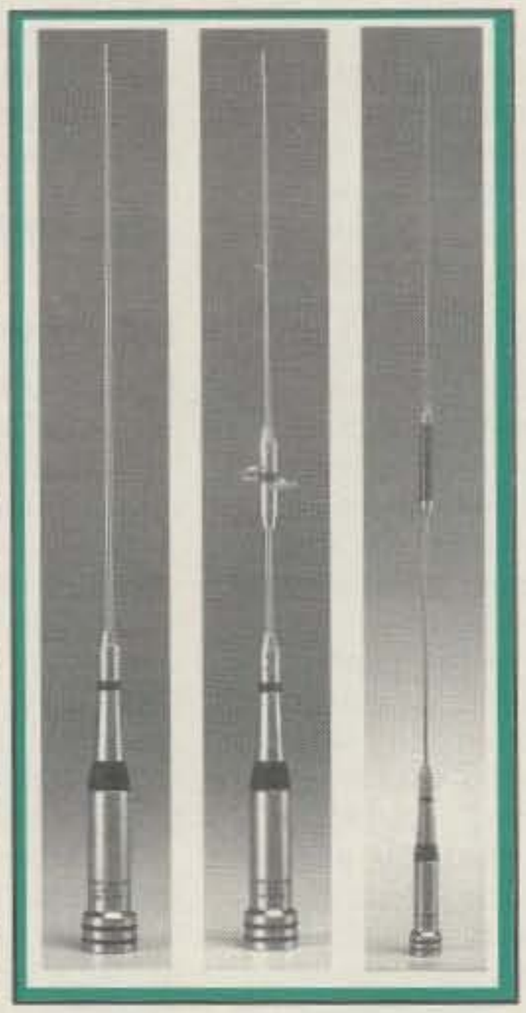

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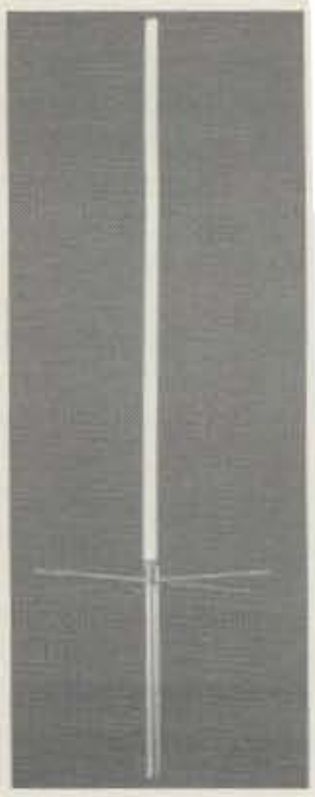
HP2000C: VHF 3/4 wave, 4dBd - 6.15 dBi., 143 - 149MHz, GOLD/TEFLON UHF conn., 60 inch. long

HP2070H: VHF 1/2 wave/UHF 3/5 wave, 0 dBd VHF/ 3.8 dBd UHF, GOLD/TEFLON UHF conn,. 18.5 inch. long

HP2070: VHF 1/4 wave/UHF 3/4 wave o dBd VHF/ 3.8 dBd UHF, GOLD/TEFLON UHF conn., 18.5 inch. long

NEVADA 1500



This is a new and improved version of our SM1300. The new 1500 offers super high quality, attractive all white fiberglass and stainless steel construction that withstands the very worst of weather, even salt spray along the coast. Custom engineered 500kHz to 1500MHz super wide band reception, low VSWR dual band 2m/70cm gain type transmitting antenna rated at 35 watts, all rolled into one! The perfect low cost, heavy duty alternative to flimsy wide band scanner antennas, built to provide peak performance year after year.

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Connector: Low Loss "N" Type
Mounting: Mast Mounting

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747SRX

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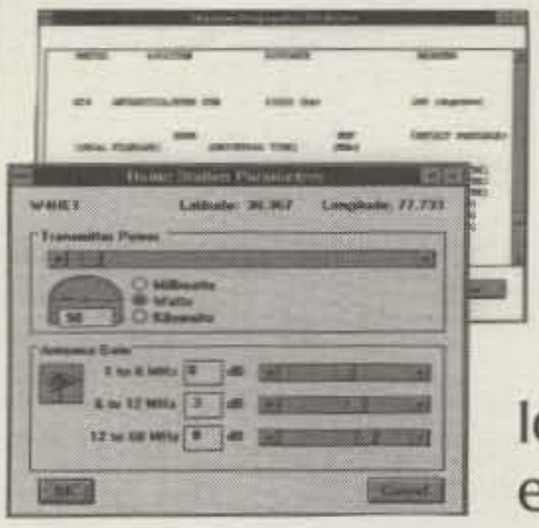
CQ March 1996

Skywave Propagation Prediction Software for Windows 3.1/Windows 95

SKYCOM 2.0



Pick a location from SKYCOM 2.0's database of over 400 call sign prefixes. Tell SKYCOM 2.0 where you are, your transmitter power, your antenna gain. Input the current solar flux or sunspot number. SKYCOM 2.0 instantly predicts and evaluates the MUFs expected for each hour of the day, calculates total path loss, and tells you the proper beam headings. SKYCOM is simple enough for the newest novice yet sophisticated enough to enable advanced users to fine tune parameters.

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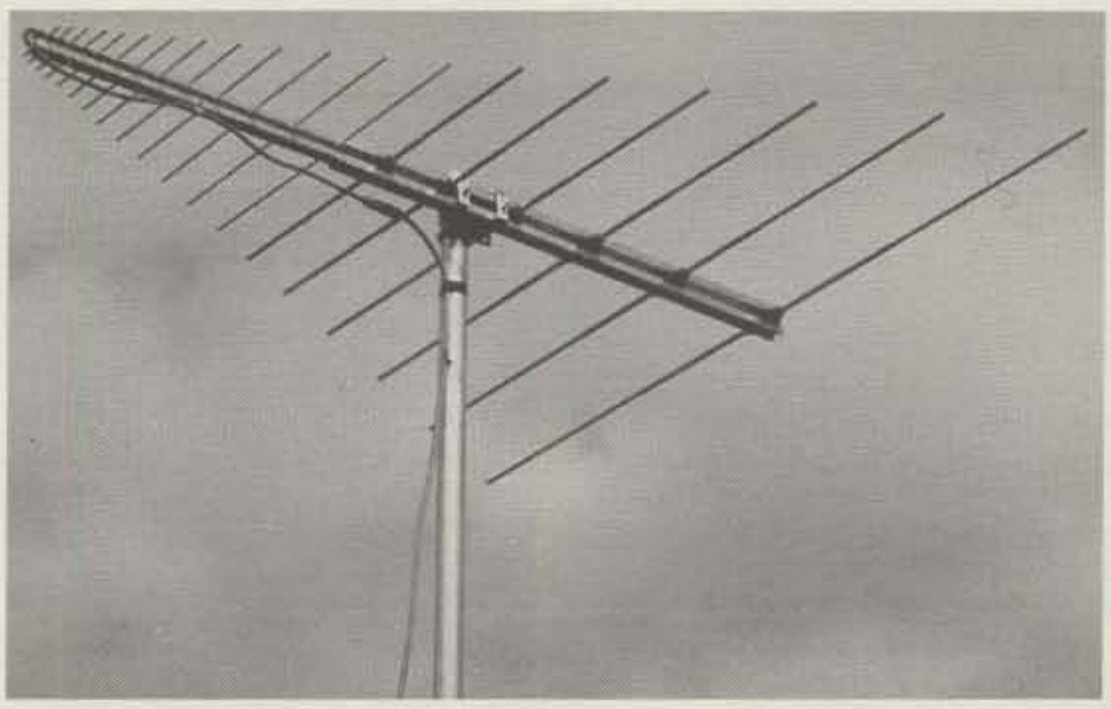

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CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 326 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC 326	9A2AA 326	N5FW 326	WØJLC 324	ON4QX 321	W3BBL 315	K4CXY 309	W6YQ 301	KE5PO 286
K1MEM 326	N4KG 326	N6AR 325	N7RO 324	K9QVB 321	N4AH 315	VE7DX 309	KA2DIV 300	KH6CF 284
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N4MM 326	WØIZ 326	WA4IUM 325	W7ULC 323	HA5DA 321	K2JF 314	VE9RJ 309	YU2TW 299	KF5PE 282
K2FL 326	PAØXPQ 326	KZ4V 325	WØSR 323	DJ2PJ 320	AA2X 314	I1EEW 307	YV5ANT 299	G4MVA 281
DL1PM 326	W2FXA 326	KB8DB 325	WA4JTI 323	IT9ZGY 320	4N7ZZ 314	N1HN 307	WA8YTM 298	K7EHI 280
K3UA 326	SM6CST 326	WA8DXA 325	W4OEL 323	K1HDO 320	W5OG 313	N3DQN 306	CT1YH 298	HB9AFI 278
K9BWQ 326	N4JF 326	EA2IA 325	KUØS 323	KB4HU 320	N5FG 313	WB4DBB 306	HB9DDZ 297	W4UW 277
K9MM 326	W2UE 326	I1JQJ 325	AG9S 322	K4XO 319	KA7T 313	I4LCK 305	N4OT 296	KB8O 277
K2ENT 326	W9WAQ 326	F3TH 324	W7CNL 322	VE3HO 319	K2JLA 312	N5HB 304	W7IIT 296	WF9K 276
K2OWE 326	AA4KT 326	K8LJG 324	K4IQJ 322	WB5MTV 318	K9DDO 312	OZ5UR 304	KØHQW 294	W3HQU 276
K4CEB 326	K9IW 326	IT9QDS 324	NC9T 322	N6AV 318	WB4UBD 311	G2FFO 303	KB3X 289	WG7A 276
I4EAT 326	YU1HA 326	W6DN 324	DL3DXX 322	AA6AA 318	K1VHS 311	K7JYE 302	LA7JO 289	YU7FW 275
K6JG 326	I5XIM 326	G4BWP 324	DJ2PJ 322	N6CW 316	G3KMQ 311	WA4DAN 301	YU1AB 288	
K6LEB 326	DL8PM 326	WØHZ 324	W1WAI 321	KA5TQF 316	OH3NM 310	HA5NK 301	NI4H 288	
KD8V 326	IT9TQH 326	N7MC 324	AA5NK 321	VE7CNE 316	WB6OKK 310	WG5G/QRPp 301	DJ1YH 288	

SSB

K4MZU 326	KSØZ 326	W2CC 326	KC8EU 324	TI2JJP 322	W6MFC 318	ZS6BBY 311	RA2YA 301	CT1YH 285
K2TQC 326	W6EUF 326	K2JLA 326	N4KEL/M 324	WB4DBB 322	N5ORT 318	WA9IVU 311	W2LZX 301	EA1AYN 285
K2FL 326	OE3WWB 326	VE2WY 326	IK8BQE 324	W5XQ 321	XE1ZLW 318	K3NEE 311	XE2DU 301	EA3BT 285
W9DWQ 326	W2FXA 326	WB4UBD 326	W3GG 324	KA5TQF 321	EA8TE 318	IN3ANE 311	VE6PW 301	N8BJQ 284
W9SS 326	SM6CST 326	IT9TGO 326	AA5NK 324	WA3HUP 321	K1UO 318	F1OZF 311	AB4NS 301	KJ5LJ 284
WA4IUM 326	K6YRA 326	AA4KT 326	K2JF 324	TI2HP 321	KF5AR 318	EI6FR 311	WP4AFA 300	LU3HBO 284
DJ9ZB 326	N4KG 326	PT2TF 326	WB5TED 324	I8XTX 321	I8IYW 318	KD5ZD 310	WA5SUE 300	VE3IMO 283
WB1DQC 326	K3UA 326	WB3DNA 326	WZ4I 324	I8YRK 321	NI5D 318	KA5RNH 310	YU2TW 300	XE1ILI 283
XE1AE 326	OK1MP 326	KE4VU 326	W2FGY 324	K4PQV 321	KU9I 318	I2MQP 310	WT4T 300	EA3CWK 283
EA2IA 326	W6DN 326	KM2P 326	WØSR 324	KS2I 321	WB6PSY 317	N5HSF 310	W7KSK 300	KE6CF 283
K2ENT 326	I2QMU 326	ZL1HY 326	YV1CLM 324	OA4OS 321	WB3CQN 317	HA6NF 310	VE3FJE 300	YC3OSE 282
OZ5EV 326	PAØXPQ 326	N5FW 326	YV5CWO 324	W7ULC 321	9H4G 317	WA2FKF 310	AB4UF 300	YV1JV 282
KA3HXO 326	N4JF 326	I1EEW 326	W5LLU 324	W3AZD 321	WA6DTG 317	W3SOH 309	WB4UHN 300	VE4MT 282
CX4HS 326	KB4HU 326	K9HDZ 326	I8KCI 324	WØULU 321	PY2DBU 317	CT1EEB 309	KB8NTY 300	VE7HAM 281
F9RM 326	KC4MJ 326	W9OKL 326	I1POR 324	KB8O 321	XE1XM 316	EA5RJ 309	I2ZGC 299	WAØQII 281
I4EAT 326	OE2EGL 326	W6BCQ 326	VE4AT 324	LU1JDL 320	W8AXI 316	XE1MD 308	NW5K 299	VU2DVP 281
KB8DB 326	SV1ADG 326	LA7JO 326	DU9RG 324	VE7WJ 320	W6SHY 316	I4CSP 308	WB6GFJ 299	LU6FAZ 281
VE3XN 326	CX2CB 326	VE7DX 326	KD5ZM 324	KF8VW 320	KV2S 315	CT1AHU 308	VE3CKP 299	KB5MRT 281
YU1AB 326	K5OVC 326	YV1CLM 326	KØHQW 324	IØAMU 320	WA9RCQ 315	N6RJY 308	EA3CB 299	WN6J 281
VE1YX 326	W4UNP 326	AA6BB 325	W7FP 324	K4CXY 320	IØSGF 315	K4JDJ 308	DK5WQ 299	N9KAE 281
N4MM 326	TI2CC 326	K5TVC 325	KA5TTC 324	G4ADD 320	N3ARK 315	AB4IQ 307	EA5GKE 298	NXØI 280
N7RO 326	WA4ECA 326	I8ACB 325	K8YVI 323	I4WZK 320	KA4RAW 315	N6AV 306	KJ9N 298	YU1TR 280
YS1GMV 326	IØZV 326	N6AR 325	NC9T 323	I4SAT 320	KE3A 315	WD5P 306	CT1BWW 296	KK4TR 280
K9MM 326	I4LCK 326	WD8MGQ 325	KB7VD 323	I8LEL 320	K2AJY 315	TI2TEB 306	VE3XO 294	WN5K 279
4Z4DX 326	K7EHI 326	K8LJG 325	KE5PO 323	K4JLD 320	KX5V 315	VE3DLR 306	KB5WQ 294	KAØZFX 279
ZL1AGO 326	IKØIOL 326	K8NA 325	K9HQM 323	WE2L 320	K7TCL 315	W3YEY 306	IT9VDQ 293	KQ4WD 279
KF7SH 326	K2JLA 326	IK8CNT 325	KC5P 323	EA3EQT 320	IK7DBB 314	KF8UN 306	AA2FN 293	HA5NK 279
ZS6LW 326	IT9TGO 326	AI8M 325	WDØGML 323	VE2GHZ 320	AB7AU 314	WA8YTM 306	KG6LF 293	WØIKD 279
VK4LC 326	ZL1HY 326	W4UW 325	WW1N 323	WS9V 319	NØAMI 314	XE1MDX 305	TI2LTA 292	N5QDE 279
YV5AIP 326	XE1L 326	WB6OKK 325	K4SBH 323	ON5KL 319	OE6CLD 314	VK3JF 305	K2EEK 291	WZ3E 279
ZL3NS 326	YU1HA 326	VE2PJ 325	WB2JZK 323	WA4DAN 319	OH5KL 313	W6SHY 305	N6ITW 291	VU2CVP 278
K9IW 326	VE3MR 326	I8LEL 325	CE7ZK 323	AA6AA 319	WDØDMN 313	KQ4GC 305	YB1RED 291	EA3CWT 278
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WA4JTI 326	KZ4V 326	W6BCQ 325	KA9I 323	XE1MD 319	N6PTI 313	EA5OL 305	N5QDE 290	WN5MBS 277
YV1AJ 326	VE3GMT 326	WØSFU 325	4N7ZZ 323	KB1JU 319	KD9CN 313	K3LUE 304	OE7KWT 290	VE2DRN 277
YV1KZ 326	K9BWQ 326	IT9ZGY 325	WN5IJZ 322	OE7SEL 319	K1VHS 313	WF9K 304	4X6DK 290	GØLRX 277
N6AHU 326	WØYDB 326	IT9TQH 325	YV5IVB 322	WDØBNC 319	OA4QV 313	G4NXG/M 304	I4UFH 289	KC6AWX 276
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W9OKL 326	W4EEE 326	K8CSG 325	WB4PUD 322	K9QVB 318	W1LQQ 312	VE3CKP 304	KF7VC 288	NX4Y 275
9A2AA 326	KE4VU 326	I2EOW 325	LZ1HA 322	KB5FU 318	K4LR 312	WB2NQT 303	TI5RLJ 287	NC3C 275
KD8V 326	AG9S 326	IK1GPG 325	N5FG 322	AA4AH 318	I8INW 312	WA1DHM 303	OK1AWZ 287	F5NBX 275
DL6KG 326	WA4WTG 326	I1JQJ 325	ZS6AOO 322	G4GED 318	ZL1BOQ 312	WA9BDX 302	IK2DUW 287	VE2AJT 275
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DL9OH 326	WD8PUG 326	K1UO 325	N2VW 322	IK8GCS 318	K8NWD 311	KD4YT 302	NM5O 285	

RTTY

K2ENT 320	WB4UBD 291	K3UA 276	I1JQJ 273	KE5PO 254	NI4H 252	W4EEU 250	KB8DB 242	G4BWP 222

dio Union (IARU) have activated a new multiband beacon—**YV5B**. The beacon begins its cycle at 10 seconds before the third minute of each hour—i.e., 0002:50Z, and repeats every three minutes. It transmits for ten seconds on 14100 kHz, then ten seconds each on 18110, 21150, 24930, and 28200 kHz at various power levels. Location is 1300 meters high in south Caracas (FK-60-NL). Future multiband beacons are in the works for Argentina, Hawaii, the United Nations building in New York City, South Africa, and Israel.

Central Arizona DX Association. The Central Arizona DX Association has elected new officers for 1996. They are: President Gary Capek, K8BN; Vice-President John Arthurs, AA7WP; Secretary Mike Bill, AA7NO; Treasurer Fred Hules II, N7PNK; Immediate Past President Ned Stearns, AA7A; Members at large Dr. Warren Hill, KF7AY, and Dave Hollander, N7RK.

Eastern Iowa DX Association. Eastern Iowa DX Association officers for 1996 are: President Jim Spencer, WØSR; Vice-President Tom Vavra, WB8ZRL; Secretary/Treasurer Gary Toomsen, KØGT.

Northern Illinois DX Association 1996 Officers. The Northern Illinois DX Association announces the 1996 officers and board of directors: President Jack Hudson, W9KDX; Vice-President Bob Stolberg, KS9W; Secretary Joe Pontek, K8JP; Treasurer Larry Greenburg, WA9MAG; Board members Ray Hibnick, WA9YYY; Bob Nielsen, K9RN; Jim Durante, W9NB; and John Smith, K9KA.

Higher ARRL Award Fees. A new fee schedule for ARRL operating awards will take effect January 1, 1996. The new schedule is based on policy developed by the Board's Membership Services Committee and approved by the Board's Administration and Finance Committee, with the goal of approximately breaking even on the costs of offering awards.

First-ever DXCC $10 (with pin); additional $5

QSL INFORMATION

1B/KUØJ to KUØJ
3D2BE to HB9KAS
3DAØZ to ZS6EZ
3ZØCON to SP2TQW
3ZØUN to SP8KEA
4K8F to UA9AB
4LØG to RF6FM
4LØJA to JP1BJR
4L5O to CT1CJJ
4N6F to YU6FPQ
4N7ØAT to DC3SZ
4U49UN to W8CZN
5H3JA to AAØOB
5H3JB to NK2T
5H3JD to DK9MA
5NØGC to F2YT
5N1DMA to W4DVJ
5N3TDR to OE1YDA
5R8DL to JH8YZB
5R8DP to JA1OEM
5R8ED to LA1SEA
5T5JC to F6FNU
5V7DB to DJ6SI
5WØBL to JH2ABL
5WØBY to JA2FBY
5WØJA to JF2RZJ
5W1MW to VK2BEX
5X1XT to WF5T
7Q7JL to GØIAS
7Q7RM to GØIAS
7Q7SB to AB4IQ
7Z5OO to W1AF
9G1BJ to G4XTA
9G5MT to WY7K
9G5RM to NZ7E
9G5VT to K5VT
9J2SZ to SP8DIP
9K2ZC to KC4ELO
9Q5AGD to SMØAGD
9Q5BB to EA4BB
9Q5RP/9X to F5DN
9U/F5FHI to F1FHI
9V1YC to AA5BT
9X5EE to PA3DLM
9X5HG to DK2SC
9Y4SF to WA4JTK
A22EX to N4CID
A22MN to WA8JOC
A35SS to AA6BB
A35ZB to DJ4ZB
AA5DX/KP4 to N2AU
BZ1QL to BY1QH
C53HG to W3HCW
C91AI to CT1DGZ
CO9OTA to CT1ZW
CP4BT to DL9OT
CP8XA to CP8AL
CR9WAG to DL8KWS
CT3EU to G3PFS
CU9CNE to CU1AC
D2SA to F6FNU
D2XX to PA3CXC
D3X to CT1EGH
D68HS to JA1ETQ
D68SY to JL1UXH
D68TA to JA1IDY
D68TK to JA1ELY
DL5XX/HC8 to DL5XX
EA8BYR to WA1ECA
EA9AU to EA9IB
EO5ØFI to RB5FF
EO5ØJS to LY1DS
ER1AM to SP9HWN
ET3YU to YU1FW
EU7SA to RC2SA
EW1WZ to DL1OY
EXØV to DF8WS
FG5FZ to F6FNU
FG5GZ to F6CLK
FK8FU to NA5U
FY5GJ to F2YT
GB3Ø1OTA to G3PMR
GP5KN to G4TTX
HC7SK to SM6DYK
HC8A to WV7Y
HH2LQ to KM6ON
HI8ROX to HI8OMA
HK/GØSHN to F6AJA
HKØHEU to HKØFBF
HL9DC to N7RO
HP1XBH to W4YC
HSØZAA to KM1R
HV4NAC to IKØFVC
HZ1AB to K8PYD
I1A/1PØ to I1RBJ
IC8/N2TGK to IC8WIC
IQØJ to IKØREH
IS1A/1P to I1RBJ
IUØYL to IKØPXD
IZ6ARI to I6LKB
J28BS to FD1PHW
J28DE to F2WS
J68AC to WA2USA
J68AH to ACØS
J68AK to W8QID
J68AS to N9AG
J68BT to W8KTQ
J68ER to W9UI
J68WX to WX9E
J88BS to WA4WIP
J88CW to WA6AHL
KC6OK to N5OK
KC6SS to WV5S
KC6WP to JA1WPX
KG4JO to WI2T
KG4ML to WB6VGI
KH2DD/KHØ to JA1SGU
KS2V/TI2 to KB5IPQ
LA1Z/P to LA6LHA
LX9DX to SP5SS
LY4ØMR to LY1BZB
OA5/IK1EDC to I1ZL
OH1NOA/OD5 to OH1MRR
OM5XX to OK3CQR
OQ5ØUSA to ON4RAT
OS4ANT to ON4ANT
OS5GK to ON5GK
OS6AA to ON6AA
OS7YY to ON7YY
P4ØJ to WX4G
PA3EVJ to VE3MR
PJ4/WA3LRO to K2SB
PJ7/OH2LVG to KE7LZ
PJ8X to KE7LZ
PJ9U to OH1VR
PPØF to PP1CZ
PZ5DX to K3BYV
RKØQXY to UAØKCL
RK4WWQ to AA4NU
RK9XWH to UZ9XWH
SØ1MZ to EA2JG
SØRASD to EA2JG
SNØUN to SP8KHT
SP5GRM to SP5ES
T3ØBH to ZL1AMO
T3ØRT to VK4CRR
T77BL to T7ØA
T91DNO to DL1DAZ
TA2DS to WA3HUP
TA2ZI to WB6EQX
TF4/DL2SCQ to DL6DK
TF4/SM6CAS to G4WFZ
TJ1AG to F5RUQ(94CB)
TJ1PD to N5DRV
TL8NG to WA1ECA
TMØP to F6BFH
TM4C to F6KAR
TM5IPA to F5LGQ
TOØP to F6BFH
TU2DP to K4MQL
TU2ZR to SM3DMP
TU4MV to F5JFT
U5WF/UR9P to SP5IUL
UAØQJG/Ø to UA1AGC
UK7R to UA9AB
UK8AX to UA9AB
UK8BA to ON7GB
UK8QU to K9FD
US5WE/US8P to SP5IUL
UU1JA to N4NWT
UX2MM to DL3BQA
V26E to AB2E
V26R to KA2AEV
V26Y to W2KKZ
V31CK to XE1CI
V31JY to KV5E
V31ML to N5FTR
V31MP to W5ZPA
V31ND to OH6ZS
V31YK to W5JYK
V47NF to WB8GEW
V47WK to AB4JI
V47WZ to WZ8D
V5/NØAFW to WA2FIJ
V5/N9NS to WA2FIJ
V63MN to JR1TNE
V73GT to WF5T
V73Y to WA4WTG
VE3MJQ/9X5 to VE2PR
VK1FF to WB2FFY
VP2EHF to KA3DBN
VP2VI to AB1U
VP8GAV to GMØLVI
VQ9QM to W4QM
VQ9ZX to K7ZX
VS6WV to KØTLM
XE1/JA1QXY to JA1HGY
XF4M to AA6BB
XX9AS to KU9C
XX9TSX to G3SXW
YJØAAY to W6YA
YS1DRF to W2PD
YU7ØGW to YU7GW
Z37GBC to YU5GBC
ZA/KA6ZYF to KA6ZYF
ZA1AJ to OK2PSZ
ZA1B to HB9BGN
ZA1E to I2MQP
ZD7BJ to W4FRU
ZD8KJ to GØFXQ
ZD8OK to N8ABW
ZD8Z to VE3HO
ZF1CQ to W8BLA
ZF1DX to W8BLA
ZF2LS to KJ6HO
ZF2RV/ZF8 to WJ7R
ZF2SY to K2UFT
ZK1NA to DL6NA
ZK2ZE to LA9GY
ZP7AA to ZP5AA
ZP9XB to PY5BI
ZZ7DX to PP5LL
ZZ8SA to PW8NG

(with pin); replacement $5; pins $5.

DXCC applications: First for an ARRL member in a calendar year: No charge for the first 120 QSO credits (previously, no limit). Additional for an ARRL member in a calendar year: $10 for the first 100 QSO credits (new).

First for a foreign non-ARRL member: $10 for first 120 QSO credits (previously no limit). Additional for a foreign non-ARRL member: $20 for first 100 QSO credits (new).

Additional QSOs: 10 cents per QSO (new). Convention/HQ walk-in card check: $2 (limit of 120 cards per application). (Return postage must be provided by the applicant for any cards submitted or for information requests.)—from *ARRL Letter*

QSL Notes

QSL **DX9C** to Robin Go, DU9RG, 818 Acacia Ave., Ayala-Alabang Village, Muntinlupa 1780, Philippines.

VK3UB, Bob in Sydney, is a pirate operation. Do *not* QSL. (VK3UB is Jock in Melbourne.)

QSL **ZW5VB** to P. Sirzanink, PP5SZ, Rua Pd

Roma 194/704, 88010-090, Florianopolis SC, Brazil.

QSL **VP5FOC** via W9VNE, P.O. Box 54482, Cincinnati, OH 45255-0482, with SASE.

AB4PW says he is no longer QSL manager for CT1DVV or CT8T.

QSL **9M2TO** via his home call of JAØDMV or direct to Tex Izumo, Bukit Dumbar Apt. 9-4, 97 Jalan Thomas 11700, Gelugor, Penang, Malaysia.

QSL **AHØT** via the Japanese bureau only to JA6BSM.

QSL **FY5YE** to Jack McElwain, W5SVZ, 9427 Angleridge Road, Dallas, TX 75238.

QSL **UH8EA, RHØE,** and **EZ5AA** via H. Miller, W5BWA, 5812 Hiawatha Drive, Alexandria, LA 71301.

QSL **LX1NO** (and his many special calls) to Norbert Oberweis, 5, Cite Oricher-Hoehl, L-8036 Strassen, Luxembourg. Norbert also now handles cards for **OD5PN.**

QSL **C4A** in CQWW CW via operator Pete Grillo, AH3C, 2150 East 6200 South, Salt Lake City, UT 84121.

If you haven't received your **V31JV** and **FS/KB4VHW** cards yet, they were lost in a move; please try again.

QSL **DX1EA** in CQWW SSB and **YV5A** in CQWW CW to Olli Rissanen, OHØXX, at either Suite 599, 1313 S. Military Trail, Deerfield Beach, FL 33442 USA, *or* P.O. Box 373, Ayala-Alabang Village, 1799 Muntinlupa, MM, Philippines.

The QSL manager for **FM5DN** has been changed from N3ADL to KU9C. N3ADL reports delays in getting the logs to the US; please be patient.

3DAØNX in CQWW will automatically be QSLed via the bureau from ZS6CAX. QSL via the bureau to ZS6CAX.

QSL **AZ9W** via operator Alejandro Cozzi, LU5UL, P.O. Box 12, 9120-Puerto Madryn CH, Argentina.

The new address of **LU6APW** is Miguel Cabezas, P.O. Box 43, 1440 Buenos Aires, Argentina.

QSL **5X4A, 5X4B,** and **5Z4FU** via the DARC (German) Bureau to DL8AAI. (He is trying to replace some lost logs for some periods in 1995.)

E-mail to reiska@popmail.ven.net has produced some long-awaited QSLs for **YWØRCV.**

QSL the CQWW SSB operation of **XR8E** via operator Luis Fieuoa, CE8EIO, P.O. Box 1512, Pta. Arenas, Chile.

QSL Mohammed Balbis, **JY4MB** at P.O. Box 3236, Amman, 11181 Jordon.

QSL **ZS9F, ZS95RWR, ZS6YA, TA2FE**, and **ZS94F** via Koos Berrevoets, KK3S, 160 Valley Road, Windsor, PA 17366.

QSL **VK9LZ** (RTTY), **VK9LX** (CW), and **VK9NM** (SSB) direct to Eddie Schneider, W6/GØAZT, P.O. Box 5149, Richmond, CA 94805-5194 with SAE and return postage, or via the bureau to W6OTC. (The former route to W6XD is no longer valid.)

The **WS6X/6Y5** in CQWW CW was actually **WH6X/6Y5**; QSL to WH6X. WS6X reports getting lots of cards.

GU3HFN is *not* via GU3MBS.

QSL the CQWW CW operation of **3DAØNX** to Koji Tahara, ZS6CAX, Japanese Embassy, P.O. Box 11434 Brooklyn 0011, Rep. of South Africa, or via the ZS bureau.

QSL **JWØE** to Oleg Kotkalo, US5MV, P.O. Box 7, Stachanov 2, 349702, Ukraine, with SAE and one IRC.

QSL **9X5TFA** to LA3T.

QSL **V26DX** to Koos Berrovoets, KK3S, 160 Valley Road, Windsor, PA 17336.

QSL **IG9A** via IT9GSF, and *not* via IV3TAN.

QSL **AP2N** direct to Muhammad Munawar Naeem, FE-70, Wahdat Colony, Lahore 54000, Pakistan.

73, Chod, VP2ML

CQ DX Awards Program

SSB

2173	EA8BMB	2175	LU3HBO
2174	EA3FHT	2176	KM6HG

SSB Endorsements

320	W4EEE/326	275	N5QDE/290
320	K4SBH/323	275	LU3HBO/284
320	KF8VW/320	200	KM6HG/226
310	KD5ZD/310	150	EA2BP/197

CW Endorsements

320	WA8DXA/325	275	WG7A/276
300	VE9RJ/307	200	KF8VW/239

Total number of active countries is 326. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

W3ASK's 45th Anniversary

With this month's column I mark my 45th year as Propagation Editor for *CQ*. In March 1951 I succeeded my good friend, the late Perry Ferrell. He inaugurated propagation forecasts specifically tailored for the needs of radio amateurs with his "Monthly DX Predictions" column, which first appeared in the June 1946 issue of *CQ*.

This month George Jacobs, W3ASK, Dean of CQ's editorial staff, celebrates his 45th anniversary as Propagation Editor of CQ.

Since March 1951 this column has appeared continuously, month after month, under my byline. I have written it while in more than two dozen different countries, from the Arctic of Scandinavia to the jungles of Peru and Liberia, and within distance of the sounds of conflict in Southeast Asia and the Middle East. Whatever situation I was in professionally, there was my crystal ball and typewriter, and I never missed a deadline. That typewriter, however, has since been replaced with a notebook computer.

Propagation gurus like to measure time and events in relation to solar cycles. Reckoned in those terms, my editorship of this column extends from the middle of Cycle 18 to what now appears to be the last year of Cycle 22. With the start of a new sunspot cycle (Cycle 23) on the horizon, there are a great number of interesting propagation events coming up in the years ahead on the HF bands. As Dean of the *CQ* editorial staff, I am enthusiastically looking forward to continuing to report them here on these pages.

As I begin my 46th year as editor of this column, I want again to pay special tribute to the editors and publishers of *CQ* who over the years from almost the initial issue have had the foresight and understanding to bring propagation predictions and forecasts to the pages of this magazine and to take the mystery out of HF propagation for radio amateurs.

11307 Clara Street, Silver Spring, MD 20902 (g.jacobs@ieee.org)

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for March 1996

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 9-10, 18-19, 22-23, 24, 27	**A**	**A**	**B**	**C**
High Normal: 1, 3, 7-8, 17, 28	**A**	**B**	**C**	**C-D**
Low Normal: 2, 4, 6, 11, 15-16, 20-21, 25-26, 29-30	**B**	**C**	**D**	**D-E**
Below Normal: 5, 12, 14, 31	**C**	**C-D**	**D-E**	**E**
Disturbed: 13	**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 S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on March 1st, fair (C) on the 2nd, good (B) on the 3rd, fair (C) on the 4th, fair-to-poor (C-D) on the 5th, etc.

Solar Cycle Progress

Sunspot Cycle 22 is now in its 115th month, and it continues to decline steadily as expected. The Royal Observatory of Belgium reports a monthly mean sunspot level of 9 for November 1995. This results in a 12-month running smoothed sunspot number of 19 centered on May 1995. This is a decline of two points from the previous month's level. During November daily levels of solar activity varied between a high of only 33 on the 17th to an absolutely spotless sun on six days—the 1st, 4th to 5th, and 24th to 26th.

According to daily observations made at Penticon, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 1995 was 73. This results in 12-month running number of 78 centered on May 1995. The level of 10.7 cm flux is paralleling very closely the decline in the sunspot count.

A smoothed sunspot number on the order of 12 and a 10.7 cm solar flux level in the upper 70s are forecast for March 1996.

SEC World Wide Web Home Page

The increasing amount of data available on the World Wide Web pages of the Internet system is reaching the staggering point. What recently has come to my attention is a Web Page that contains a great deal of solar, geophysical, and ionospheric data that can be of considerable importance to users of the HF spectrum. This is the Home Page of the Space Environment Center (SEC) in Boulder, Colorado.

The Space Environment Center provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. The SEC's parent organization is the National Oceanic and Atmospheric Administration (NOAA). Near real-time data is revised and compiled several times a day and summarized on the SEC Home Page, the address of which is http://www.sel.noaa.gov

The SEC Home Page is attractively presented with colorful graphics and an easy-to-use menu system using window-type buttons. The Web Page contains three main directories, all of which I have found to be of considerable interest.

Perhaps the information of most interest to users of the HF spectrum appears in the button selection "Radio Users," which is in the "Tailored Space Weather Products" directory. In fact, the stated purpose of this selection is to provide radio operators with current data on the state of the ionosphere. Among the data contained in the "Radio Users" file are the following:

- Joint USAF/NOAA Primary and Secondary HF Propagation Reports revised every six hours. (See the November 1995 column for explanation of these reports.)
- Report of Solar & Geophysical Activity
- Solar & Geophysical Activity Summary
- Auroral Electrojet Plot
- USAF Auroral Oval Display
- Weekly Summary and 27-day Forecast of solar and geophysical data
- 27-day 10.7 cm A_p and maximum K_p geomagnetic indices

I have also found the "Solar Images" button selection file in the "On-Line Solar-Terrestrial Data" directory of special interest, since it features a near real-time photo of the sun as seen with powerful telescopes from some of the

Short-Skip Propagation Chart
March & April 1996
Local Standard Time
At Path Midpoint

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	Nil	Nil	08-19(0-1)	08-13(1-0) 13-16(1) 16-19(1-0)
15	Nil	08-16(0-1)	09-12(1) 12-17(1-2) 17-18(0-1)	08-09(0-1) 09-10(1) 10-13(1-2) 13-14(2) 14-17(2-3) 17-18(1-2) 18-20(0-1)
20	Nil	07-08(0-1) 08-09(0-2) 09-14(0-3) 14-16(0-2) 16-23(0-1)	07-08(1) 08-09(2) 09-10(3) 10-14(3-4) 14-16(2-4) 16-18(1-4) 18-19(1-3) 19-20(1-2) 20-23(1) 23-05(0-1)	06-07(0-1) 07-08(1-2) 08-09(2-3) 09-10(3) 10-15(4-3) 15-18(4) 18-19(3) 19-20(2-3) 20-21(1-2) 21-05(1) 05-06(0-2)
40	07-09(0-1) 09-10(0-2) 10-12(2-3) 12-17(3-4) 17-19(2-3) 19-20(1-2) 20-22(0-1)	06-07(0-2) 07-09(1-4) 09-10(2-4) 10-15(4-3) 15-17(4) 17-19(3-4) 19-20(2-4) 20-22(1-2) 22-00(0-2) 00-06(0-1)	06-07(1) 07-08(4-2) 08-15(3-1) 15-17(4-2) 17-19(4-3) 19-20(4) 20-22(2-4) 22-00(2-3) 00-06(1-2)	06-08(2-1) 08-15(1-0) 15-16(2-0) 16-17(2-1) 17-19(3-2) 19-21(4-3) 21-22(4) 22-00(3-4) 00-02(2-3) 02-06(2)
80	07-08(2-3) 08-11(3-4) 11-18(4) 18-20(3-4) 20-22(2-3) 22-00(1-2) 00-06(1) 06-07(1-2)	07-08(3-2) 08-11(4-1) 11-16(4-0) 16-18(4-2) 18-20(4-3) 20-22(3-4) 22-00(2-4) 00-06(1-2) 06-07(2)	07-08(2-1) 08-11(1-0) 11-16(0) 16-18(2-1) 18-20(3-2) 20-00(4) 00-05(2-3) 05-07(2)	07-08(1-0) 08-16(0) 16-18(1-0) 18-20(2-1) 20-22(4-2) 22-00(4-3) 00-05(3) 05-07(2-1)
160	05-07(4-2) 07-09(3-1) 09-17(2-0) 17-19(3-1) 19-20(4-2) 20-05(4)	05-06(2-1) 06-07(2-0) 07-09(1-0) 09-17(0) 17-19(1-0) 19-20(2) 20-22(4-3) 22-03(4) 03-05(4-3)	05-06(1) 06-19(0) 19-20(2-1) 20-22(3-2) 22-03(4-3) 03-05(3-2)	05-06(0-1) 06-19(0) 19-20(1-0) 20-22(2) 22-03(3-2) 03-05(2-1)

ALASKA
Openings Given in GMT

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	Nil	22-00(1)	22-00(1) 00-02(2) 02-04(1)	06-13(1) 07-12(1)*
Central USA	Nil	20-22(1) 22-00(2) 00-01(1)	22-00(1) 00-03(2) 03-05(1)	07-09(1) 09-12(2) 12-14(1) 07-12(1)*
Western USA	Nil	20-22(1) 22-00(2) 00-03(1)	19-22(1) 22-00(2) 00-02(3) 02-04(2) 04-06(1)	06-08(1) 08-09(2) 09-12(3) 12-13(2) 13-15(1) 08-10(1)* 10-12(2)* 12-14(1)*

HAWAII
Openings Given in Hawaiian Standard Time

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	Nil	08-11(1) 11-13(2) 13-14(3) 14-15(2) 15-16(1)	02-05(1) 05-07(2) 07-13(1) 13-15(2) 15-17(3) 17-19(2) 19-21(1)	18-19(1) 19-21(2) 21-00(3) 00-02(2) 02-03(1) 19-21(1)* 21-00(2)* 00-02(1)*
Central USA	11-15 (1)	08-09(1) 09-13(2) 13-15(3) 15-16(2) 16-17(1)	03-05(1) 05-08(2) 08-13(1) 13-15(2) 15-16(3) 16-18(4) 18-19(3) 19-21(2) 21-23(1)	18-19(1) 19-21(2) 21-01(3) 01-04(2) 04-05(1) 19-21(1)* 21-01(3)* 01-01(2)* 02-03(1)*
Western USA	11-15(1)	08-09(1) 09-10(2) 10-12(3) 12-15(4) 15-16(3) 16-17(2) 17-18(1)	02-04(1) 04-06(2) 06-09(4) 09-11(3) 11-13(2) 13-15(3) 15-17(4) 17-19(3) 19-21(2) 21-23(1)	17-19(1) 19-20(2) 20-23(4) 23-05(3) 05-06(2) 06-07(1) 19-20(1)* 20-21(2)* 21-04(3)* 04-05(2)* 05-06(1)*

*Indicates best time 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.
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.
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances use the preceding Short-Skip Chart.
#See explanation in "How To Use Short-Skip Charts" in this column.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

most outstanding observatories. The clarity is often great enough to see sunspots and sunspot groups when they exist.

More SEC Home Page info is available by e-mail from ncohen@sel.noaa.gov

March Conditions

On March 21 the *Vernal Equinox* will occur. This is the day when the sun crosses the equator on its apparent travel into the northern sky. On this day the hours of darkness and daylight are of equal duration throughout the world. This equinoctial phenomenon has its related effects upon high-frequency radio propagation conditions throughout most of March and April. On circuits within the northern hemisphere, where it is spring, expect daytime usable frequencies to be somewhat lower than during the winter months, while nighttime frequencies should be a bit higher. For paths within the southern hemisphere, where it is fall, opposite effects will be noted.

The most interesting propagation changes should occur on the longer openings between the northern and southern hemisperes—for example, from the USA to South America, to the South Pacific, to Central and Southern Africa, etc. Because it is spring in the northern hemisphere and fall in the southern hemispere, the ionosphere is more similar and stable than during the winter and summer seasons. This "equalization" in conditions should produce a marked improvement in openings between both hemispheres on all bands between 160 and 10 meters. The best times to look for these openings are shortly before local sunrise and again shortly after local sunset on the 160, 80, 40, and 30 meter bands, and for an hour or two after sunrise and again for an hour or two before sunset on 17 and 20 meters. On 15, 12, and 10 meters check for inter-hemispheric openings towards the southeast and south from a few hours before noon through the early afternoon hours. Check later in the afternoon for openings towards the south and southwest and towards the west.

Twenty meters is expected to be the best band for DX propagation from sunrise to sunset during March, followed by 15 and 17 meters. A few 10 meter DX openings are also forecast for March, mainly to southern and tropical areas during the daylight hours.

During the period between sunset and sunrise 30 and 40 meters are expected to be the optimum bands for DX propagation, with good openings forecast to many areas of the world. Some fairly good DX openings are also predicted for 80 meters during the hours of darkness, and some 160 meter DX openings may also be possible during this period. When propagation conditions are High Normal or better, the 20 meter band may also remain open to some areas of the world during the hours of darkness.

For specific times of DX openings for each amateur band 10 through 160 meters during March, refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for March and April, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for distances between approximately 50 and 2300 miles.

For day-to-day changes in HF propagation conditions expected during March, see the Last Minute Forecast, which appears at the beginning of this column.

VHF Ionosphere Openings

Chances look a little better for ionospheric openings on the VHF bands during March. A seasonal increase is expected in short-skip sporadic-*E* type openings on 10 meters, and an occasional opening may also be possible on 6 meters. These openings are more likely to occur during the daylight hours over distancesof approximately 1000 to 1400 miles.

There is also a good chance for some widespread auroral activity on the VHF bands, especially when the HF bands are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for those days that are likely to be in these categories during March.

Not much meteor activity is expected this month, but some might be possible during minor showers that may occur March 14–15 and March 24–25.

73, George, W3ASK

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

Making Sense Out Of Frequency Allocations

The Amateur Service is very fortunate to have many bands of radio frequencies allocated to it. Amateur radio, the oldest radio service, has been around since the beginning of electrical communication. The first federal licensing of radio stations took place in 1912. Amateurs, who were ordered off the air during World War I, returned to the airwaves with their spark gap transmitters in 1919.

That same year retired Westinghouse engineer Frank Conrad, operator of amateur station 8XK (there were no ITU prefixes back then), began something new. Instead of communicating with other amateurs, he began transmitting to the public! His musical transmissions created great interest and attracted a rapidly growing audience. In September of 1920 a Pittsburgh department store mentioned Conrad's broadcasts in an advertisement for some primitive radio receivers and they quickly sold out. Broadcasting was born.

Harry P. Davis, a Westinghouse vice president, saw the ad and suddenly had the idea that the manufacture of radio sets might be suited to the idled production capability his company had built up during the war. A government license for creation of a public broadcast system was applied for and granted.

Station KDKA of the Westinghouse Broadcasting System under the direction of amateur Frank Conrad inaugurated the new service in November 1920, working on a wavelength of 360 meters. (The station is still in operation!)

Hundreds of commercial radio stations followed during the next few years, all operating on the same frequency. As you might expect, bedlam resulted. Broadcasters were no longer in radio for fun, novelty, and romance. They had to make money to survive; their philanthropic days were over. Advertising was their salvation, and they welcomed with open arms the commercial sponsors that flocked to and unlocked the economic door of broadcasting.

As commercial activity expanded, the amateurs were assigned the 200 meter "shortwave" bands, which broadcasters found ineffective and condemned as ". . . the graveyard of wireless." Confident, however, that there must be a more fertile place for them in the radio spectrum, amateurs began to investigate the shortwaves.

The amateur operators made a discovery which brought governments and communications firms back into the shortwave field in a hurry. The early tests on these radio waves had shown that their range was extremely limited and somewhat variable and faded out a few miles from the transmitter. What no one had dreamed was that they came in again, often loud and clear, thousands of miles away after being reflected from the heavens!

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Without broadcast regulations everyone had a field day! The result was chaos, and millions of listeners switched off their radio receivers in disgust. The economic impact from poor radio receiver sales led to the Radio Act of 1927 and the creation of the Federal Radio Commission. The FRC was granted legal authority to decide how much of the radio spectrum each service would get.

Radio waves do not respect national borders. The International Telegraph Union was formed in 1865 to facilitate the exchange of telegraphic messages across national borders. Telephone and radio communications were later added, and the first ITU frequency allocations were made in 1927. In 1932 the name was changed to the International Telecommunication Union. Headquartered in Geneva,Switzerland, the ITU is made up of more than 200 countries that agree on telecommunications matters. Now a specialized agency of the United Nations, a primary purpose of the ITU is the allocation of radio frequencies.

In the United States, the basic document controlling telecommunications is the Communications Act of 1934. The act established the independent government agency known as the Federal Communications Commission. The FCC regulates all wire and radio communications within international agreements and national law.

Radio Frequency Allocation

An important duty of the FCC is the distribution of non-government radio frequencies. Allocation of radio frequencies involves setting aside segments of the radio spectrum for the use of particular radio services and assigning specific frequencies within those segments for the operation of individual radio stations. This is the fundamental task for which the Federal Communications Commission was created in 1934. The FCC also is responsible for establishing the rules and regulations that govern the operation of these stations.

In some respects, frequency allocation can be likened to building highways. The planning and development of invisible communication lanes, however, is much more complicated than road building. There is still a wide choice of land highway routes, but radio paths are limited in number and many are crowded. And unlike land traffic, radio transmissions cannot be routed by underpasses and overpasses, nor can they obey traffic signals to allow other traffic to pass, or to stop at any given point, for radio waves spread out in all directions, crossing state lines and international boundaries.

As land traffic increases, highways are widened and alternate routes are provided. Radio highways, too, can handle only a certain amount of traffic (or transmissions) before additional lanes are needed and more exacting operating controls are employed.

Radio Paths

Not all radio paths are the same width. Some types of transmissions require wider lanes than others. For example, FM transmissions need band widths far wider than that used for AM. A television station's combination of picture and sound requires hundreds of times the spectrum space occupied by AM. Channel widths differ according to the requirements of the various services. Furthermore, not all radio frequencies behave alike. Those in different portions of the spectrum have different characteristics. For example, 1000 kHz is suitable for AM broadcasting but not for FM or TV. Similarly, 410 kHz is good for ship navigation by direction finding but is not suitable for ship navigation by radar.

There are certain limitations in any radio system that govern its use. Most mobile and portable transmitters need frequencies that provide only limited range. On the other hand, transmissions that cross the seas need long-range frequencies. Satellite communications have still different requirements.

There are also many frequencies that bear heavy traffic in some areas but go begging elsewhere. The FCC seeks to put these idle radio lanes to work without disrupting existing services and without causing interference.

Any extensive rerouting of traffic over the invisible radio paths requires complex planning and execution. A mass of facts and figures relating to the use of the radio spectrum must be studied, plotted, and applied.

In some respects the work resembles a giant checkerboard. For example, changing the frequency of one station can mean moving it to another band, and moving one in that band to still another, and so on until a chain reaction of shifts is completed in order to accommodate the first move without interference problems.

Radio Bands, Channels, And Frequencies

It is customary to speak of the spectrum space occupied by each radio service as a "band," —a group of adjacent channels allocated for the use of a particular service. These channels are the traffic lanes assigned for the transmissions of individual stations in that service.

Within these channels each station operates on a designated "frequency" or frequencies. This means that it transmits its electrical impulses at so many "cycles" (electrical vibrations called "waves") per second, or "Hertz" (Hz). The term "Hertz" is used to honor the German physicist Heinrich Rudolph Hertz, who was the first to create, detect, and measure electromagnetic waves. These emissions are measured also in "kiloHertz," "megaHertz," "gigaHertz," and "teraHertz."

A kiloHertz (kHz)is a short way of denoting

a thousand of these waves a second, a megaHertz (MHz) a thousand kiloHertz, a gigaHertz (GHz) a thousand megaHertz, and a teraHertz (THz) a thousand gigaHertz. Radio waves of certain frequencies travel great distances, while others have shorter range.

The lowest frequency normally used for radio communication is about 10,000 Hz (10 kHz). This is considered to be the bottom of the usable radio spectrum. It encompasses the part of the electromagnetic spectrum that can be used for communication purposes. The spectrum is arranged progressively upward according to the respective wave lengths, graduating upward from "long waves" and "short waves" to microwaves (those above 1000 MHz).

In the early days of radio it was customary to refer to a station operating on a certain "wave length" such as 360 meters. As use of the radio spectrum expanded, however, it became simpler to use the "frequency" designation, which now is national and international practice.

For convenience, the radio spectrum below 30 kHz is known as the VLF (very low frequency) range; from 30 to 300 kHz, LF (low frequency); from 300 kHz to 3 MHz, MF (medium frequency); 3 to 30 MHz, HF (high frequency); 30 to 300 MHz, VHF (very high frequency); 300 to 3000 MHz, UHF (ultra high frequency); 3 to 30 GHz, SHF (super high frequency); and 30 to 300 GHz, EHF (extremely high frequency).

How The Spectrum Is Organized

Before World War II the usable portion of the radio spectrum was limited to the bands between 10 kHz and 300 MHz. Subsequent electronic developments made it possible to extend the useful spectrum to 40 GHz.

For illustrative purposes, the radio spectrum may be compared to a long vertical ruler with inches or fractions of inches marking off, in irregular spacings, the bands allocated to the different radio services.

The portion between 10 and 540 kHz is devoted largely to long-range radiotelegraph stations and radio beacons for ships and aircraft. Between 535 and 1605 kHz is the familiar AM ("standard") broadcast band.

Between 1605 kHz and 25 MHz are bands for long-distance radiotelegraph and radiotelephone communication, for ships at sea and planes in the air, and for international broadcasting. The amateur service holds many important allocations in this area.

FM and TV broadcasting, as well as various safety, business, and private radio services, are individually provided for in the segment between 25 and 890 MHz. Above that, extending to 40 GHz, are bands for radio-navigation, common carrier, mobile, and a host of other specialized radio services.

Spectrum space beyond 40 GHz is used mainly for experimental and developmental work. Experimentation also is being carried out on frequencies within the visible light spectrum, potentially extending the upper limit of the electromagnetic spectrum used for communication.

It is interesting to note that the space occupied by AM broadcasting is only one forty-thousandth of the entire radio spectrum currently allocated to the various services. In addition to bands for AM, FM, and TV broadcast, there are others for aviation, marine, po-

Composition of Call Sign	Call Sign Blocks
1 letter, 1 digit, 1 letter[1]	K1A through KØZ[2] N1A through NØZ[2] W1A through WØZ[2]
1 letter, 1 digit, 2 letters	K1AA through KØZZ N1AA through NØZZ W1AA through WØZZ
1 letter, 1 digit, 3 letters[3]	K1AAA through KØZZZ N1AAA through NØZZZ W1AAA through WØZZZ
2 letters, 1 digit, 1 letter	AA1A through ALØZ KA1A through KZØZ NA1A through NZØZ WA1A through WZØZ
2 letters, 1 digit, 2 letters	AA1AA through ALØZZ KA1AA through KZØZZ NA1AA through NZØZZ WA1AA through WZØZZ
2 letters, 1 digit, 3 letters[1, 3]	AA1AAA through ALØZZZ KA1AAA through KZØZZZ NA1AAA through NZØZZZ[2] WA1AAA through WZØZZZ

[1] The letter "X" may not follow the digit. These call signs are assigned to Experimental stations.
[2] Not currently used by the FCC in U.S. Amateur Service station call signs.
[3] Some 3-letter combinations are not allocated, such as certain "Q" signals, " inappropriate words," and signals (such as "SOS").

Table I– Station Call Sign Blocks Assigned to U.S. Amateur Service—47 CFR Part 2 Sec. 302.

lice, fire, industrial, land transportation, amateur, citizens, common carrier, and other uses. Other portions of the spectrum are set aside for non-communication equipment—such as medical, industrial, and other electronic devices—so that their excess energy can be released without causing interference to radio channels used for communication purposes.

Factors in Allocation

It would be wasteful and chaotic to operate a broadcast station on one frequency and, say, a police station and a ship station on adjacent frequencies. There must be appropriate bands of frequencies for the dozens of different radio services the FCC now accommodates, and within these bands assignments must be made for the operation of some 50 million fixed, mobile, and portable transmitters.

In the early days of radio a few kiloHertz one way or another was of little importance. Later, with increasing use of the spectrum, the problem of interference grew proportionally, and it became necessary to define more precise channel boundaries, engineering standards, and other requirements.

Since maximum utilization of the spectrum depends upon optimum allocation of frequency bands and upon proper use of the assigned channels, the Commission is required to study the behavior of radio waves, to test apparatus and performance, and to monitor the technical quality of signals.

The primary obstacle to expanded radio use is the scarcity or non-availability of frequencies for certain fast-growing services, particularly in the non-broadcast field, such as land mobile, common carrier, and personal radio. Technical developments have made it possible to move further "upstairs" in spectrum use, but at the same time, the number of industrial and business firms desiring to use radio has expanded even more rapidly. The result is an extreme shortage of frequencies.

As a consequence, some frequency rationing is required in order to provide the maximum benefit to the greatest number of people. Basically, preference in the use of radio is given to services on which the safety of life and property depends.

Some additional use of non-broadcast radio channels in short supply is obtained by increasing the amount of frequency sharing or "pooling" in an area. Further relief is obtained through use of so-called "split-channel," narrow-band FM, "single sideband," and other spectrum-efficient technical refinements. This permits more stations to operate in a given band.

A higher degree of efficiency in the use of all frequencies, as well as cooperative effort, is required to open doors to new groups as well as to take care of mushrooming existing services. In recent years the FCC has been forced to auction off licenses to certain frequencies to the highest bidder.

International Agreements

Interference can come not only from domestic stations and the increasing number of electronic devices, but also from foreign stations. That is why bilateral and multilateral arrangements between nations are necessary.

Bands allocated for radio telephone and radiotelegraph must be used by such stations of all nations, and the ship, aeronautical, and broadcast bands also must be shared. A French plane over New York must be able to talk to the local airfield on the same frequency as an American plane over Paris uses to communicate with the airfield there. By the same token, merchant ships the world over must be able to communicate on frequencies common to maritime use.

The international aspect of radio has developed to such an extent that almost no major frequency allocation can be made without considering worldwide usage. As a consequence, the primary allocation of frequency bands now is determined by international treaty and other agreement, and assignment of individual channels within those bands is made by the member nations.

Radio Station Callsigns

As an aid to enforcement of the international radio laws and regulations, most transmitting stations of the world are required to identify themselves at regular intervals when they are in operation. Each station is assigned a callsign—a combination of letters or letters and numbers that serves to identify that station. By international agreement, the first characters of the callsign indicate the country in which the station is authorized to operate. Therefore, anyone monitoring the airwaves is able to identify the national origin of a radio transmission by its station callsign prefix.

Although the U.S. amateur service only uses a maximum of two-letter prefixes, up to three prefix numbers or letters are allocated by the ITU. The national prefixes assigned to the United States and its possessions are AAA–ALZ, KAA–KZZ, NAA–NZZ, and WAA–WZZ. No other prefixes are authorized. The balance of the "A" prefixes is as follows: AMA–AOZ is assigned to Spain, APA–ASZ to Pakistan, ATA–AWZ to India, AXA–AXZ to Australia, and AYA–AZZ to Argentina.

While all radio station callsign prefixes are allocated by the ITU, the balance of the callsign is determined by the telecommunications regulatory body of the individual country in which the radio operation will take place.

The FCC is guided in the assignment of U.S. station callsigns by rules contained in the Code of Federal Regulations (CFR). The Code of Federal Regulations is the government laws that apply to the various Executive departments and federal agencies. The code is divided into 50 titles which represent broad areas subject to Federal regulation. Title 47—Telecommunications—is further subdivided into parts covering specific regulatory areas.

The Federal Communication Commission does not issue a frequency chart. Frequency allocations by services (not individual stations) are listed in Part 2, "Frequency allocations and radio treaty matters" of Title 47 (Telecommunication) of the Code of Federal Regulations (CFR), available at most public libraries.

Part 2, Subpart D is entitled "Call Signs and Other Forms of Identifying Radio Transmissions." Section 302 contains a table which specifies the composition and blocks of international callsigns available for assignment when such callsigns are required by the rules pertaining to particular classes of stations. The radio service categories are Military, Coast/Marine/Ship, Aeronautical/Aircraft, Land Mobile, Broadcasting, Experimental, Personal Radio, and the Amateur Service.

All U.S. amateur radio stations *must* be assigned a station callsign that conforms to certain formats or "blocks" as specified in 47 CFR Part 2 Section 302. The callsign blocks that pertain to the amateur service are contained in Table I. The rules also state that other identifying data may be specified for use with the callsign. 73, Fred, W5YI

CIRCLE 68 ON READER SERVICE CARD

CONTINENTAL LEADERS

AFRICA

A	EA9AM	15,832,824
28	No Entrant	
21	5H3CK	3,049,410
14	EA8BWW	2,782,494
7	ED9LZ	6,047,504
3.7	No Entrant	
1.8	No Entrant	

ASIA

A	4X2T	7,933,335
28	JH2ABL	10,284
21	N6BFM/9K2	5,275,900
14	UAØWY	2,503,236
7	RW9UZZ	758,550
3.7	RAØFA	44,640
1.8	No Entrant	

EUROPE

A	OZ5EV	6,468,090
28	S51AY	140,967
21	OK1RI	2,982,240
14	*IB4M	5,125,020
7	S5ØA	4,536,756
3.7	S57AW	1,719,468
1.8	S52CD	422,532

NORTH AMERICA

A	6D2X	10,530,432
28	VE1RAA	37,024
21	KC2X	1,471,080
14	KP2A	7,088,976
7	TE1C	7,281,630
3.7	CJ7SZ	1,757,568
1.8	K1ZM	327,712

OCEANIA

A	WR6R/WH6	9,907,968
28	ZL1AXB	186,189
21	YC3BC	652,460
14	N6VI/KH6	3,981,344
7	VK3EW	3,222,576
3.7	No Entrant	
1.8	No Entrant	

SOUTH AMERICA

A	P4ØR	15,705,995
28	ZVØW	1,533,050
21	ZW5B	14,095,142
14	PYØFM	9,660,432
7	YV5A	4,581,048
3.7	YV4FZM	320,022
1.8	No Entrant	

MULTI-SINGLE

AF	EA8BR	13,399,103
AS	XX9X	9,078,220
EU	TM1C	13,710,246
NA	HIH2PK	14,583,380
OC	FO5IW	8,734,432
SA	P4ØV	21,390,358

MULTI-MULTI

AF	No Entrant	
AS	JA1YXP	2,502,693
EU	9A1A	25,012,814
NA	KP4XS	27,093,690
OC	DU2AUU	1,849,512
SA	LU4FM	23,826,270

**Denotes low power.*

Contest Results *(from page 25)*

ON5GO, ON5OT, ON5SH, ON5SY, ON5UM, ON6DN, ON6HP, ON6HZ, ON6LK, ON6MR, ON6PU, ON7AW, ON7BD, ON7NB, ON7SF, ON7UN, ON7VQ, ON7YZ, ON7ZM, ONL4003, ONL9356, PA3EBT, PA3EZL. **SP5ØOP**: SP6DVP, SP6IHE, SP6GCU, SP6SNT, SP6LUV, SP6FIK, SP6TPF, SP-23Ø22-OP. **VE7ZZZ**: VE5FN, VE6EZ, VE6BSV, VE6MGS, VE6PDQ, VE7BKO, VE7EME, VE7FTP, VE7GGG, VE7PRN, VE7PTT, VE7RBL, VE7SK, VE7RK, VE7VX. **VX6FI**: VE6BIC, VE6LB, VE6PY, VE6AQ, VE6BJJ. **WA1LNP**: WA1LNP & N1NCI. **WA8LOW**: WA8LOW, WD8MQJ, WB8GEX, NY8E. **WZ1R**: WZ1R, KY1H, AK4L, KB1W, NJ1F, NY1L, WM1K, K1MBO, K1VWL, AA1AS, WA1ZAM. **YO2KBB**: YO2LFP, YO2IU, YO2LIT. **YU1HFG**: Club Group.

Station Operators Multi-Op Single Transmitter

4M3B: YV3BC, YV3EHD, YV3CFE, YV3BXH, YV5MMA/3, YV3FIX, YV3BKC. **9A1CVW**: 9A3LD, 9A3PG, 9A4ZS, 9A6GXR. **9A1HBC**: 9A2AJ, 9A2EU, 9A2NO, Davor, Ivica, 9A1HBC. **AB7BS**: AB7BS & KC7BNH. **AEØM**: AEØM & NØBBS. **C49C**: 5B4KH & 5B4WN. **CE6EZ**: CE6EZ & CE6PCM. **CE8SFG**: XQ8ABF, CE8SFG, CE8EJO, CE8FGC. **CJ2ZP**: VO2AC, VE2ZP. **CK7U**: VE7WRA, VE7WNA, VE7TTQ, VE7HMI, VE7IPW, VE7JLB, VE7MGR. **CT5P**: CT1AHU, CT1BOP, CT1DIZ, CT1ELP, CT1EDD, CT4NH. **CT8T**: CT1AOZ, CT1DVV, CT1ESV. **CT9M**: CT3BM, CT3DL, CT3EE. **DAØTJM**: DL1SWG, DL4SUA, DL4SVA, DH3SWH.

DFØRG: DC6AA, DG2ABP, DG6OBX, DH1OAH, DL6OBX, DL9WIZ. **DFØRI**: DFØRI & DL4ABL. **DF7RX**: DF7RX & DK2OY. **DJ6QT**: DJ6QT & DL3KDV. **DKØEE**: DK6WL, DL1MFL, DL3SBI, DL4MCF, DL4MDQ, DL4MEH, DL5MFF. **DLØPF**: DL8RDW, DL9RCF, DL9RDZ. **DLØRH**: DL1HF & DK5XG. **DLØTD**: DG1SDO, DG4NAV, DJ7IK, DL8OBC, T94DX. **DLØTUD**: DL6MUG, DL6DVU, DL8WOW. **DX1CW**: 4F1AKH, 4F1AOC, 4F1BYN, 4F1DMD, 4F1EAA, 4F1PP, 4F1FZE, 4F3GDX, DU1COA, DU1QJV, DU1QJW, DU3MJJ, DU6CCZ, ROLLY. **EA1NK**: EA1AKP, EA1AU, EA1AX, EA1DD, EA1GT, EA1NK, EC1BXI, EA1MC, EC1-48360. **EA3CWK**: EA3CWK, EA3GFA, EA3AIR, EA3DU, EA3ALD.

EA3FP: EA3UJ, EA3AAY, EA3AJM, EA3CCN, EA3CKX, EA3CWU, EA3EJI, EA3EMY, EA3ESJ, EA3DZD. **EA3RKG**: EA3BDW, EA3BOX, EA3EIO, EA3DGQ. **EA8BR**: EA8BR & EA1AK/6. **ED1URS**: EA1EB, EA1YO, EA1ABT, EA2BFM, EA1EK, EA1BD, EA1BDR, EA1FD, EA1AGP, EA1BAW, EA1EDF. **ED3HP**: EA3AM, EA3BW, EA3AJW, EA3GEP, EA3GGO, EC3DEG. **ED3PX**: EA3FHN, EA3FYO, EA3ADS, EA3JG. **ED3SPC**: EA3AEL, EA6ABO, EA3DNC, Xavi, Robert, Joan. **ED3TR**: EA3ANY, EA3CT, EC3CVD, EA3KG, EC3CTR. **EJ9HQ**: EI9HQ & EI4GK. **EW1WC**: Pezepzovoi, Shukokjlo, Litskevitch, Levolchev. **F6KBF**: F5RRX, F5RWM, F5SIB, F6AXW, F5MCJ. **F6KCS**: F5JCB & F5PRH.

F9IE: F9IE, F6ARC, F6BEE, GØJFX, JH4NMT, JF6DEA. **FO5IW**: JA1ELY, JA1OEM, JA7KAC, FO5IW. **G4UJS**: G4UJS, G4XUM, G4XKR, G3VAO. **GBØDX**: G3OZF, G4JVG, G4DOW, GØHSD. **GW3CSA**: GØKXL, G4WSE, GØIEQ, G3RTU, GØSTU, GØPZO, G1AOF. **GXØFDX**: GØIDE, GØNEI, GØLRE, GØKMU, G7NER, GØUCS, GØUSM. **GXØOBS**: GØIZM, GØKYM, G1MLK, G4JGV, G4JYE, G4WMH, 2E1BSL, 2E1BVK. **HA3KNA**: HA3OV, HA3NU, HA3NS, HA3FTA, HA3OU. **HG5M**: HA5BVD, HA5EH, HA5WA, HA5AWP, HA5MY, HA5BBC, HA5OF, HA5AGS, HA1WD. **HG6Y**: HA6DX, HA6NG, HA6OB, HA6OI, HA5BSW. **HH2PK**: HH2PK & T93A/5B4ADA.

HLØT: Club Group. **IB8S**: IC8SDL, IC8BNK, IC8JAH, IC8FBU, IC8HWN, IC8COF, IC8EEA, IC8GVV, IC8WIB, IC8WIC. **II2K**: I2KHM, IK2BUF, IK2UCK, I2UPG, I2AT, IK2SGF, I2GXS. **II9E**: IT9EWG & IT9KWF. **IL3/IK5VIA**: IK3AGY, IK3BSM, IK3HAQ, IK3PQH, I3THJ, IK3RIY, IK3RIZ, IK3WUX, IK3GHW, IK5VIA. **IO5A**: I5OYY, I5JHW, I5NSR, I5JAN, IK5NAW, IK5EKB, IK5PWC. **IR1ANT**: I1JQJ, I1HYW, I8IYW, IK1ADH, IK1GPG, IK1QFM, IK1TZO. **IR3X**: I3LTT, I3QKO, I3VFJ, IK3CSX, IK3GES, IK3HMD, IK3IEO, IK3QAR, IW3FT. **IR4T**: I4UFH, I4YSS, I4JMY, IK4IEE, I2VXJ, IK2HOG. **IU2D**: I2MQP, I2EOW, IK2ILH, IK2IKT, IK2FEQ, IK2MRZ, IK2MMF, IK2RJK, IK2EKY, IK2GAU, IK2THS.

IU4U: I4AUM, I4GAD, I4FYF. **JA1YDU**: JA9VDA & JHØNZN. **JA3ZOH**: JG3JEW, JI3OPA, JR4ISF. **JE3ZSZ**: JI3GER & JHØXUP. **JE6ZIH**: JR6GKT, JI6BRB, JG4KEZ. **JG2ZQZ**: JA2BY, JA2BIV, JA2JSF, JH2MYN, JI2KAR, JM2CCL, JO2BBC. **JH1YHS**: JF1MIA & JR7MZC. **JH5ZJS**: JA5BJC, JA5FDJ, JA5THU, JH5FXP, JR5PDX, JR5VHU. **JJ3Y8B**: JH1ORL & JI3EREV. **JT1M**: Club Group. **KØIJL**: KØIJL & AAØBY. **K3MD**: K3MD, KD3SF, N3VAV. **KC1F**: KC1F & N1AU. **KF8Y**: KB8AUX & KF8Y. **KF9PL**: KF9PL, K9ZO, N4DGW. **KI7WX**: K6XO & KI7WX. **KO6RW**: KO6RW & W8AKS/6. **KQ4HC**: KO4EW & KQ4HC. **KRØB**: KRØB, NØBKL, N9BDM, KSØT, AF9T, KAØJZV, KJØB, KBØKQA.

KT8X: KT8X, KC8EK, AA8AV, K8MJZ, KF8DF, NU8Z, WX3M, KG8CW, AA8U. **KU8E**: KU8E & NZ4K. **LA1R**: LA4EU, LA4GIA, LA3EDA, LA3SJA, LB3XE, LB3UE. **LU1FZR**: LU1FZR, LU6FWN, LU2FLN, AZ8FAG. **LU1HLH**: LU1HLH, LU6HPH, LU8HSO, LU9HVR, LU3HTS, Julio. **LU1YY**: Club Group. **LU4DRC**: LW1EXU, LW2DVY, LW4EUQ, LW7EIC. **LU8DZE**: LU8DZE, LW9ETY, LW9ETX, LW5ETX, LW4DYU, LU6DTS, LW9EUM, LU6DH. **LV1V**: LU1VV, LU1VK, LU2VDF, LU4VZ, LU9VY. **LY1DQ**: LY1DQ & LY3BHY. **LZ9A**: LZ1JY, LZ2CC, LZ2DF, LZ2HE, LZ2JE, LZ2PO, LZ2UU, LZ3SM, LZ3DJ, LZ1-F-184. **NØKFE**: NØKFE, NØPKX, KBØQJX.

N3BB: N3BB & AA5RB. **N4ZZ**: N4ZZ, KØEJ, W9WI. **N9ENA**: N9ENA, KB9FYB, N9XFH. **NCØP**: NCØP, WAØETC, WAØFLS, WRØG, WDØGVY, WOØV. **NE8T**: NE8T, N8CXX, N8BTU, K8CC. **NIØS**: WBØWVU, KCØZW, NØPDL, KDØAY, KBØJCB, NIØS. **NW2B**: NW2B, KF2XK, NO2T. **NX3Y**: N3ASU, N3MLV, N3MUV, AA3EZ, AA3JD, KA3QLF, NX3Y. **OE2S**: OE2GEN, OE2MON, OE2VEL. **OE3R**: OE1KYW, OE1BLU, OE3KLU. **OE8Q**: OE8KEK & OE8SKQ. **OH5NQ**: OH5LF, OH6EI, OH6LI. **OH6AD**: OH6KTR, OH6MHZ, OH6UV. **OH6AH**: ON5OO, ON6PV, OH6AH, ON6QR, ON6VL. **OH7AAC**: OH4LTK, OH6LNI, OH7KIR, OH7MHL, ON7WV.

OK1KNR: OK1TD, OK1DTP, OK1FHI, OK1MPX, OK1XKK. **OK2KJU**: Club Group. **OK2KOD**: Club Group. **OK8AHE**: DL4RU, OK1DIG, OK1GW. **OL5D**: OK1FOP, OK1HWB, OK1VCB, OK1UOS, OK1UMX. **OZ5EDR**: OZ1EIG, OZ1ELZ, OZ1IVA, OZ5ABD, OZ5LH, OZ6VG, OZ7MQ. **OZ7ALB**: OZ7TRE & OZ6ABZ. **OZ7ANT**: OZ1AXG, OZ1CJX, OZ1JRF, OZ4OA, OZ5AAM. **P39P**: 5B4AFM, 5B8AH, 5B8AJ, Nicholas, Petros. **P4ØV**: AI6V & N7NG. **PA3DWD**: PA3DWD, PAØCOR, PE1LAU, PE1OHL. **PI4COM**: PA3ERC, PA3BBP, PA3GBO, PA3EWP. **PI5ØALK**: PAØXAW & PA3DLA. **PT7C8**: PT7AA, PT7BZ, PT7CB, PT7NK, PT7OO, PT7WA, PT7WB.

RA3AWO: Gouskov, Voloshin, Zaslavsky, Smirnov. **RJ4W**: UA4WGU, RU4WJ, UA4WJF, Alexey. **RK9CWY**: RX9CAZ, RA9CJR, Rimma. **RN3D**: V. Chervykav, A. Boburkov, D. Boburkov, S. Titov, A. Bondarenko, S. Nikonov. **RU3A**: RA3AUM, RA3AUU, RK3DT, RU3FM, RN6MM, RV6HY, RX3ACS, RA9USU, UA6XGL. **RZ1AWJ**: UA1-169-1333 & UA1-169-14Ø. **S5ØD**: S53RY, S57AD, S58KW. **S53CAB**: S53MM & S53CC. **S53R**: S59Z & S53R. **S55T**: S51EA, S51FA, S56M, S57AL. **SKØUX**: SMØJHF, SMØKCO, SMØTQX, SMØORD, SMØMPV. **SKØWJ**: SMØSYP, SMØMLZ, SMØTHN, SMØHEP. **SK6AW**: SM6CDG, SM6CVE, SM6DED, SM6DER, SM6GBM, SM6HCX, SM6IQD, SM6MGZ, SM6MOJ, SM6UQJ, SM6VAO.

SK7MH: Club Group. **SM7AIO**: SM7AIO & SM7/YO9FVU. **SN9K**: SP9EIJ, SP9EPV, SP9IJU, SP9LJD, SP9SNK, SP9TCG. **SP2PMO**: SP2JKC, SP2AYC, SP2FOV, SP2WDW. **TM1C**: F5SNJ, F6CTT, F6EPH, F6FVY, F6HLC. **TM2V**: F6GLH, F6GYT, F1Ø881. **TM8A**: F2VX, F5OZF, F5RXL, F5SSG, F6EXV. **TO5GI**: F6GWV, F6HMQ, F6ASS. **TP8CE**: F6FQK, F5JFU, F6APU, DL3MBE, DF6VX, OZ5AAH, DL3KCE, KØSFN, DJ9ZB, DL6MFL. **UT7W**: UR5WCW, UR5WAN, UT7WZ. **VE2PZ**: VE2AUW, VE2DZS, VE2PFQ, VE2MAM, VE2WPZ, VE2PFD, VE2KCB, VE2ZV, VE2JJS, VE2VLL, VE2KRI. **VE3RM**: VE3RM & VE3WRL. **VE8YEV**: VE8NC, VE8CF, VE8GC, VE8GM.

VK4MZ: VK4MZ & VK4EMM. **VK6ANC**: VK6APK, VK6TKR, VK6NU. **VP2MDE**: K5GA, N5RP, W5ASP, VP2MFH, VP2MDJ, VP2MFS. **VX2LR**: VE2WJ, VA2RB, VA2SL, VA2LR. **VX3SK**: VA3SK, VA3MW, VA3PC, VE3SMP, KO4OE. **VX6AO**: VE6'S AMR, CIZ, EX, JAZ, KLO, NAO, BIR, DMD, FXR, KC, LSA, RAJ. **VX6JY**: VE6JY, VE6WQ, VE6SLV, VE6LDX. **VY9QR**: VE5DX, VE5SF, VE5CPU, VE5TP. **W1BK**: W1BK & K1TXH. **W6EEN**: W6EEN & K6XC. **W6YRA**: KC6LDO, KU6T, KC6LDS. **WA7IIM**: KA7AGH, WA7IIM, WA7OEM, W7TWL. **WB8ENR**: WB8ENR, N9AG, N8BJQ. **WK1P**: WK1P, N1KWF, KD1GJ, WA1ZYX. **WO9Z**: WO9Z, WB8ROE, WR9R.

WV6U: WV6U, KN6SO, WA6TKV, W6REC. **WX1Z**: K1KP, WX1Z, N1OEK, N2MZH, KB2R, WA1S. **WY3T**: N3JRX, N3KGL, KA3PVA, WB3AAL, WB3FYL, WI3L, WY3T. **WZ3T**: N3JLL, AA3AO, WC8R, WZ3T, NE3F. **XU95HA**: Romhanyi Judit & XU7VK. **XX9X**: DK5WL, DK5WN, OH6DO. **YT7P**: Sale, Srdja, Zoran, Alex, Mile, Mira. **YT9N**: YU7BW, 4N7ZZ, YU7LM. **ZY2HT**: PU2LSR & PY2PAH.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call denotes low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

SSB RESULTS
QRP/p SECTION

WORLDWIDE

JA6GCE	**A**	**599,860**	**616**	**337**
YU1KN	**A**	**552,570**	**664**	**489**
LY3BA	**A**	**446,250**	**632**	**375**
OK1DKS	**A**	**247,245**	**427**	**265**
N1AFC	**A**	**175,925**	**307**	**227**
KA1CZF	"	174,503	324	257
YU1LM	"	137,751	354	219
JR2BNF/1	"	113,580	256	180
LY3BY	"	97,200	301	200
UR6QA	**A**	**57,834**	**190**	**162**
N7JXS	**A**	**44,802**	**184**	**131**
HAØGK	**A**	**24,128**	**144**	**104**
UA9SFR	**A**	**22,176**	**95**	**84**
SP9NLI	**A**	**8,875**	**80**	**71**
YO4RDN	**A**	**8,215**	**60**	**53**
SP5PZQ	"	3,515	63	55
YO5CAL	"	2,695	49	47
PA3CAL	**A**	**2,583**	**45**	**41**
JE7DOT	"	2,436	32	29
WD9IAB	**A**	**2,193**	**45**	**43**
L5F	**28**	**37,296**	**134**	**111**
		(Op: LU1FNH)		
UY3CC	**21**	**173,493**	**332**	**223**
JH1HRJ	**21**	**116,660**	**232**	**190**
EA4CRU	**21**	**68,733**	**190**	**169**
LA5FBA	**21**	**40,171**	**175**	**139**
IK1TWC	**21**	**22,989**	**105**	**97**
VE6SH	**21**	**8,037**	**67**	**57**
WA6FGV	**21**	**3,360**	**61**	**56**
ES6RHB	**21**	**680**	**20**	**20**
RW9AB	**14**	**699,648**	**620**	**384**
DL9YEK	**14**	**61,773**	**203**	**177**
JH1GNU	**14**	**47,104**	**153**	**128**
JA2JSF	"	46,624	148	124
SO5TW	**14**	**10,800**	**90**	**80**
SP4CMW	**14**	**2,640**	**40**	**40**
SP9EWO	"	1,457	34	31
N8AXA	**14**	**1,219**	**25**	**23**
JK1OXU	"	680	52	50
SP2UUU	"	135	9	9
JA6UBK	**7**	**99,160**	**180**	**148**
JA2DLM	"	24,300	92	81
W1MK	**3.7**	**5,304**	**57**	**51**
SP8YDJ/P	**3.7**	**2,320**	**41**	**29**
DL1BWM	**3.7**	**544**	**19**	**17**
YL3GHD	**1.8**	**2,400**	**40**	**35**
LY3NJM	**1.8**	**126**	**10**	**9**
SP5NOG	**1.8**	**84**	**7**	**7**

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

KM1H	**A**	**6,966,176**	**2853**	**908**
		(Op: KQ2M)		
K5ZD	**A**	**2,415,520**	**1400**	**620**
N1HRA	**A**	**1,086,912**	**1052**	**544**
KD1NG	"	939,276	821	446
KZ1K	"	788,392	892	456
			(Op: K1PLX)	
K1YDG	"	537,732	648	383
KV1W	"	531,522	553	386
KA1DWX	"	251,694	328	237
KW1K	"	92,232	335	244
KA1MH	"	52,910	158	130
N1RJF	"	22,568	118	104
KC1XX	**14**	**4,787,328**	**2368**	**832**
K1KJT	"	826,200	899	486
K1DWQ	"	386,218	428	343
W1LQQ	"	71,484	175	161
WA1MKS	"	27,405	109	105
KE1Y	**3.7**	**1,295,050**	**1015**	**439**
KD1F	"	438,750	506	325
***WS1A**	**A**	**967,600**	**785**	**472**
***AA1EY**	**A**	**524,032**	**559**	**356**
*K8JLF/1	"	141,372	256	198
*AA1GV	"	68,484	204	156
*KD1TM	"	51,830	177	146
*KB1GW	"	40,832	150	128
*AE1D	"	17,388	106	92
*K1VSJ	"	3,636	39	36
*WA1WRH	"	1,144	23	22
***KA1VMG**	**28**	**3,626**	**48**	**37**
***W2IQL**	**21**	**79,659**	**201**	**167**
***WF1L**	**14**	**555,984**	**808**	**468**
*WV1C	"	20,748	119	114
KF2O	**A**	**1,090,880**	**813**	**487**
WB2YQH	**A**	**641,146**	**600**	**386**
W2HG	"	530,540	572	410
WB2RAJ	"	438,480	484	336
WR2V	"	351,302	436	322
WT2Q	"	181,035	284	243
NE2W	"	163,842	340	249
KU2Q	"	125,560	224	172
KD2KS	"	114,369	243	201
KS2G	"	80,808	200	168
WA2ABN	"	32,805	97	81
W2FXA	"	13,530	71	66
WV2HJK	"	11,193	101	91
K2EEK	**28**	**5,494**	**45**	**41**
N2MM	**21**	**787,520**	**810**	**428**
K2MGA	**14**	**376,278**	**464**	**357**
K2AW	"	140,616	253	217
KY2J	**3.7**	**620,916**	**617**	**354**
K1ZM	**1.8**	**327,712**	**736**	**308**
***K2QMF**	**A**	**567,760**	**513**	**376**
***N2INN**	**A**	**379,056**	**438**	**298**
*K2BQW	"	176,180	286	230
*KB2RAS	"	80,460	212	180
*N2PEB	"	61,194	180	141
*N2NYR	"	58,086	157	126
*AA2GS	"	35,910	138	114
*KD2UJ	"	18,675	90	83
*N2QIP	"	18,145	100	95
*WB2JFP	"	15,136	103	88
*N2OO	"	7,854	52	51
*W2LRO	"	5,850	102	45
*N2PSL	"	2,205	36	35
***N2YLG**	**14**	**4,758**	**42**	**39**
*WB2BAU	"	3,572	50	47
***W2FGY**	**7**	**11,526**	**52**	**51**
W3BGN	**A**	**4,289,229**	**2080**	**721**
K3ZO	**A**	**3,768,210**	**1852**	**745**
N3MKZ	**A**	**1,300,772**	**1037**	**517**
NY3Y	"	577,863	639	429
W3AP	"	375,463	463	319
NI3I	"	303,438	465	309
KB3AGZ	"	210,645	363	279
WA3DMH	**14**	**180,923**	**295**	**239**
W3GH	**7**	**712,008**	**776**	**396**
WE3C	**3.7**	**1,514,300**	**1064**	**475**
***WW3S**	**A**	**647,972**	**743**	**442**
*KD3HN	"	181,662	311	221
*WV3B	"	159,334	321	266
*K3WW	"	93,636	200	153
*AA3FY	"	42,600	181	157
*N3PGG	"	32,704	182	146
*AD8J	"	30,171	102	89
*NY3C	"	26,200	114	100
*KA3AVB	"	24,130	136	127
***N5OKR**	**28**	**24,480**	**150**	**102**
*KC3PZ	"	23,622	145	93
***WB2BZR/3/T**	**28**	**17,802**	**125**	**86**
***WJ3N**	**21**	**8,512**	**60**	**56**
***N3KIP**	**7**	**1,092**	**14**	**14**
WZ4F	**A**	**2,790,530**	**1785**	**722**
KI4HN	**A**	**2,758,682**	**1543**	**674**
KA4RRU	**A**	**2,487,148**	**1605**	**701**
NQ4I	"	2,222,208	1477	643
K4VUD	"	2,081,968	1592	641
WA4LZR	"	1,127,751	1021	501
			(Op: NX4N)	
KC4DWT	"	312,480	480	315
WB4BBH	"	225,828	340	246
W1ENZ	"	108,885	252	183
K3BYV	"	96,012	225	189
W4DGG	"	15,686	69	62
AD4ES	"	11,466	89	78
KC2X	**21**	**1,471,080**	**1127**	**552**
WC4E	"	772,708	758	454
N4BP	"	550,240	624	380
W4YDY	"	9,486	70	62
N4MM	**14**	**2,926**	**40**	**38**
KC4YM	**7**	**42,456**	**116**	**87**
KE4BM	**3.7**	**63,368**	**237**	**178**
W4TMN	"	4,320	51	48
AC4NJ	**1.8**	**149,940**	**447**	**238**
AA4MM	**1.8**	**88,400**	**386**	**200**
***AI2C**	**A**	**645,216**	**665**	**429**
***WA4ZXA**	**A**	**528,990**	**600**	**385**
*KI4DC	"	278,616	534	312
*KD4LHA	"	136,668	277	188
*AA4UF	"	134,568	354	252
*KC4FWS	"	74,433	167	129
*KS4KP	"	67,938	172	134
*K4BAI	"	21,505	102	85
*KI4KR	"	10,259	69	63
*KC4URW	"	3,636	37	36
*KD4HYT	"	3,193	35	31
***KD4HXT/T**	**28**	**24,596**	**123**	**86**
*KD4FTY	"	4,824	47	36
*K2YJL/M	"	3,162	40	34
*KD4TYE/T	"	1,080	24	15
*KE4GWV/T	"	990	20	18
***WA4YNP**	**21**	**954**	**20**	**18**
***KA4KFQ**	**14**	**443,785**	**505**	**391**
			(Op: N4MO)	
*WA6KUI	"	408,480	483	370
*N4YGY	"	329,406	452	341
*N4EUK	"	7,935	72	69
***W4YDD**	**3.7**	**9,120**	**63**	**60**
WM4Z/5	**A**	**1,386,606**	**1297**	**613**
KB5WWA	**A**	**679,572**	**782**	**439**
WA5SOG	"	97,200	231	180
N5FG	"	66,096	202	153
KY5N	**28**	**18,204**	**106**	**74**
W5VX	**21**	**1,200,933**	**1233**	**513**
KZ5D	**21**	**1,177,397**	**1052**	**533**
KI5JC	**14**	**665,529**	**933**	**489**
NJ1V/5	"	621,504	997	498
K5DC	"	252,960	393	310
W5KFT	**3.7**	**472,768**	**623**	**356**
KG5JH	"	72,900	400	225
KG5YA	**1.8**	**5,840**	**84**	**73**
***NZ5O**	**A**	**722,768**	**853**	**454**
***NT5D**	**A**	**436,536**	**623**	**376**
*N5OZB	"	269,267	441	293
*KJ5YM	"	246,750	401	250
*AB5SE	"	187,094	407	278
*WK5K	"	125,790	287	210
*W5ELI	"	44,690	141	109
*W5RNF	"	42,364	163	89
*KJ5RC	"	18,618	125	107
*WZ5J	"	3,010	54	43
*KO9X	"	1,612	30	26
***KB5NFZ/N**	**28**	**2,112**	**33**	**22**
***N5NMX**	**21**	**100,394**	**267**	**202**
***N5XGS**	**14**	**15,392**	**120**	**104**
***AB5HD**	**3.7**	**1,558**	**41**	**38**
K3EST	**A**	**4,957,470**	**2458**	**774**
K6HNZ	**A**	**1,755,365**	**1383**	**569**
W6TKF	**A**	**1,755,444**	**1483**	**607**
KM6YX	"	1,211,800	1388	584
KC6X	"	1,128,385	1214	565
NW6S	"	1,058,743	1012	527
KG6LF	"	772,317	999	483
AB6YL	"	409,944	519	348
N6IP	"	175,686	354	178
WA6TKT	"	43,568	145	112
NY6Y	"	8,520	69	60
W6BSY	**21**	**286,296**	**585**	**316**
KD6KKP	**14**	**84,102**	**564**	**262**
W6ISQ	"	3,264	34	34
N6RO	**3.7**	**822,120**	**829**	**372**
AB6ZV	**3.7**	**796,262**	**836**	**359**
***KK6RG**	**A**	**110,123**	**270**	**197**
*W6PYX	"	85,822	224	166
*WA8LLY/6	"	48,216	177	147
*AA6EE	"	6,237	75	63
***K6SVL**	**28**	**12,322**	**107**	**61**
***KU6T**	**21**	**20,352**	**110**	**96**
*WZ9J	"	10,082	71	71
N7AVK	**A**	**4,083,795**	**2388**	**755**
NB7N	**A**	**2,447,864**	**1881**	**697**
WA7FOE	**A**	**2,247,900**	**1736**	**708**
KC7V	"	1,814,961	1588	591
AJ7/JK2VOC	"	1,438,400	1775	464
W7SE	"	584,496	591	369
W7LZP	"	413,946	541	377
K7ABV	"	266,612	380	316
KC7UP	"	233,920	379	298
NN7F	"	233,640	520	360
AA7RW	"	198,996	338	276
W7LR	"	57,670	190	158
N9ITX/7	**14**	**636,022**	**871**	**487**
W7FP	"	445,146	592	439
W7AYY	"	106,704	233	208
KC7EM	**7**	**1,934,460**	**1080**	**495**
N7DD	**7**	**1,644,480**	**1034**	**480**
KA7T	**1.8**	**6,192**	**129**	**86**
***N7LOX**	**A**	**730,132**	**781**	**494**
***W7TSQ**	**A**	**327,980**	**472**	**310**
*AA7UN	"	300,240	742	417
*W7QN	"	257,022	480	327
*N7WWQ	"	233,621	384	271
*KA7PNH	"	81,075	329	235
*W7YS	"	35,028	163	139
*KA7KUZ	"	935	17	17
***WA7BNM**	**21**	**446,336**	**662**	**352**
*WJ7S	"	399,630	650	330
***W7HS**	**14**	**65,746**	**190**	**173**
*KC7JDL	"	9,372	87	66
WZ8T	**A**	**609,822**	**634**	**414**
NG8D	**A**	**546,190**	**558**	**386**
W8UPH	"	294,576	414	304
NE8I	"	163,760	289	712
NR8Z	"	104,632	218	164
K8DD	"	87,101	189	161
WB8Q	"	69,536	193	164
KA8UOT	"	68,614	204	169
K8MR	"	62,270	166	130
WB8BUQ	"	38,505	197	151
N8QVP	"	32,745	133	111
KB8ORO	"	27,734	108	98
W8IDM	"	8,256	54	48
KE8NH	**28**	**810**	**18**	**15**
KD8SQ	**14**	**69,006**	**181**	**159**
W8WG	"	1,127	23	23
KF8UM	**7**	**198,584**	**378**	**241**
K8DO	"	72,046	197	163
***N8LYM**	**A**	**250,525**	**379**	**275**
***K8QLK**	**A**	**201,933**	**343**	**241**
*KA8ZPE	"	118,656	249	192
*KF8VG	"	92,129	226	181
*KB8MBJ	"	77,914	200	163
*K8VW	"	33,580	127	115
*W8XY	"	528	33	33
***WB8ORV**	**14**	**159,848**	**276**	**232**
*WT8P	"	47,854	157	142
***WA8KEM**	**1.8**	**1,620**	**47**	**45**
KD9ST	**A**	**932,052**	**922**	**506**
KBØC	**A**	**618,260**	**592**	**380**
K9UQN	"	75,509	195	161
WR9I	"	23,896	122	103
WA9BOW	**21**	**89,908**	**230**	**182**
WE9V	**14**	**3,744,000**	**2157**	**832**
KK9A	**14**	**2,830,620**	**1722**	**764**
WB9OHJ	"	22,936	99	94
KS9K	**3.7**	**1,203,432**	**1077**	**492**
		(Op: NØBSH)		
***WA9CCQ**	**A**	**162,610**	**277**	**202**
***KF9VJ**	**21**	**5,406**	**55**	**51**
*NEØP/9	"	782	19	17
***W9JOO**	**14**	**178,176**	**290**	**256**
***AA9IA**	**7**	**52,216**	**144**	**122**
*K9FOH	"	26,492	84	74
***WOØS**	**1.8**	**5,220**	**108**	**87**
NXØI	**A**	**1,654,432**	**1269**	**656**
WAØACI	**A**	**383,843**	**561**	**337**
K4VX	"	230,155	331	241
WB8QFB	"	227,468	402	292
KMØL	"	192,000	328	256
W4ETO	"	164,045	265	215
WAØQZP	"	40,348	153	131
AAØUU	"	6,552	41	39
WØGFV	**28**	**1,564**	**23**	**23**
WØPPF	**14**	**42,024**	**148**	**136**
AAØFB	"	17,088	100	96
***ACØW**	**A**	**604,384**	**608**	**404**
***KAØWWT**	**A**	**299,132**	**443**	**332**
*K9BQL/Ø	"	228,165	367	265
*WAØBNX	"	86,699	215	181
*AAØVT	"	2,784	25	24
***AAØSO**	**21**	**27,927**	**131**	**107**
***AKØA**	**14**	**353,424**	**605**	**398**

JAMAICA

*6Y5DA	A	1,737,580	1610	533

BAHAMAS

*C6AFV	7	735,572	550	307

CUBA

*CM3JO	3.7	24,832	119	97

MARTINIQUE

TO2DX	3.7	1,568,320	850	416
		(Op: FM5CD)		
FM5DN	1.8	52,638	138	93

SAINT MARTIN

*FS5PL	A	7,528,698	3619	822
		(Op: WX9E)		

DOMINICAN REPUBLIC

*HI8ROX	21	400,554	549	306

PANAMA

*HP3/KG6UH	A	94,866	234	163

ALASKA

KF7S/KL7	A	796,365	774	347
WL7MA	7	771,776	682	248
*WL7EF	A	640,232	718	382
*NL7DU	"	14,976	78	72
*KL7FAP	14	137,550	274	210

US VIRGIN ISLANDS

KP2A	14	7,088,976	3165	912
		(Op: KW8N)		
*KP2BH	A	709,776	625	372
*NP2O	"	325,780	510	260

PUERTO RICO

*KP4VP	A	837,005	960	395

COSTA RICA

TE1C	7	7,281,630	1885	745
		(Op: TI2CF)		

CANADA

VA3MG	**A**	**3,061,422**	**1607**	**623**
XO5SF	**A**	**1,677,638**	**1135**	**499**
		(Op: VO1SF)		
VE7IN	**A**	**1,571,427**	**1037**	**481**
CJ4VV	**A**	**1,545,729**	**12130**	**489**
VE7JMN	"	470,532	600	347
VE7XO	"	272,020	357	268
XN5JA	**A**	**180,504**	**380**	**218**
VA2AM	**A**	**159,210**	**238**	**183**
VE3CWE	"	128,832	221	183
VE6NAP	**A**	**104,005**	**217**	**155**
VE4RP	"	64,960	162	145
VE3ZTH	"	39,151	124	119
VE1RAA	**28**	**37,024**	**137**	**104**
CJ3ZD	**21**	**105,560**	**226**	**185**
CJ7NTT	**14**	**4,951,782**	**2715**	**801**
VA3MM	**14**	**3,048,940**	**1833**	**628**
VE3KUK	"	1,273,596	994	503
VX3WTO	"	1,012,368	833	483
VE7NKI	"	897,438	1102	401
CJ5GC	**14**	**203,049**	**440**	**231**
VA2CO	**14**	**134,070**	**239**	**218**
CJ2DR	**7**	**2,294,496**	**1042**	**496**
CJ7SZ	**3.7**	**1,757,568**	**1052**	**398**
CJ3LRL	**3.7**	**518,514**	**542**	**267**
***CJ6JO**	**A**	**2,037,497**	**1506**	**563**
*CJ6V	"	1,124,840	981	488
			(Op: VE6FR)	
***CJ7CFD**	**A**	**862,218**	**1026**	**378**
***VE2AWR**	**A**	**291,276**	**368**	**261**
***VE3EL**	**A**	**26,690**	**101**	**85**
***VE3HX**	**28**	**1,134**	**21**	**18**
***VE9ST**	**21**	**167,757**	**295**	**199**
***XM7A**	**14**	**3,210,350**	**2009**	**715**
			(Op: VE7SV)	
***CJ2SPY**	**14**	**948,930**	**802**	**470**
***VE6BMX**	**14**	**548,034**	**666**	**379**
***VE3QMM**	**3.7**	**32,040**	**103**	**89**

MEXICO

6D2X	**A**	**10,530,432**	**4109**	**864**
			(Op: K5TSQ)	
6D2A	"	539,608	680	296
***XE3LMV**	**A**	**157,752**	**511**	**252**
***XE3JCT**	**21**	**135,608**	**473**	**253**
***XE2AC**	**3.7**	**1,596**	**21**	**21**

ANGUILA

*VP2EN	A	5,744,520	3032	729
		(Op: AA4NC)		

MONTSERRAT

*VP2MGF	A	1,092,136	1199	422
		(Op: WB9HRO)		

TURKS AND CAICOS

*VP5A	A	2,178,100	1525	575
		(Op: KN4UG)		

CAYMAN ISLANDS

*ZF1DX	14	1,394,193	1492	447
		(Op: W8BLA)		

AFRICA

KENYA

5H3CK	21	3,049,410	1900	546
		(Op: I4LCK)		

NIGERIA

5NØMVE	A	1,415,826	1008	471
*5N3/SP5XAR	14	129,315	236	185

MAURITANIA

*5T5JC	A	2,877,105	1654	583

ZAIRE

9Q5TT	21	2,211,552	1494	504
		(Op: ON6TT)		
*4U9Q	A	183,816	362	207
		(Op: ON6TT)		

CANARY ISLANDS

ED8OR	A	14,809,145	4391	949
		(Op: OH1XX/DU1)		
EA8BWW	14	2,782,494	1530	611
EA8AFJ	7	624,510	410	257
*EA8BXQ	A	99,520	206	160
*EC8AAZ	21	18,177	83	73

CUETA & MELILLA

EA9AM	A	15,832,824	4326	1022
		(Op: EA3NY)		
ED9LZ	7	6,047,504	1620	631
*EA9AR	A	838,420	693	412

LIBERIA

*EL2PP	A	9,699,256	3337	872

MAYOTTE

FH5CQ	A	1,857,962	1403	449

SOUTH AFRICA

ZS6BRH	A	655,175	611	359

ASIA

AZERBAIJAN

4JØ/UX9IZ	14	4,956	42	42

ISRAEL

4X2T	A	7,933,335	3215	835
*4X6DK	A	84,736	222	128
*4Z4TA	14	67,496	160	143
*4Z5FW	14	725	29	25

KUWAIT

N6BFM/9K2	21	5,275900	2828	700

TAIWAN

BV/JQ1VNM	A	1,879,780	2002	463
BV/JP1RIW	7	80	4	4

TURKMENISTAN

EZ8BO	14	3,737	38	37

KOREA

HL5BVQ	**A**	**20,713**	**111**	**77**

SAUDI ARABIA

HZ1HZ	**A**	**1,152,473**	**921**	**427**
7Z5OO	"	347,256	425	273
			(Op: K3UOC)		

JAPAN

JA7BEW	**A**	**1,165,626**	**903**	**462**
JE3ZFS	**A**	**1,137,600**	**898**	**480**
			(Op: JF2QNM)		
7J1ABC	"	380,844	500	284
JA1PEJ	"	183,643	303	227
JA9CCG	"	84,819	209	147
JA2QVP	"	32,732	114	98
JA3CE	"	4,726	36	34
JA4RTX	"	1,196	24	23
JI2UNR	**21**	**1,587,320**	**1185**	**516**
JE2PCY	"	92,781	213	169
JE2HYS	"	91,287	213	161
JHØEPI	"	64,894	174	142
JA1XPU	"	3,952	42	38
JA5EXW	**14**	**1,712,502**	**1105**	**558**
JA8RJE	**14**	**1,007,930**	**766**	**490**
JH6AUS	"	784,080	709	440
JH7QXJ	"	392,156	453	316
JG4AKL	"	378,672	436	322
JA7FFN	**7**	**8,080**	**45**	**40**
JA2ESR	"	1,470	7	7
***7K3OWM**	**A**	**457,164**	**516**	**324**
***JJ1VRO**	**A**	**381,225**	**441**	**299**
*JR4GPA	"	374,255	485	289
*JE1LFX	"	298,809	394	279
*JA1BUI	"	263,978	313	286
*JFØSGW	"	250,162	346	274
*JA6SRB	"	246,168	355	263
*JE9EMA	"	237,180	360	236
*JA1GYO	"	193,536	313	224
*JS1UMQ	"	171,900	288	191
*7K1EHK	"	140,230	244	185
*JG1TVK	"	112,470	223	163
*JHØHON	"	101,430	204	161
*JE9LLO	"	96,866	214	154
*JH7BMZ	"	86,154	181	166
*JG1JQJ	"	83,904	222	152
*JI3MVQ	"	69,069	182	143
*JQ2BBC	"	60,030	169	145
*JA1QN	"	55,692	164	126
*JA1BRL	"	48,816	153	108
*JA3LDH	"	43,435	136	119
*JA4GXS	"	41,496	140	104
*JE1UFF	"	40,595	150	115
*JA2GHP	"	37,476	137	108
*7J1ABD	"	37,100	134	100
*JR1MRG	"	34,496	134	88
*JA1ASO	"	33,128	115	101
*7N2UQC	"	26,790	111	94
*JG5OYU	"	26,160	106	80
*JA1AB	"	23,545	102	85
*JH4FUF	"	20,775	109	75
*JH1JGZ	"	20,292	103	76
*JA6AQV	"	20,240	101	88
*JH2WHS	"	19,360	91	80
*JH1TYU	"	19,180	85	70
*JA1STY	"	15,192	85	72
*JE3TAT	"	11,466	72	63
*JI1RCB	"	10,260	74	57
*JA9DDF/2	"	9,450	61	54
*JH9WSX	"	7,301	64	49
*JA2BEY	"	6,656	56	52
*JA4HIX	"	3,774	40	37
*7N3IWA	"	1,674	29	27
*JA1EIS	"	495	13	11
*JI7WPV	"	253	11	11
*JH8UQJ	"	243	10	9
***JH2ABL**	**28**	**10,384**	**106**	**59**
*JA1VVH	"	364	13	13
*JA1AAT	"	132	13	11
***JF3NLQ**	**21**	**552,420**	**612**	**330**
***JR7WAB**	**21**	**322,344**	**461**	**296**
*JL1MWI	"	245,079	366	261
*JR9VNB	"	221,440	338	256
*JI1FDF	"	211,508	344	253
*JAØBMS/1	"	158,118	284	219
*JE1XCZ	"	130,260	257	195
*JR7LVK	"	86,154	204	166
*JE9HVF	"	78,500	190	157
*JS1KQQ	"	74,536	196	154
*JA6QDU	"	63,990	172	135
*JJ6TWQ	"	53,317	151	131
*7M2CAG	"	51,870	152	133
*JJ2TQO	"	38,985	126	115
*JA9BLD	"	34,020	127	105
*JI4WHS	"	26,976	116	96
*JA5EO	"	18,249	91	77
*JE6UXS	"	14,129	78	71
*JG1RDV	"	12,012	73	66
*JA3MXP	"	10,324	66	58
*JH1RMH	"	9,976	64	58
*JA4AQR/3	"	4,446	44	39
*JG1GCO	"	1,725	25	25
*JA3FZI	"	1,716	26	22
*JE1HXZ	"	1,540	24	22
*JJ1NUI	"	1,500	26	25
*JF2PXB	"	688	16	16
*JQ1AHZ	"	656	17	16
*JR3KAH	"	234	10	9
***7M1MCT**	**14**	**549,081**	**560**	**361**
***JN2QCV/9**	**14**	**174,600**	**303**	**225**
*JH6SQI	"	62,906	170	142
*JL2ICO	"	27,720	112	90
*JAØHYU	"	14,819	80	73
*JA9KUG	"	10,320	70	60
*JE1LGY	"	2,697	31	31
*JA7AXP	"	2,378	32	29
*JR1GGB	"	1,368	24	19
*JG3WCZ	"	833	17	17
*JA1POS	"	792	23	18
***JR7OMD/2**	**7**	**102,240**	**159**	**142**
*JE2UFF	"	59,496	127	111
*JA2NNF	"	36,694	90	83
*JA1NYV	"	2,990	25	23
*JE6GIQ	"	2,548	27	26
***JF6OJX**	**3.7**	**5,282**	**22**	**19**
*JE1SPY	"	1,116	18	18

MONGOLIA

JT1CC	**A**	**80,196**	**259**	**163**

TURKEY

***TA2ZI**	**A**	**242,979**	**420**	**199**
			(Op: W6POK)		

ASIATIC RUSSIA

RZ9UA	**A**	**7,142,014**	**2712**	**909**
UA9MR	**A**	**1,913,922**	**1156**	**529**
UA9AR	"	1,038,684	796	404
RA9AA	**21**	**105,549**	**248**	**151**
RW9UZZ	**7**	**758,550**	**602**	**325**
			(Op: UA9UST)		
***UA9USK**	**21**	**430,236**	**664**	**323**
*UA9UPR	"	282,726	527	278
***RK9CYA**	**14**	**159,358**	**267**	**218**
			(Op: RA9CKQ)		
*RA9XSL	"	159,341	260	221
*UA9QCP	"	14,466	66	63
RAØFU	**A**	**2,002,104**	**1378**	**552**
RUØSN	**A**	**1,625,552**	**1041**	**566**
UAØSR	"	1,405,162	1039	506
UAØWY	**14**	**2,503,236**	**1405**	**674**
UAØJQ	"	1,789,942	1236	650
RZØLWA	**7**	**38,640**	**148**	**80**
			(Op: RWØLMF)		
RAØFA	**3.7**	**44,640**	**133**	**93**
***UAØAPP**	**A**	**47,082**	**158**	**133**

KAZAKHSTAN

UNØG	**14**	**671,760**	**653**	**360**
***UN9PQ**	**21**	**17,982**	**81**	**74**
***RN9XA**	**7**	**5,642**	**32**	**31**

INDIA

***VU2PTT**	**21**	**40,959**	**173**	**123**

EUROPE

CROATIA

9A7A	**14**	**3,919,505**	**2159**	**785**
			(Op: 9A3ER)		
9A2TX	"	11,775	85	75
9A4D	**1.8**	**305,728**	**482**	**272**
			(Op: 9A2LH)		
***9A/SP6MLX**	**A**	**366,424**	**553**	**326**
*9A3QK	"	254,700	473	300
*9A3ZG	"	162,925	344	245
***9A1CEI**	**21**	**77,920**	**200**	**160**
*9A2A	21	38,794	124	119
			(Op: 9A2FM)		
***9A3NU**	**14**	**177,822**	**369**	**267**
*9A1CDD	"	5,484	69	66
***9A3KR**	**1.8**	**99,552**	**255**	**183**

ANDORRA

C31OF	**1.8**	**123,888**	**285**	**174**

PORTUGAL

CT1EEN	**A**	**1,019,788**	**1148**	**473**
CS5AUO	"	224,553	376	289
CT1BNW	**14**	**59,004**	**149**	**132**
***CT6EAT**	**A**	**310,534**	**416**	**287**
*CS6EDX	"	210,160	400	284
*CT1QF	"	45,892	181	154
***CT1ETE**	**28**	**42,560**	**145**	**112**
*CQ7ERK	"	33,888	128	96
*CQ5ELF	"	8,640	66	48
*CT1EDJ	"	1,848	28	22
***CT1END**	**21**	**151,536**	**360**	**264**
***CT88WW**	**14**	**905,625**	**993**	**525**

GERMANY

DL8PC	**A**	**2,146,080**	**1350**	**680**
DF6QV	**A**	**2,016,576**	**1374**	**648**
DL1NCT	**A**	**861,445**	**778**	**457**
DL1APW	"	795,434	776	463
DL8UCC	"	438,064	509	343
DL1ZFG	"	321,470	457	305
DK5AD	"	307,440	465	315
DK4IO	"	236,600	400	280
DF5NF	"	230,040	382	284
DL9ZBG	"	138,663	272	213
DK7ZT	"	123,336	260	216
DK3KD	"	107,445	240	195
DF3TE	"	94,550	320	155
DL9SEV	"	78,754	220	169
DK5KJ	"	66,528	378	176
DL1ASF	"	44,044	171	154
DL4HRT	"	22,695	97	85
DL2JDS	"	17,085	100	85
DL3HWW	"	6,840	64	57
DL7YS	"	6,336	49	48
DL5AUJ	"	2,262	29	29
DL3ME	**21**	**4,280**	**40**	**40**
DJ5LA	**14**	**1,996,530**	**1390**	**610**
DL4MHU	"	126,968	329	236
DL2JX	"	108,790	267	215
DL3KUM	"	9,750	85	75
DKØNK	"	49	7	7
DL7VMM	**3.7**	**24,780**	**121**	**105**
***DAØIU**	**A**	**1,038,233**	**979**	**497**
			(Op: DL2OBF)		
***DF1IAZ**	**A**	**572,460**	**716**	**406**
*DJ6NI	"	454,135	575	359
			(Op: DL1MGB)		
*DL3JAN	"	287,339	507	299
*DK6BT	"	239,294	388	298
*DL5IO	"	192,210	366	258
*DL1ARK	"	118,917	288	219
*DL3DBY	"	97,121	270	197
*DK7ZH	"	81,468	200	168
*DL5XAT	"	72,275	240	175
*DL3HRA	"	59,422	177	146
*DL9GMN	"	59,400	189	150
*DL2AKF	"	52,884	176	156
*DL1RNH	"	46,982	175	139
*DL4FDR	"	42,714	152	126
*DL3HWM	"	41,344	137	136
*DL1DWT	"	31,680	133	110
*DL8FP	"	22,172	100	92
*DL3ABL	"	17,510	102	85
*DL2DWA	"	16,188	80	71
*DL8DZL	"	14,342	81	71
*DL5ANS	"	12,456	78	72
*DL4JTW	"	6,063	66	47
*DL7UFR	"	5,684	55	49
*DL3NBL	"	3,741	45	43
*DL2YAK	"	1,131	32	29
*DF9NS	"	627	22	19
***DL3BRA**	**21**	**56,199**	**165**	**131**
*DL1JPL	"	44,368	148	118
***DL9BCL**	**14**	**92,000**	**266**	**200**
*DL8EAQ	"	16,236	100	99
*DJØBX	"	13,884	100	89
*DL3DRN	"	1,440	26	24
*DL8URJ	"	384	16	16
***DL5FDA**	**3.7**	**264,810**	**564**	**273**
			(Op: T94CQ)		
*DJ6QO	"	128	8	8
***DL8AAE**	**1.8**	**4,140**	**51**	**45**

SPAIN

EA7DHP	**A**	**2,173,878**	**1587**	**639**
EA2IA	**A**	**1,827,328**	**1270**	**664**
EA1UX	**A**	**1,364,218**	**1306**	**547**
EA5GRC	"	1,230,939	1100	587
EA1JO	"	421,648	533	361
EA5BD	"	207,350	368	280
EA1FGJ	"	88,706	242	194
EA2CCG	"	73,620	216	180
EA5JC	"	64,074	204	157
EA7CWA	"	48,216	168	143
EA1AW	"	45,012	150	132
EA7BR	"	24,592	106	96
EA5CRU	"	1,998	40	37
ED1CON	**7**	**167,316**	**251**	**191**
EA1US	"	75,046	200	157
EA5BY	"	52,836	146	119
EA5ADC	"	4,758	41	39
EA3ELM	**3.7**	**192,000**	**341**	**240**
EF2KRK	"	64,528	190	148
EA4KD	**1.8**	**94,240**	**201**	**152**
***EA3GJH**	**A**	**1,252,284**	**1114**	**537**
***EA3BKI**	**A**	**1,225,434**	**1068**	**537**
***ED7BHP**	**A**	**1,109,349**	**1230**	**543**
*EA5AL	"	914,000	856	457
*EA3FP	"	914,000	856	457
*ED1KN	"	875,748	813	501
*EA5ZI	"	619,056	800	432
*EA7AGW	"	596,410	820	430
*EA7GXD	"	426,777	562	353
*EA1DAX	"	283,241	446	301
*EA1AJV	"	264,972	465	311
*EA1IF	"	231,933	475	313
*EA7HDQ	"	225,008	401	287
*EA1EVQ	"	222,402	410	303
*EA1GRP	"	200,610	390	270
*EA1MK	"	177,898	365	262
*EA3EXU	"	172,571	398	277
*EA7RU	"	155,480	342	260
*EA3ESZ	"	125,249	267	251
*EA3GHQ	"	110,880	242	180
*EA5CMQ	"	77,376	200	186
*EA3DVJ	"	75,922	231	187
*EA3FAJ	"	71,552	220	172
*EA5YJ	"	60,131	180	157
*EA3EYJ	"	59,570	200	161
*EC1AKV	"	38,364	163	138
*EA5WX	"	38,144	145	128
*EA3GHZ	"	37,760	163	160
*EA7CWV	"	33,524	130	116
*EA1ETN	"	29,500	128	118
*EA1AUM	"	26,378	134	121
*EA5GJT	"	21,400	113	107
*EA3EVR	"	20,710	100	95
*EA3GFW	"	19,900	144	100
*EA3ELZ	"	14,365	93	85
*EA1EBJ	"	12,936	154	84
*EC2BAW	"	8,246	65	62
*EA1BLF	"	7,524	58	57
*EA1DLN	"	7,524	58	57
*EA4EIS	"	3,332	37	34
*EC5AFN	"	2,800	40	40
*EC4DJY	"	1,456	28	26
*EA7GGP	"	156	6	6
***EA7FTR**	**21**	**807,824**	**955**	**464**
***EA3CWS**	**21**	**417,942**	**535**	**321**
*ED3HH	"	152,656	315	232
			(Op: EA3ANM)		
*EF1AA	"	122,208	435	228
			(Op: EC1ACJ)		
*EA2AKP	"	68,208	206	164
*EA7AIG	"	62,361	183	169
*EC3ABU	"	35,105	142	119
*EC3CTQ	"	34,596	172	124
*EC7CWV	"	32,032	188	143
*EA5AAJ	"	31,464	120	114
*EC3CMT	"	5,355	56	51
***EA5GRL**	**14**	**95,794**	**378**	**227**
*EA5FJL	"	51,246	147	117
*EA1FFC	"	50,318	221	181
*EA1AAA	"	18,645	121	113
*EA3AMV	"	8,400	78	75
***EA3CWT**	**3.7**	**242,088**	**365**	**262**
***EA1DVY**	**1.8**	**8,832**	**52**	**46**

BALEARIC ISLANDS

EA6ZS	**A**	**5,880**	**64**	**60**

MOLDOVA

ER5DX	**21**	**58,437**	**166**	**129**
***ER3DX**	**14**	**158,883**	**370**	**251**
***ER3AAQ**	**3.7**	**13,664**	**116**	**112**
*ER3ZZ	"	2,496	55	48

ESTONIA

ES1OX	**14**	**77,592**	**300**	**212**
ES1QD/Ø	"	27,720	151	120
***ES1QD**	**21**	**19,747**	**107**	**91**

BELARUS

EW6TU	**14**	**53,350**	**294**	**181**
EU6EU	**1.8**	**3,354**	**41**	**39**
***EU4EU**	**A**	**3,948**	**48**	**47**
***EU4BD**	**7**	**26,260**	**112**	**101**

FRANCE

TM7XX	**A**	**5,444,698**	**2373**	**851**
			(Op: F5MUX)		
TM3U	**A**	**2,866,824**	**1691**	**696**
			(Op: F6DZU)		
F8WE	"	890,919	995	459
F2AR	"	495,732	600	379
F5TGR	"	110,940	175	172
F5POJ	"	74,655	225	189
F6DZD	"	39,600	140	120
F5LGQ	"	21,146	106	97
F6FUN	**14**	**39,664**	**151**	**134**
F2EE	**7**	**2,882,922**	**1560**	**581**
F5FHI	**7**	**1,352,736**	**1023**	**462**
***F6JHL**	**A**	**144,692**	**370**	**244**
*F5PCX	"	127,525	281	225
*F6FNA	"	105,565	277	215
*F5YJ	"	97,970	241	194
*F6DLM	"	47,610	160	138
*F9XA	"	20,296	128	118
***F6BVB**	**21**	**155,760**	**296**	**240**
***F5BEG**	**3.7**	**277,680**	**433**	**267**

ENGLAND

GØAEV	**28**	**25,947**	**122**	**93**
G3NLY	**3.7**	**1,148,364**	**1003**	**434**
***G6QQ**	**A**	**41,905**	**171**	**145**
*G4NXG/M	"	29,610	117	105
***G3YOG**	**21**	**13,552**	**84**	**77**

NORTHERN IRELAND

***GIØKOW**	**21**	**901,478**	**881**	**479**
***GIØUJG**	**14**	**2,224,320**	**1801**	**662**

SCOTLAND

GM3BCL	**A**	**292,285**	**459**	**325**
GM4NNC	"	170,856	217	168
GM4PVC	"	52,122	187	146

WALES

GW4BLE	**A**	**6,133,923**	**2442**	**853**

HUNGARY

HA3NU	**A**	**185,976**	**319**	**246**
HA3OU	"	3,774	40	37
***HA4GDO**	**A**	**24,440**	**137**	**104**
***HG8QB**	**28**	**7,878**	**53**	**39**
***HA8PH**	**14**	**281,766**	**563**	**302**
*HA4FB	"	205,700	450	275
*HA4YV	"	28,842	157	114
***HA7RC**	**7**	**40,992**	**147**	**122**
***HA4FV**	**3.7**	**206,736**	**451**	**236**
*HA4XG	"	56,848	180	136

SWITZERLAND

HB9AWS	**A**	**40,125**	**166**	**125**
HB9BVR	**14**	**607,274**	**850**	**337**
***HB9NN**	**A**	**4,838**	**59**	**41**

ITALY

IR8A	**A**	**6,221,171**	**2617**	**869**
			(Op: I8QLS)		
II6F	**A**	**1,893,125**	**1287**	**625**
			(Op: I6FLD)		
IO4A	**A**	**1,305,726**	**1142**	**538**
			(Op: IK4PVR)		
IV3UHL	"	680,559	776	451
IK8CHL	"	606,792	738	393
IK6GPZ	"	178,711	313	233
IK3XZX	"	79,629	149	127
IK4CBM	"	26,676	125	108
IK1MEG	"	18,426	96	83
IR4B	**21**	**956,130**	**816**	**471**
IQ4L	"	692,160	673	420
IN3XUG	"	144,092	285	221
IK2IKW	"	6,273	55	51
I8XVP	**14**	**1,706,523**	**1492**	**611**
IV3TMV	**14**	**1,171,251**	**1024**	**543**
IQ8A	"	543,456	714	408
			(Op: IK8HJE)		
IQ6I	"	425,196	672	381
			(Op: IK6CAC)		
I3VHO	"	5,808	50	48
II3T	**7**	**2,670,472**	**1397**	**602**
			(Op: IV3TAN)		
I5JFG	"	48,384	181	144
IN3ZNR	**3.7**	**739,970**	**858**	**385**
IV3YYK	**3.7**	**723,000**	**867**	**375**
IK2QEI	"	720,384	823	384
***IQ8X**	**A**	**537,209**	**679**	**389**
***IO2L**	**A**	**435,710**	**612**	**374**
			(Op: I2OKW)		
*IO7G	"	254,609	408	289
*IR7V	"	197,847	397	267
			(Op: IK7VJX)		
*IQ7J	"	168,264	349	246
			(Op: IK7JWX)		
*IK7RVY	"	167,896	416	248
*IK3SCB	"	77,175	213	175
*IK3OII	"	71,370	223	183
*II0BI	"	66,402	200	153
*I3YVK	"	34,875	170	93
*IK8XVE	"	34,290	140	127
*IK8IFW	"	33,840	158	141
*IK8YFU	"	17,945	110	97
***IK2ODD**	**28**	**9,800**	**69**	**50**
***IB4M**	**14**	**5,125,020**	**2584**	**916**
			(Op: I4ABF)		
*IQ7A	"	411,320	831	364
			(Op: IK7XIV)		
*II2R	"	154,704	350	264
			(Op: IK2QPR)		
*I4PZP	"	118,721	281	227
***IR4R**	**7**	**712,920**	**699**	**390**
			(Op: IK4ALM)		
*IOØKHP	"	70,437	239	159
*IK7WPD	"	2,812	40	37

SARDINIA

ISØODV	**3.7**	**83,776**	**263**	**154**
***ISØGSR**	**A**	**173,444**	**370**	**262**
*ISØLLJ	"	61,370	199	170

SICILY

IT9AJP	**A**	**127,232**	**335**	**256**
IU9S	**14**	**4,592,434**	**2869**	**847**
			(Op: IT9BLB)		
***IR9B**	**14**	**2,097,405**	**1795**	**635**
			(Op: IT9STX)		

SVALBARD

JW/DF6JC	**14**	**1,811,326**	**1426**	**586**

NORWAY

LA2IR	**A**	**184,604**	**307**	**266**
LA1PHA	"	21,100	111	100
LA7CL	"	15,010	108	95
LA2MJA	**14**	**107,206**	**330**	**242**
LA7AK	**7**	**26,500**	**123**	**106**
***LA2AD**	**A**	**67,483**	**254**	**179**
*LA2WHA	"	29,264	156	118
*LA2MV	"	10,191	82	79

LUXEMBOURG

LX1NO	**7**	**1,913,624**	**1549**	**502**
LX1UN	**3.7**	**351,208**	**634**	**286**
***LX1HX**	**A**	**685,584**	**817**	**414**
*LX1JH	"	45,584	183	148
***LX9UN**	**7**	**507,180**	**705**	**321**
			(Op: LX1KC)		

LITHUANIA

LY2IJ	**A**	**1,898,528**	**1425**	**632**
LY2BN	"	345,654	502	346
LY2KM	"	284,260	490	305
LY2OX	"	179,324	355	254
LY3BQ	"	4,802	54	49

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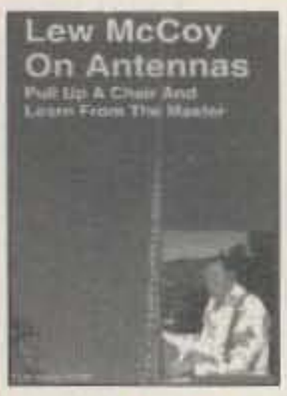

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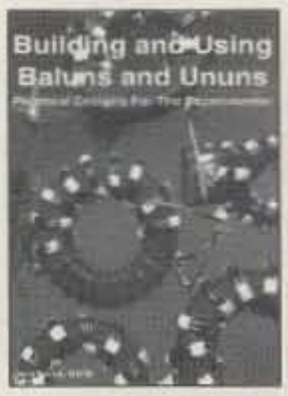

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Learn with this video how veteran operators set up their satellite stations. Find out how to locate and track ham satellites with ease. Watch as operators access current satellites and contact far ranging countries around the world. This video is filled with easy to understand advice and tips that can't be found anywhere else.

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Order No. VHOR.....$19.95

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LY2IC	**14**	**302,900**	**555**	**325**
LY1BYK	"	144,495	364	247
			(Op: LY2BAH)	
LY1FW	"	143,175	322	249
LY2LA	"	100,064	342	212
LY2AE	"	58,080	206	165
LY3BX	**7**	**451,792**	**627**	**302**
LY6M	**3.7**	**1,196,506**	**1194**	**437**
			(Op: LY1DS)	
LY1DR	"	820,914	948	379
LY2BM	"	156,140	358	211
LY2QJ	"	21,888	121	96
LY3BS	**1.8**	**222,300**	**434**	**234**
***LY2FN**	**A**	**563,560**	**762**	**386**
*LY2TZ	"	155,364	3435	242
*LY3KB	"	31,152	155	132
***LY2BUU**	**7**	**173,886**	**321**	**219**
***LY2OU**	**1.8**	**29,256**	**134**	**106**

BULGARIA

LZ1BJ	**A**	**153,035**	**351**	**241**
LZ6R	**21**	**142,128**	**299**	**188**
LZ1KNP	**7**	**283,864**	**446**	**259**
			(Op: LZ3SF)	
***LZ4BU/P**	**A**	**259,515**	**300**	**219**
*LZ1DM	"	143,664	351	219
***LZ2GS**	**28**	**8,112**	**59**	**48**

AUSTRIA

OE5SPW	**A**	**105,669**	**256**	**199**
OE1WWL	"	40,755	103	95
OE5BGN	**21**	**302,253**	**460**	**259**
OE3R8B	**14**	**581,584**	**844**	**326**
***OE1GOA**	**A**	**38,184**	**144**	**129**
*OE1WEU	"	13,351	85	79
*OE1FBU	"	6,180	60	60
***OE3MCS**	**14**	**94,671**	**268**	**201**
***OE5D/2**	**7**	**10,452**	**80**	**67**

FINLAND

OH8LQ	**A**	**3,916,380**	**2272**	**780**
OH1AD	**A**	**3,746,961**	**2110**	**789**
			(Op: OH1WZ/3)	
OH1EH	**A**	**3,413,591**	**2138**	**769**
OH1BV	"	867,495	818	453
OH1AF	"	126,195	249	179
			(Op: OH1NSJ)	
OH2VZ	"	72,360	150	135
OH1TD	"	32,154	162	138
OH1BOI	"	5,600	56	50
OH1AB	"	21	4	3
			(Op: OH1NSJ)	
OH1JD	**14**	**2,980,569**	**1788**	**717**
OH6IU	"	415,614	811	339
OH3WS	"	111,972	311	258
OH6OS	**7**	**245,980**	**351**	**245**
***OH6KZP**	**A**	**165,966**	**421**	**278**
***OH7TO**	**A**	**157,200**	**370**	**262**
*OH6QP	"	53,940	198	155
*OH7NW	"	39,093	201	157
*OH2RL	"	15,500	102	100
*OH6RC	"	408	17	17
***OH4MDY**	**21**	**152,900**	**351**	**220**
***OH3NM**	**14**	**33,220**	**159**	**151**
***OH3MFP**	**3.7**	**18,400**	**101**	**92**

CZECH REPUBLIC

OK1ARI	**28**	**8,601**	**71**	**47**
OK1RI	**21**	**2,982,240**	**1709**	**720**
OK1LL	"	198,198	332	242
OL3C	**14**	**901,968**	**925**	**437**
OL2M	**3.7**	**754,754**	**856**	**377**
***OK1KT**	**A**	**442,352**	**509**	**348**
***OK1BA**	**A**	**207,060**	**392**	**255**
*OK2SWD	"	55,632	200	152
*OK1DXW	"	45,885	163	133
*OK1AOU	"	17,400	115	100
***OK2TBC**	**21**	**239,258**	**398**	**227**
*OK2PCL	"	9,842	100	37
***OK2BEE**	**14**	**150,766**	**346**	**242**
***OK2PJW**	**3.7**	**216,580**	**463**	**238**

SLOVAKIA

OM8A	**A**	**6,351,870**	**2605**	**870**
OM4HL	**21**	**371,358**	**495**	**299**
OMØWR	**14**	**2,290,476**	**1622**	**652**
***OM3PC**	**A**	**141,414**	**294**	**222**
*OM3OM	"	124,033	270	203
*OM3RDP	"	90,272	277	182
*OM3IF	"	27,720	132	110
***OM7PY**	**21**	**3,500**	**40**	**35**
***OM6RM**	**14**	**25,920**	**152**	**108**
***OM3KUN**	**7**	**63,940**	**222**	**139**
*OM7AG	"	16,800	90	80
***OM7V**	**3.7**	**217,056**	**436**	**238**
*OM2SM	"	9,728	76	64

BELGIUM

ON6AA	**A**	**1,097,200**	**863**	**520**
ON9CCQ	"	227,329	413	281
			(Op: VE3ZZ)	
OT5T	**7**	**4,403,994**	**1774**	**679**
			(Op: ON4UN)	
ON4BW	"	673,024	741	352
ON9CJM	**3.7**	**1,223,880**	**669**	**310**
			(Op: WQ2M)	
***ON4TO**	**A**	**594,864**	**663**	**432**
*ON6CR	"	216,398	385	287
*ON4XG	"	128,594	293	226
*ON4CU	"	100,498	220	218
***ON7BJ**	**21**	**24,415**	**110**	**95**
***ON4ALW**	**14**	**405,750**	**555**	**375**
*ON7RN	"	150,784	315	256

DENMARK

OZ5EV	**A**	**6,468,090**	**592**	**447**
OZ1IWE	"	470,448	498	324
OZ1CCB	**21**	**4,995**	**51**	**45**
OZ1KRF	**14**	**710,112**	**751**	**416**
OZ1INN	"	509,658	665	346
***OZ1ACB**	**A**	**176,530**	**369**	**254**
*OZ8T	"	86,580	235	180
*OZ1JSH	"	65,880	249	190
*OZ7HAM	"	42,344	163	134
*OZ8OY	"	20,895	114	105
*OZ6PI	"	10,680	101	89
***OZ1FMO**	**7**	**3,870**	**45**	**43**
***OZ3SK**	**1.8**	**111,452**	**295**	**187**

THE NETHERLANDS

PAØIJM	**14**	**764,670**	**861**	**426**
PI5ØWAL	**7**	**2,958**	**61**	**51**
			(Op: PA2CHM)	
***PA3EMN**	**A**	**352,070**	**539**	**323**
*PAØKHS	"	233,778	403	282
*PA3AEB	"	50,796	187	153
*PA2ALF	"	39,285	157	135
***PAØDOM**	**21**	**8,400**	**58**	**56**
***ZS6IR/PA**	**7**	**91,848**	**236**	**172**
***PAØMIR**	**3.7**	**155,940**	**318**	**226**
*PA2SWL	"	118,384	291	196

SLOVENIA

S57W	**A**	**644,780**	**788**	**412**
S53BM	"	517,032	611	387
S51AY	**28**	**140,967**	**347**	**207**
S57DX	**21**	**1,460,592**	**1055**	**552**
S59L	"	382,083	500	303
S5ØA	**7**	**4,536,756**	**1642**	**714**
S5ØC	**7**	**3,646,830**	**1491**	**645**
			(Op: S55OO)	
S57AW	**3.7**	**1,719,468**	**1179**	**486**
S53EA	**3.7**	**1,245,342**	**1065**	**447**
S57O	"	1,214,904	1003	454
S51WB	"	705,794	859	359
S59KW	"	623,896	622	364
S58AB	**1.8**	**416,806**	**563**	**299**
S52CD	**1.8**	**422,532**	**570**	**291**
S5ØM	"	146,970	316	207
***S5ØR**	**A**	**2,716,285**	**1631**	**715**
*S53BB	"	75,411	208	171
*S53DX	"	44,968	184	146
***S52UT**	**14**	**1,096,290**	**966**	**474**
*S57J	"	708,390	790	463
*S57U	"	440,216	656	392
***S54ZZ**	**7**	**830,700**	**946**	**355**
*S52JG	"	50,400	148	126
***S57FYL**	**3.7**	**93,766**	**260**	**173**
***S59VM**	**1.8**	**84,320**	**233**	**170**

SWEDEN

SM7UFW	**A**	**530,587**	**630**	**391**
SM7DXQ	"	180,200	352	265
SM3CER	"	14,060	84	74
SM5OK	"	12,246	83	78
SM6CDG	"	3,995	49	47
SMØKV	**21**	**5,145**	**50**	**49**
SK3LH	**14**	**1,986,952**	**1548**	**674**
			(Op: SM3PZG)	
SM5LPO/Ø	"	668,548	826	421
SMØHTO	**7**	**813,254**	**470**	**403**
***SM7RZF**	**A**	**99,456**	**237**	**192**
*SMØBOS	"	84,630	228	195
*SMØFM	"	40,664	151	136
*SM6FJY	"	11,248	84	74
***SM5BDA**	**21**	**34,650**	**125**	**125**
***SM6SHF**	**14**	**34,181**	**169**	**133**
*SM5DUT	"	16,830	108	102
*SM7HSP	"	14,694	102	93
*SM6AHU	"	9,272	89	76
*SM7AIL	"	6,136	72	59
***SK4UW**	**3.7**	**1,980**	**33**	**30**
			(Op: SM4JHK)	

POLAND

SP6CIK	**A**	**319,808**	**471**	**304**
SP9HZF	**A**	**275,172**	**485**	**276**
SP6IXF	"	200,753	357	241
SP7VCK	"	59,361	157	141
SP9LDP	"	41,088	160	128
SP7MGD	"	22,050	98	75
SP8GEY	"	21,218	113	103
SP9LAB	**28**	**8,832**	**67**	**46**
SP5GRM	**14**	**2,789,352**	**1710**	**684**
SQ5O	"	179,256	366	264
			(Op: SP5IUK)	
SQ6CWP	"	95,400	290	200
SP6COK	**7**	**251,262**	**460**	**243**
SP9EML	7	30,360	127	110
***SP6KEP**	**A**	**485,298**	**551**	**342**
***SP3SLA**	**A**	**464,232**	**635**	**348**
*SP7SEW	"	461,664	645	336
*SP7LZD	"	364,863	561	314
*SP9UOG	"	184,574	301	229
*SP7DZA	"	177,310	360	238
*SP5BB	"	139,416	300	222
*SP2AHD	"	119,476	281	238
*SP8EEX	"	115,200	262	200
*SP9KRT	"	113,484	285	193
*SP5GKN	"	103,558	241	182
*SP8UFB	"	98,580	240	212
*SP8OON	"	84,711	220	187
*SP9JXC	"	83,056	237	179
*SP9MDY	"	64,107	196	153
*SP1EOI	"	50,160	168	152
*SP6LK	"	43,335	152	135
*SP9LKS	"	23,859	139	99
*SP2WDW	"	18,100	100	100
*SP9LAS	"	6,116	47	44
***SP6OJG**	**21**	**7,100**	**53**	**50**
***SP9RFF**	**14**	**20,425**	**109**	**95**
*SP8HXN	"	10,944	88	72
***SP9CAY**	**7**	**73,224**	**192**	**162**
*SP9XCN	"	64,930	205	151
*SP6AGD	"	31,236	128	114
***SP9IKN**	**3.7**	**6,710**	**62**	**55**
*SP6PAX	"	1,972	30	29
*SP5SSB	"	50	6	5
***SP5JTF**	**1.8**	**4,982**	**54**	**47**

GREECE

SV2BFN	**A**	**1,000,825**	**1172**	**475**
SVØAN	"	998,082	843	366
SV2YC	**14**	**15,900**	**103**	**100**
***SV1DET**	**21**	**194,796**	**502**	**252**
*SV2CWY	"	94,245	264	183
***SV2AEL**	**7**	**107,508**	**240**	**186**

BOSNIA

T93M	**14**	**1,379,148**	**1435**	**562**

TURKEY

TA1FA	**A**	**336,832**	**666**	**304**
***TA1BM**	**14**	**72,090**	**292**	**178**

EUROPEAN RUSSIA

RV3AQ	**A**	**763,000**	**1008**	**436**
RA1AA	**A**	**752,852**	**995**	**428**
UA3ZU	"	402,984	741	348
RA3FH	"	217,916	448	314
RA3LZ	"	32,154	151	138
UA4LM	**21**	**463,639**	**726**	**373**
UA6NZ	**14**	**492,456**	**725**	**426**
UA1CKC	"	374,339	629	371
UA3PP	"	235,500	489	750
RA3VV	**3.7**	**157,176**	**368**	**222**
RU4AA	**1.8**	**89,950**	**265**	**175**
***RU4WE**	**A**	**129,092**	**360**	**236**
*UA4AHA	"	105,028	337	217
***UA4PNT**	**21**	**133,504**	**408**	**224**
*RA4NAJ	"	6,600	65	55
***RU3D**	**14**	**602,536**	**851**	**451**
***UA3DPX**	**7**	**110,630**	**233**	**185**
***UA4PNX**	**3.7**	**138,012**	**269**	**217**
*RA3WA	"	88,408	264	172
*RU1AO	"	36,844	150	122
***RV1CC**	**1.8**	**32,944**	**150**	**116**

KALININGRAD

UA2FX	**14**	**1,979,454**	**1401**	**618**
UA2FZ	**7**	**2,312,416**	**1188**	**569**
UA2FF	**1.8**	**252,164**	**451**	**242**
***UA2FB**	**A**	**1,206,445**	**1111**	**505**

UKRAINE

UT7QF	**A**	**3,771,176**	**2241**	**769**
UTØD	**A**	**3,094,989**	**1723**	**691**
UT4UZ	**A**	**2,779,602**	**1854**	**687**
UR7E	"	1,820,637	1571	567
			(Op: UR5EDU)	
UT3UZ	"	1,175,856	1134	524
UX4UM	"	1,120,600	1102	520
UX7MM	"	1,064,952	1152	504
US6UN	"	1,048,014	591	402
UT8IM	"	472,246	821	389
UXØMM	"	411,245	712	353
UY5TE	"	305,228	565	308
UT4PZ	"	40,500	150	150
UT5UGR	"	34,398	158	126
UX5UO	**28**	**4,375**	**45**	**35**
UU8J	**21**	**307,976**	**664**	**274**
			(Op: UU7JF)	
EM7Q	**14**	**638,165**	**954**	**451**
			(Op: UR5QN)	
UY1I	"	364,704	733	348
			(Op: UT3IQ)	
US9LJ	"	265,680	577	328
UX7I	**7**	**622,204**	**709**	**358**
US5QRW	"	265,738	422	257
UY2ZA	"	191,060	308	233
UY5ZZ	**3.7**	**469,300**	**700**	**325**
UT5UT	"	251,160	445	273
UT7ND	"	173,628	380	234
***UR5EAT**	**A**	**1,389,150**	**1403**	**567**
***UX8I**	**A**	**599,589**	**873**	**419**
*UR3MP	"	283,994	533	298
*UT4PR	"	226,502	471	218
*UR3PDM	"	137,500	322	220
*UR4LCB	"	54,849	210	141
*UR5WHT	"	54,135	176	135
*UT8IA	"	53,694	211	157
*UY1HY	"	43,740	163	135
*UR5BCJ	"	23,175	121	103
***US5ZZ**	**21**	**27,648**	**125**	**96**
*US5ZE	"	12,544	100	56
*UT1IF	"	2,952	36	36
***UR5ZOK**	**14**	**580**	**27**	**20**
***UX2VZ**	**7**	**85,936**	**200**	**164**
***UT4LW**	**1.8**	**47,348**	**192**	**133**
*UT1ZZ	"	5,088	55	53
*UR7IAY	"	874	26	23

LATVIA

YL1ZD	**A**	**16,892**	**103**	**82**
YL2GN	**7**	**433,192**	**578**	**313**
***YL2TW**	**A**	**1,872,640**	**1364**	**640**

ROMANIA

YO3FRI	**A**	**189,750**	**434**	**253**
YO2LIN	**3.7**	**88,894**	**263**	**169**
***YO7LFV**	**A**	**566,506**	**781**	**382**
*YO2DFA	"	325,992	551	289
*YO3JF	"	184,260	437	249
*YO9AGJ	"	82,696	251	179
*YO6OEK	"	68,440	160	116
***YO3RU**	**28**	**5,217**	**48**	**37**
***YO7DAA**	**21**	**14,520**	**160**	**117**

YUGOSLAVIA

4NØAV	**A**	**5,218,445**	**2421**	**815**
			(Op: YU7AV)	
YT1AD	**A**	**3,161,570**	**1732**	**773**
YU8DX	"	127,906	259	204
YT9C	**21**	**925,568**	**846**	**448**
			(Op: YU1IG)	
YT1AU	"	38,564	140	124
YU7SF	"	3,552	46	37
YTØEXY	**14**	**2,016,972**	**1543**	**626**
			(Op: YU1KW)	
YZ1U	**3.7**	**208,500**	**482**	**250**
			(Op: YU1BBA)	
***YU7AL**	**A**	**325,380**	**485**	**319**
*YU7YZ	"	17,222	117	209
***YZ7A**	**21**	**312,432**	**445**	**283**
			(Op: Charlie)	
***YU1NR**	**14**	**1,159,524**	**1188**	**558**
***YU7KM**	**3.7**	**67,942**	**221**	**161**
***YZ1MB**	**1.8**	**42,120**	**157**	**130**

MACEDONIA

Z3ØM	**14**	**2,790,564**	**2274**	**717**
			(Op: Z32XX)	
***Z32KV**	**A**	**31,050**	**156**	**115**
***Z32JA**	**21**	**719,928**	**760**	**404**
***Z31GB**	**7**	**144,200**	**291**	**206**
***Z31GX**	**3.7**	**527,520**	**647**	**336**

ALBANIA

ZA1AJ	**21**	**164,220**	**307**	**210**
ZA1AB	**14**	**4,860**	**86**	**54**
			(Op: OH1MKT)	

OCEANIA

THE PHILIPPINES

DU1COO	**14**	**183,340**	**319**	**206**
DU1SSR	"	133,960	246	197

HAWAII

WR6R/WH6	**A**	**9,907,968**	**3203**	**798**
WH6CQH	**28**	**41,587**	**167**	**91**
N6VI/KH6	**14**	**3,981,344**	**2002**	**664**
KH6FKG	"	1,410,300	1092	450
K6GSS/KH6	**7**	**1,721,004**	**853**	**346**
***WH6LU**	**28**	**5,676**	**51**	**44**
*NH6YK	"	5,670	61	45
***KH6GMP**	**21**	**314,842**	**451**	**242**

SAIPAN

WHØAAV	**14**	**465,340**	**617**	**265**

PAPUA NEW GUINEA

P29NR	**A**	**1,124,750**	**932**	**409**

AUSTRALIA

VK5GN	**A**	**3,915,877**	**1726**	**587**
VK3TZ	**A**	**2,318,316**	**1134**	**572**
VK2ARJ	**28**	**27,413**	**127**	**79**
VK3EW	**7**	**3,222,576**	**1100**	**504**
***VK3SM**	**14**	**5,085**	**133**	**45**
***VK8BE**	**14**	**1,380**	**25**	**20**

INDONESIA

YC5JEN	**21**	**56,800**	**166**	**142**
***YB6INU**	**A**	**1,019,890**	**850**	**395**
*YB2CPO	"	553,828	621	307
***YC3BC**	**21**	**652,460**	**663**	**340**
*YC8FEJ	"	153,295	465	115
*YC3SPS	"	105,966	217	174
*YC6PUP	"	56,507	167	121
*YC1JZF	"	27,657	150	63

NEW ZEALAND

ZL1AXB	**28**	**186,189**	**414**	**159**
ZL4AS	**7**	**133,840**	**173**	**140**
***ZL2TT**	**A**	**728,594**	**747**	**337**

SOUTH AMERICA

CHILE

3G1X	**A**	**6,736,656**	**2366**	**879**
			(Op: CE1IDM)	
CE6DFY	**21**	**960,540**	**795**	**420**
XR4M	**14**	**463,136**	**525**	**328**
			(Op: CE4MLN)	
***CE2EZE**	**7**	**67,156**	**124**	**103**

URUGUAY

CX4SS	**A**	**31,050**	**105**	**90**
CX7BY	**14**	**1,688,568**	**1099**	**529**
***CX6VM**	**21**	**1,663,365**	**1031**	**561**

ECUADOR

HC1OT	**A**	**11,115,725**	**3575**	**925**
HC2HM	**14**	**2,367,378**	**1351**	**603**
HD2RG	"	922,580	522	326
***HC1/KE4EWI**	**A**	**19,847**	**97**	**89**
***HC1NWW**	**7**	**69,336**	**125**	**107**

COLOMBIA

***HK3JJH**	**A**	**2,238,150**	**1035**	**694**

ARGENTINA

LT6E	**A**	**8,428,628**	**3227**	**898**
			(Op: LU6ETB)	
***L37N**	**A**	**3,257,067**	**1608**	**687**
			(Op: LU2NI)	
***LU8ADX**	**A**	**1,514,442**	**1028**	**519**
*LU5ER	"	601,650	591	382
*LU5EWO	"	185,130	284	242
*LU8HLI	"	166,608	288	234
*LU4DFH	"	135,170	241	205
***L3HL**	**28**	**881,892**	**821**	**393**
			(Op: LU7DW)	
***LU1MA**	**28**	**843,980**	**780**	**380**
*LU3HIP	"	811,590	740	390
*LU2DW	"	781,280	732	380
*LU4OJS	"	594,145	622	331
*LW1DIP	"	244,185	391	223
*LU3OJZ	"	233,590	350	235
*LW2DBM	"	176,813	321	203
***LW2EOC**	**21**	**275,544**	**362**	**267**
***LU5FCI**	**14**	**1,758,447**	**1118**	**549**
*LU6AMD	"	467,172	491	342
*LU5EVK	"	23,901	106	93
***LW1ECO**	**7**	**8,352**	**0**	**0**
***LW8EXF**	**3.7**	**240**	**13**	**12**
*L7F	"	150	14	10
			(Op: LU7FEU)	

PERU

OC4EI	**A**	**2,070,310**	**1235**	**590**

ARUBA

P4ØR	**A**	**15,705,995**	**4932**	**947**
			(Op: K4UEE)	

NETHERLAND ANTILLES

PJ9T	**A**	**3,821,925**	**1832**	**655**
			(Op: AB4JI)	

BRAZIL

PQØMM	**A**	**8,428,698**	**3003**	**846**
			(Op: PP5JR)	
PY2OU	"	47,492	137	124
PT7SD	"	24,570	100	91
ZVØW	**28**	**1,553,050**	**1216**	**445**
ZY5C	**28**	**1,232,144**	**1017**	**424**
ZW5B	**21**	**14,095,142**	**4534**	**1054**
			(Op: PY5EG)	
PY4OY	**21**	**6,532,974**	**2702**	**823**
PY3BD	"	586,333	566	353
PP5MQ	"	71,632	177	148
ZV5AM	**14**	**201,966**	**307**	**246**
ZW5DU	"	26,500	114	100
PU5FBS	**3.7**	**1,176**	**27**	**21**
***PW2N**	**A**	**1,272,245**	**939**	**481**
			(Op: PY2NY)	
*ZY2APQ	"	357,675	464	285
*PXØA	"	88,202	211	166
*PU2KXK	"	990	18	15
***PY2OZF**	**28**	**107,535**	**291**	**201**
***PP5UA**	**21**	**1,527,760**	**1007**	**520**
*PY2XW	"	9,515	65	55
***PT2AW**	**14**	**115,388**	**240**	**182**

FERNANDO DE NORONHA

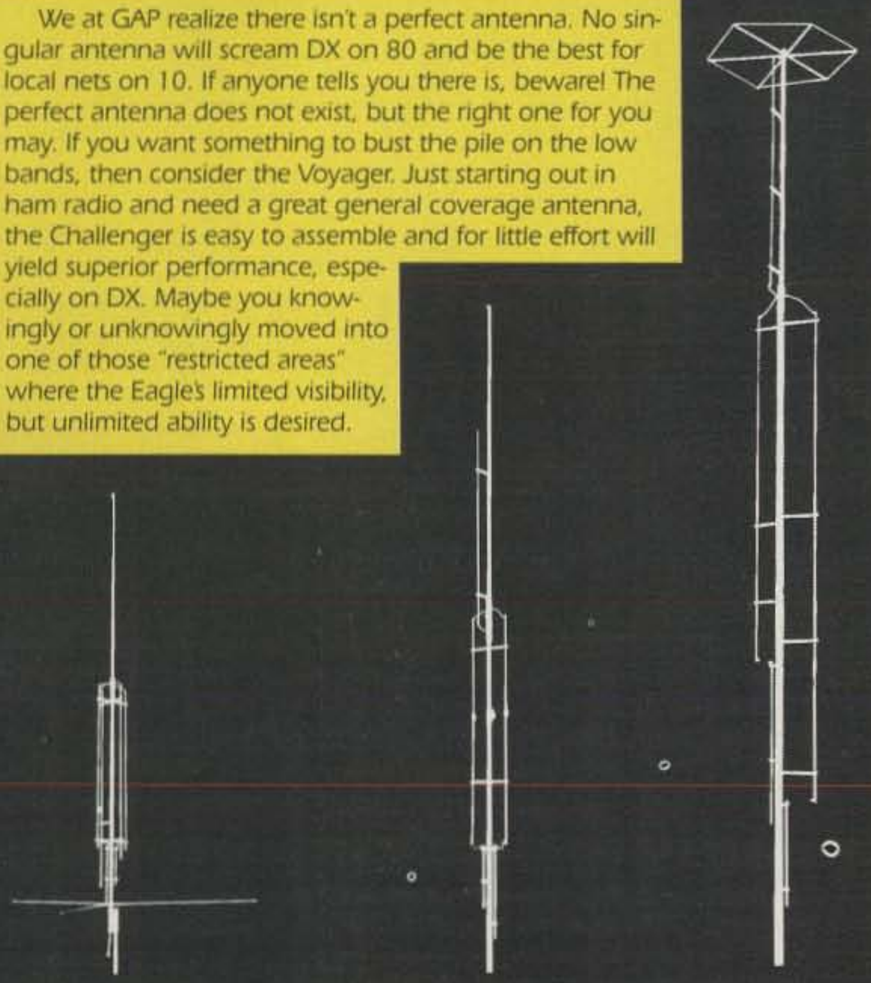
PYØFM	**14**	**9,660,432**	**3482**	**939**
			(Op: PY5CC)	

VENEZUELA

YW5P	**14**	**1,890,432**	**1179**	**547**
			(Op: YV5FGL)	

GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX · Challenger DX · Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

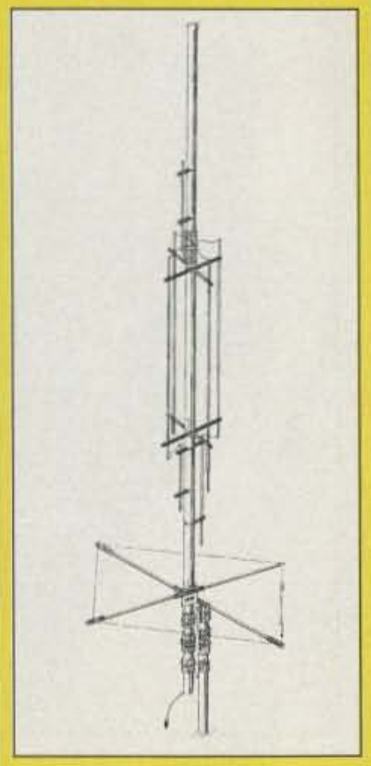
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

New Release: TITAN DX



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX (Just Released)			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$289
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

GAP ANTENNA PRODUCTS INC.
6010 N. Old Dixie Hwy.
Vero Beach, FL 32967

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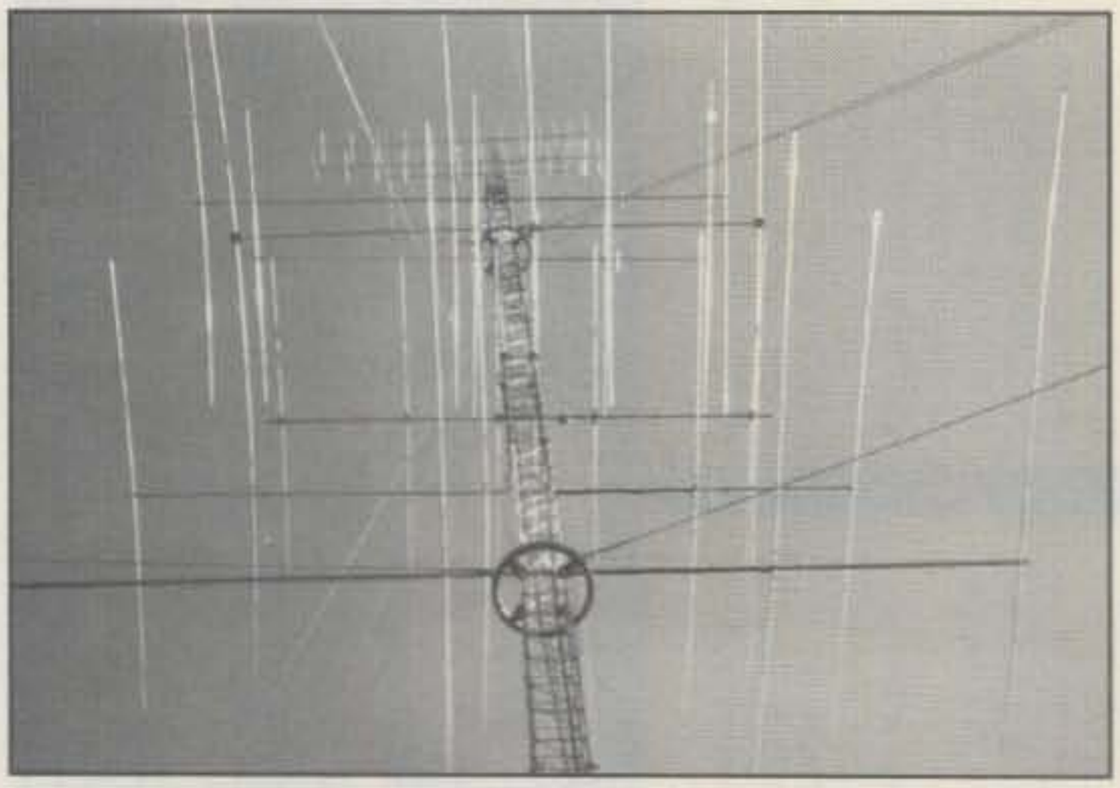

For those who like antenna pictures, this is the impressive array of OH1EH. It's a 140 footer with five elements on 10, four over four on 15 and 20, and three elements on 40.

This is the operating site of OT5A. Don't we all wish we had a moat surrounding our station to keep out the neighbors!

YV5A		7	4,581,048	1349	579
			(Op: YV5JDP)		
4M5R		7	2,119,368	793	466
			(Op: YV5MRR)		
YV4FZM		3.7	320,022	265	207

PARAGUAY

ZP6XR		A	5,552,129	2440	781
ZPØY		21	12,406,668	4211	997

SINGLE OPERATOR ASSISTED

UNITED STATES

KA2AEV		A	4,670,150	2142	713
KY2T		"	3,146,504	1694	724
W6XR/2		"	1,647,564	1142	547
WAØPUJ		A	1,452,562	1201	631
WA4CHI		"	1,435,532	1344	614
KC3MR		A	1,108,480	944	512
NE9U		A	1,089,327	974	551
NO9Z		"	878,570	916	490
KW4T		A	803,200	823	502
N1CC/2		"	794,200	747	475
KA7ZUM		A	707,520	942	480
KCØZC		"	659,858	766	482
N1NQD		A	338,621	417	307
NØAXL		"	335,175	517	327
WA3WJD		"	293,411	415	305
K1TO		"	268,840	320	235
AA6MC		A	242,780	420	305
KD6UO		"	206,184	310	213
N1AU		"	187,920	293	216
WB2TNL		"	161,472	296	232
AA8OT		A	149,694	262	183
K8CV		"	139,800	264	200
N6CCL		"	113,778	245	189
K3KO		"	100,890	211	171
AB2E		"	89,586	271	189
K9OSH		"	79,128	200	157
K3IXD		"	78,711	219	173
NN3Q		"	76,388	219	169
N1KWJ		"	57,852	171	126
KE3GA		"	54,516	157	132
KA2CKJ		"	53,550	182	150
K3LA		"	51,456	170	134
KBØISS		"	50,173	151	131
KA5W		A	49,056	172	146
***KE4FZB**		A	47,676	144	116
NØAT		"	46,080	133	128
W3KV		"	40,424	135	124
WE9A		"	40,200	129	120
***AA1CB**		A	30,875	154	125
K5EC		"	25,168	112	104
K8CX		"	16,102	110	97
NW8F		"	14,742	96	81
W4JVN		1.8	2,176	35	34

DX

ZS9F		A	4,115,088	1958	697
S59AA		A	1,631,112	1199	584
IN3ASW		A	1,465,830	1148	580
F5NBX		A	1,278,720	1000	555
ED5OL		A	1,140,736	1010	557
JF1SEK		A	1,073,237	813	473
EA3ADK		"	957,096	944	504
IØ2A		"	801,121	826	457
VX3VET		A	675,612	542	383
S56A		"	507,276	584	378
***VX3TA**		A	456,960	471	336
DL5IC		A	376,532	466	338
DF1IC		"	303,638	428	314
GWØARK		A	260,996	416	284
***PA3AAV**		A	187,854	337	262
JG3KIV		"	181,441	306	221
IKØNGI		"	121,030	355	247
IK4QJH		"	103,525	256	205
VA3NR		"	97,968	203	156
***EA1DDO**		A	81,654	243	186
***JA7SUR**		A	39,820	138	110
IK2PHE		"	37,674	146	126
LU7HLF		28	904,383	812	391
***7L1FPU/1**		21	141,040	271	215
CJ7SBO		14	2,041,571	1367	623
IR6A		14	1,005,178	1030	541
IK6VXO		"	371,460	418	302
EA3CB		14	187,050	348	290
***VE2JDR**		14	102,289	211	187
***IT9LTA**		14	74,005	240	205

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

N3BB	4,916,969	2509	821
KT8X	4,133,184	2194	824
NE8T	4,119,200	2108	800
WX1Z	3,416,129	1862	761
N4ZZ	2,669,586	1832	733
WV6U	2,664,116	1834	676
KU8E	2,330,498	1438	667
NCØP	1,986,023	1454	673
KF9PL	1,935,780	1391	660
KQ4HC	1,748,916	1363	606
KRØB	1,735,000	1284	625
KØIJL	1,624,784	1249	623
NX3Y	1,580,904	1067	563
WB8ENR	1,529,440	1197	605
WY3T	1,512,864	1338	612
WK1P	1,335,129	978	557
W6EEN	1,254,825	1002	495
NW2B	1,179,023	975	521
KC1F	1,170,700	928	509
WO9Z	1,115,400	851	520
AEØM	855,782	780	379
KI7WX	812,500	1013	500
K3MD	773,882	890	478
WZ3T	763,969	975	499
NIØS	715,008	745	448
AB7BS	624,310	822	419
NØKFE	379,090	492	334
W1BK	218,526	328	242
WA7IIM	218,159	361	269
N9ENA	210,112	350	268
KD6RW	137,781	296	189
KF8Y	112,068	264	198
W6YRA	51,740	176	130

NORTH AMERICA

HH2PK	14,583,380	5027	980
TO5GI	8,298,000	3673	922
VP2MDE	7,852,355	3005	785
VX2LR	6,717,150	2714	825
CK7U	6,317,729	2619	743
VX6JY	5,879,510	2649	845
VE2PZ	5,155,692	2321	752
VY9QR	4,567,221	2450	683
VE3RM	4,516,851	1923	727
CJ2ZP	3,939,620	1783	701
VX3SK	2,748,592	1404	616
VX6AO	2,011,100	1468	476
VE8YEV	50,040	166	120

AFRICA

EA8BR	13,399,103	4113	947
CT9M	12,286,732	3765	878

ASIA

P39P	9,633,638	3819	763
XX9X	9,078,220	4731	820
JH5ZJS	8,625,760	3301	845
C49C	8,552,816	3715	718
JJ3YBB	5,196,106	2182	773
JE6ZIH	4,727,190	2201	713
JA3ZOH	4,556,552	2033	728
JA1YDU	3,643,644	1710	674
JG2ZQZ	2,073,890	1200	559
RK9CWY	1,527,104	1064	428
XU95HA	1,310,290	1500	463
JH1YHS	1,280,433	903	483
HLØT	274,245	510	235
JT1M	5,060	49	44
JE3ZSZ	1,400	26	25

EUROPE

TM1C	13,710,246	4267	1023
IR4T	11,434,064	3499	1016
LZ9A	11,311,089	3617	1069
CT5P	10,180,656	4061	976
CT8T	9,428,172	3733	1014
F9IE	7,470,876	2841	906
OE2S	6,744,965	2926	905
TM2V	6,672,330	3012	882
GBØDX	6,067,548	2729	921
S55T	5,980,425	2544	825
HG6Y	5,847,744	2659	912
DF7RX	5,488,728	2358	883
IO5A	5,421,300	2529	850
DKØEE	5,236,875	2761	855
DJ6QT	4,765,770	2252	855
OH7AAC	4,536,252	2412	846
EA3CWK	4,526,400	2303	800
TM8A	4,393,278	2207	846
SKØUX	4,227,795	2000	803
OH5NQ	4,212,104	2189	808
IU2D	4,140,800	2123	800
SN9K	4,135,194	2344	777
RJ4W	4,090,275	3146	735
HG5M	4,068,176	2382	784
OH6AH	4,056,507	2064	819
UT7W	3,941,621	2093	821
EA1NK	3,798,951	2162	767
RN3D	3,751,634	2343	746
YT9N	3,681,752	2381	712
II2K	3,666,016	1995	782
RU3A	3,543,300	2190	762
IU4U	3,496,800	1848	744
PA3DWD	3,394,622	2084	737
EA3FP	3,184,490	1809	790
S5ØD	3,031,875	1726	735
G4UJS	2,873,286	1810	702
TP8CE	2,658,684	1980	651
IR1ANT	2,588,390	1842	718
RA3AWO	2,574,187	1779	707
ED3TR	2,393,160	1646	660
LY1DQ	2,335,850	1664	682
DAØTJM	2,329,590	1522	670
F6KBF	2,252,506	1455	674
S53R	2,196,761	1282	581
EW1WC	1,987,804	1605	602
9A1HBC	1,905,000	1307	625
DLØRH	1,763,575	1416	605
GXØFDX	1,643,140	1332	580
IB8S	1,640,730	1340	601
SP2PMO	1,615,180	1269	581
OE8O	1,576,750	1221	595
SKØWJ	1,499,025	1301	575
EA3RKG	1,488,350	1154	578
GXØOBS	1,394,171	1071	557
DFØRI	1,322,565	1061	555
ED1URS	1,209,390	1117	546
OK8AHE	1,203,042	971	519
HA3KNA	1,143,337	1061	481
GW3CSA	1,096,188	1087	501
II9E	1,087,165	1044	515
OK2KOD	1,034,926	1001	499
SK6AW	996,000	924	500
ED3PX	930,198	932	458
F6KCS	910,504	845	497
EJ9HQ	756,079	1150	463
OK1KNR	735,791	834	409
OZ7ANT	735,540	926	410
OL5D	678,150	496	275
DLØTUD	674,850	706	409
OK2KJU	661,200	695	400
YT7P	593,118	753	397
IR3X	537,372	595	396
OH6AD	450,300	616	395
IL3/IK5VIA	436,449	695	361
ED3HP	419,750	770	365
OZ5EDR	376,123	566	341
DLØTD	371,508	521	332
LA1R	352,500	363	250
SM7AIO	349,460	512	346
S53CAB	320,595	500	319
OE3R	315,576	506	324
PI4COM	289,872	569	366
DLØPF	179,400	341	260
OZ7ALB	170,403	355	237
DFØRG	104,064	270	192
9A1CVW	61,088	206	166
RZ1AWJ	52,155	236	171
ED3SPC	47,064	191	148
PI5ØALK	38,313	187	129
SK7MH	10,143	73	69

OCEANIA

FO5IW	8,374,432	3691	643
VK4MZ	5,111,600	1876	650
VK6ANC	1,406,886	1101	442
DX1CW	727,560	753	235

SOUTH AMERICA

P4ØV	21,390,358	5680	1034
PT7C8	15,515,600	4728	982
LV1V	8,755,968	3264	877
4M3B	8,192,850	2219	1158
ZY2HT	6,617,520	2730	840
CE8SFG	6,464,352	2671	816
LU1HLH	5,485,494	2310	786
LU1FZR	4,065,984	1861	724
LU1YY	2,438,812	1411	619
CE6EZ	2,396,196	1374	594
LU8DZE	1,332,562	949	509
LU4DRC	383,040	470	315

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WZ1R	13,598,020	4749	1145
WA1LNP	880,453	861	511
WA8LOW	512,068	723	409

DX

KP4XS	27,093,690	7586	1170
9A1A	25,012,814	7322	1258
LU4FM	23,826,270	6166	1194
HG73DX	20,915,066	6283	1234
OT5A	19,638,456	6400	1208
EM2I	13,063,454	5784	1094
EW5A	9,104,355	4099	985
VE7ZZZ	8,005,021	3150	859
6E2T	7,121,946	3374	697
LY7A	5,245,882	3156	802
VX6FI	4,732,931	2317	749
OF1AA	2,801,259	1798	709
4N5ØA	2,758,088	1916	614
JA1YXP	2,502,693	1263	571
DU2AAU	1,849,512	1363	404
E2ØAT	1,719,681	1366	543
OH3NE	1,502,527	1722	533
SP5ØOP	1,303,776	1227	503
BVØFMT	847,962	1068	383
OH7AB	793,728	907	468
OI6AY	788,288	1076	452
YO2KBB	392,320	619	320
IO2W	252,566	416	293
YU1HFG	134,787	407	251

CHECK LOGS

The following logs were used for cross-checking. Check logs and SWL logs are always appreciated. Thank you.

AB7DS, AC6BO, CT1EPC, CT3AP, DL3ARX, DL3NEO, DL5DWW, DL5JRA, DL5LRA, DL6CGT, EA1CZF, EA1DSK, EA1OB, EA1OS, EA2ABM, EA2AGB, EA2CMY, EA2XR, EA3AFW, EA3AHF, EA3CYM, EA3CZR, EA3FYD, EA3NA, EA4BJD, EA4TK, EA5AEN, EA5BHK, EA6VQ, EA7GVW, EA8AM, EA8DM, EA8DM, EC4AEO, EC4AFU, EC5ACZ, EC5ADC, EW8DA, HI8OMA, IKØVIE, IK7WUE, JA1POS, KB3AAG, KB4TUW, KCØBI, KE6EUI, KJ5IG, KL7IDA, KX7J, LA1BJA, LA2IZ, LA6BBA, LA8DY, LA8HGA, LA9FFA, LA9LO, LA9NM, LU5ONX, LY2BAG, LZ1KSN, LZ2LH, NØXCF, NP4IW/6, OH1VL, OH6NVC, ORØOST, OZ1CID, OZ1SY, PA3EWP, PW7AB, PW8CZ, PW8EM, RA4LAH, RA6AEL, RK3BA, RX3RT, RX9WQ, SK4UW, SMØCSX, SM3MHD, SM4BNK, SM6BWQ, SM7/YO9FVU, SO3MAQ, SP-Ø189-68, SP1GZT, SP2DWA, SP2IU, SP2JMR, SP2LNW, SP2WEP, SP3JIA, SP4AS, SP4SHD, SP4SKW, SP6AUI, SP6CZ, SP6EQZ/9, SP6FJ, SP6JZB, SP6SNS, SP7GAQ, SP8FHM, SP8JMA, SP8NAD, SP8QDB, SP8WJD, SP9BBH, SP9CLO, SP9CQ, SP9DGO/P, SP9MAN, SP9OYT, SPL-2ØØ189, UA3GR, UA3WCN, UA4ZA, UT1WA, UU4JMJ, VE3BR, VK4IV, VX3TEE, W2OAE, W8QZA/WZ5, WA7VYJ, YL3IZ/MM, YO7CEG, YO8CRU, YO9FLL, ZX5LL.

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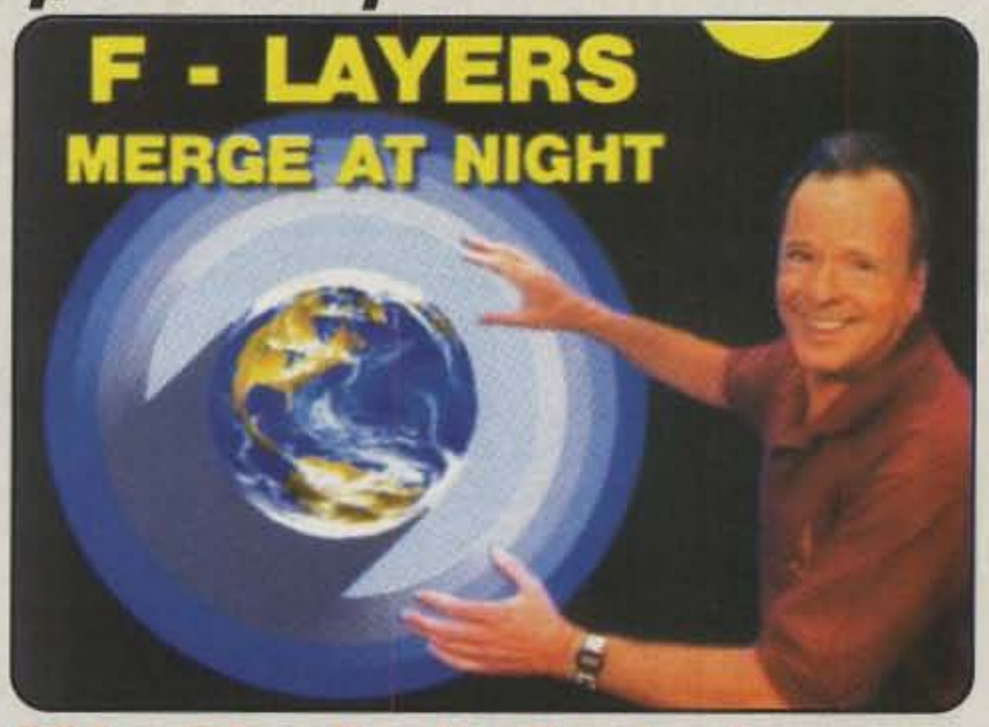

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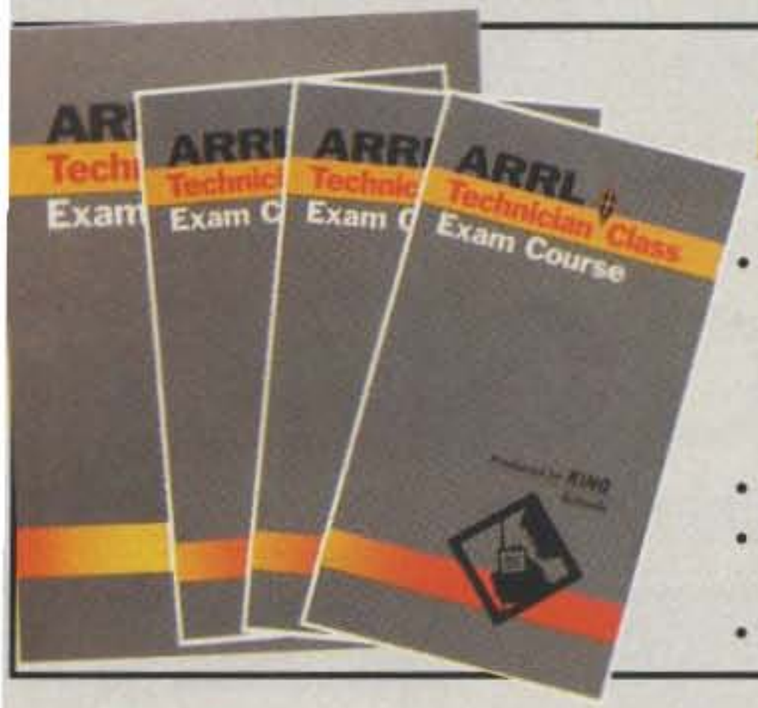

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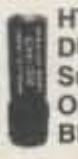

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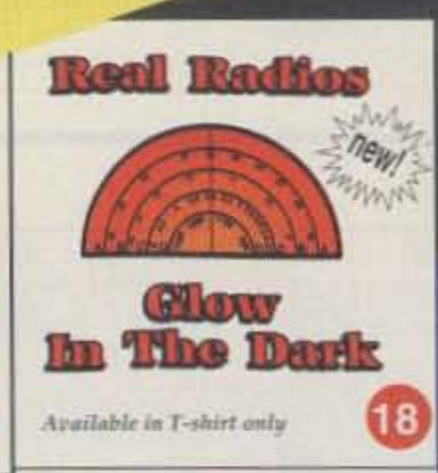

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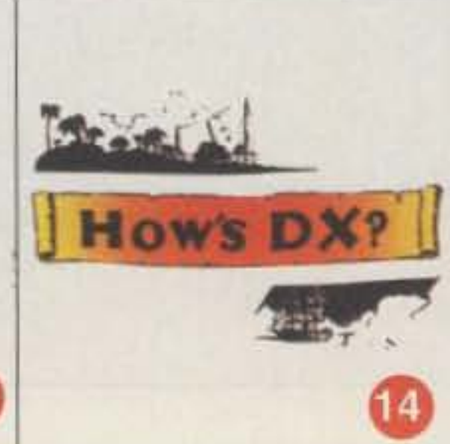

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FREE Ham Gospel Tracts, SASE. N3FTT, 5133 Gramercy, Clifton Heights, PA 19018.

Join the LAMBDA AMATEUR RADIO CLUB for gay, lesbian, bisexual and transgendered hams and their friends. Monthly newsletter, on-air meetings, DXpeditions and local chapters. For more info write to: LARC, P.O. Box 24810, Philadelphia, PA 19130-2405, or send e-mail to: LambdaClub@aol.com

WANTED: Heathkit "Williamson-type" audio amplifier. Bill, W6SAI, 48 Campbell Lane, Menlo Park, CA 94025.

PICTURE QSL CARDS of your shack, etc., from your photo or black ink artwork. 500 $28.00, 1000 $44.50. Also non-picture cards. Custom-printed cards, send specifications for estimate. Send 2 stamps for illustrated literature. Generous sample kit $2.00, half pound of samples $3.00. **RAUM'S**, 8617 Orchard Road, Coopersburg, PA 18036. FAX or phone 215-679-7238.

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DX QSL's. The **"GO LIST"** QSL Manager List is a monthly publication containing the most current QSL routes. Available on 3.5 inch IBM-compatible diskettes, monthly printed newsletter, or monthly on our telephone BBS. Single disk $12/US, $13/other. Four quarterly disks, $32/US, $36/other. Twelve monthly disks, $62/US, $74/other. Sample newsletter, $3/US, $4/other. Twelve monthly newsletters $30/US, $35/CAN-MEX, $45/other. DX-BBS, $30/year. Visa/MasterCard welcome. GO LIST, P.O. Box 2306, Paducah, KY 42002-2306. AE4AP/KB4RGW 502-898-8863, or fax 502-898-8865. **THE PAPER IS BACK!!**

SECRET CB BOOKS 1-29 $10.00 ea. SAMS books $15.00 ea. Modulation kits RCI 2950, HR 2510, Connex 3300, Cobra 148, Cobra 29, plus many more. $17.00. Call 1-800-536-0109 for free catalog.

RF TRANSISTORS AND TUBES: MRF454, 2SC2879, 2SB754, 2SC1307, 2SC1946A, TA7222AP, 4CX250B, 811A, 3-500G. WESTGATE 800-213-4563.

THE 59(9) DX REPORT: Weekly DX and Contest bulletin. SASE for sample. P.O. Box 73, Spring Brook, NY 14140.

DIGITAL JOURNAL: Published 12x per year, features everything for the digital communicator—Rigs, Operations, Computers, Software, News, and Reviews. $25 U.S., $42 DX-Air Mail orders (with payment—U.S. Funds ONLY) to IDRA, Dept. C, P.O. Box 2550, Goldenrod, FL 32733-2550. Or fax to 407-671-0194. VISA/MC accepted.

SX88 Hallicrafters receiver wanted. Jim, W6OU, 714-528-5652.

INEXPENSIVE HAM EQUIPMENT: Send stamp for list. WA4DSO, 3037 Audrey Dr., Gastonia, NC 28054.

ISLAND HUNTERS read the Island News. Sample #10 SASE to P.O. Box 701, Fernandina Beach, FL 32035-0701.

QSL CARDS Many styles. Top quality. Order Risk Free. Plastic cardholders, T-Shirts, Personalized caps, mugs, shirts. Other ham shack extras. Information and samples. **Rusprint 1-800-962-5783.**

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KENWOOD TS-520S $350, TS-530S $500, TS-830S $600, TS-140S $650. K1BW 413-538-7861.

DAYTON hamvention® '96

✣ May 17, 18, 19, 1996 ✣

General Chairman, Ken Allen, KB8KE

Asst. General Chairman, Dick Miller, N8CBU

✷ Giant 3 day Flea Market ✷ Exhibits ✷ Activities for the Non-Ham

When and Where •• •• NEW DATE THIS YEAR •• ••

May 17, 18 and 19, 1996; Dayton, Ohio at Hara Arena

Communications

FAXMail: (information sent to you via FAX): Set your Fax to manual send/receive, then call (513) 276-6934

BBS via America Online: Keyword "Ham", then "Conference" , then "conventions", then "Hamvention"

PHONE: (513) 276-6930. For fast response, please obtain the committee Voice Mail box numbers via FAXMail or BBS.

FAX (incoming): (513) 274-8369

MAIL: Hamvention, Box 964, Dayton, Ohio 45401-0964

E-MAIL: Hamvention@aol.com or n8emo@ix.netcom.com

WWW: http://users.aol.com/hamradclub/dayton.htm

Special Services

Lodging information and special award nomination forms were in our 1995 Program. A limited number of Handicap parking permits are available. License Exam by appointment only. For Form 610, call 1-800-418-3676
Call, FAX, Mail, or BBS for more information.

Bus service

Bus service will be provided between Hamvention, Air Force Museum, Salem Mall and Forest Park Mall parking areas. Many hotels/motels will have bus service for a nominal charge.

Returned Checks

A $25 service charge will be assessed on all returned checks.

Deadlines

In order to have time to return tickets to you, we must have advanced registration orders postmarked not later than May 3 (USA) or April 26 (Canada). Tickets will not be mailed before January 15th,1996. Ticket requests that are received **AFTER** the deadline will be processed and **HELD** for pick-up at the Hamvention Office in the Silver Arena. Tickets can be picked up beginning Thursday, May 16 at 8:00 a.m.

Flea Market

Flea Market Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. A maximum of 3 spaces per person (non-transferable). Electricity is available in a portion of the last Flea Market row for $50 additional. Rental tables and chairs are not available in the Flea Market. Vendors ***MUST*** order an admission ticket for each person when ordering Flea Market spaces. Please send a separate check for Flea Market space(s) and admission ticket(s). Spaces will be allocated by the Hamvention committee from orders mailed by February 5. Please use 1st class mail *only*.

Notification of Flea Market space assignment will be mailed on or about **March 25, 1996**. Please indicate in the box below if you would like to attend regardless of Flea Market space assignment.

HAMVENTION Is sponsored by the Dayton Amateur Radio Association Inc.

Advance Registration

Enclose check or money order for amount indicated in U.S. dollars and type or print your name and address clearly.

Make checks payable to:

Dayton HAMVENTION Mail to -
Dayton Hamvention Box 1446, Dayton, OH 45401-1446

Flea Market tickets *Please check one and enclose **two** checks.*

❑ Send admission tickets **only** if flea market space(s) assigned.

❑ Send admission tickets **regardless** of flea market space assignment.

	How Many		
Admission (valid all 3 days)	_____	@ $12.00*	$_____
Grand Banquet	_____	@ $23.00**	$_____
Alternate Activities			
Saturday Luncheon	_____	@ $9.00	$_____
Sunday Luncheon	_____	@ $9.00	$_____
		Total	**$**_____
Flea Market ‡ (Max.3 spaces)	_____	$45/1 space	
	_____	$100/2 adjacent	
	_____	$200/3 adjacent	$_____
Electricity	add _____	$50.00	$_____
Covered tent	_____	$290.00 ea.	$_____
		Total	**$**_____

Name _____ Call _____

Address _____

City _____ State _____ Zip+4 _____ – _____

Daytime Phone # ( )_____ Evening Phone # ( ) _____

* $15.00 at door
**$25.00 at door, if available
‡ Admission ticket must be ordered with flea market spaces

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Motorola R2008C Communications System Analyzer—The R2008C is an expansion of the base model R2001C which is a standard communications system analyzer with cellular test options. Function capabilities are spectrum analyzer, duplex generator, modulation oscilloscope, frequency counter, AC/DC digital voltmeter, RF wattmeter, general purpose oscilloscope, multi-mode code synthesizer, distortion/SINAD meter, and sweep generator. Unit in like new condition with manuals. Price $4,575.00. Call Swiderski Electronics, Inc., 800-221-5643, X204 or 1200 Greenleaf Avenue, Elk Grove Village, IL 60007-5597.

ASTRON Power Supply, brand new w/warranty, RS20M $95, RS35M $139, RS50M $195. Call for other models, 818-286-0118.

RADIO TOWER: 200 feet with base and lights. No cables. $2,000.00. Call K9HKA, 309-723-4671.

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ATTENTION SB-200 & SB-220 OWNERS: Restore and upgrade your tired old amplifier with our parts and kits. Power supply boards, soft keys, soft starts, new fans & motors, many more items. Write for details—**Please specify the model**. Harbach Electronics—WA4DRU, 2318 S. Country Club Road, Melbourne, FL 32901-5809.

HAM RADIO REPAIR—Prompt service. HALL ELECTRONICS, 1660 McKee Rd., Suite A, San Jose, CA 95116 (408-729-8200).

PERSONALIZED, Customized—Caps, Mugs, T-Shirts. Write for color brochure with designs, colors, and text. Donovan Deily (WA3B), RD2 Box 2088A Todd Drive, Leesport, PA 19533-9653.

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MORSE CODE COMPUTER INTERFACES for IBM $49.95, with CW Filter $79.95. Free Shareware and Ham Catalog. Dynamic Electronics 896, Hartselle, AL 35640 (205-773-2758, FAX-773-7295).

TRANSISTOR RADIOS Wanted. Especially shirtpocket size. Also 4-pin tubes and antique radios. D. M. Maurer, 29 South 4th Street, Lebanon, PA 17042 (717-270-7037).

VANITY CALL SIGN application hand-delivery for all gates except gate 1. KA3NGB will deliver your 610-V to Pittsburgh minutes after your gate opens. For info mail SASE to Box 3337, Gettysburg, PA 17325.

PLASTIC DUSTCOVERS for the following paddles: Bencher, Vibroplex Iambic, Vibrokeyer, and MFJ-564 with your callsign engraved. $14.00 includes S&H. Larry D. Stamm, 28 Topton Road, Kutztown, PA 19530.

ScopeBooster: Increase the input frequency of your oscilloscope to 170 MHz. No internal connections required. Henry Wolfe, 206 Gilbert Ave., Winsted, CT 06098.

SP-10 TRANSCEIVER KIT (January 73). Just $65 postpaid USA/CAN. Lectrokit, 401 West Bogart, Sandusky, OH 44870.

STEPS TO SETTING UP Your TV Repair Store, $125. Steps To Troubleshooting Electronic Problems in Circuits, $25. Send certified check or money order only to Arnold Burns, 425 East 51st, Brooklyn, NY 11203.

ANNOUNCING: ***Radios by Hallicrafters,*** the definitive book on The Hallicrafters Company and its products by Chuck Dachis, "The Hallicrafter Collector." More than 200 pages, over 600 photographs and 10 years in the making. Available late March 1996 at $29.95 plus s&h from Schiffer Publishing Ltd., 77 Lower Valley Road, Atglen, PA 19310.

HAM RADIO ONLINE: A free Internet magazine devoted to the radio enthusiast. Becoming the #1 site for Amateur Radio on the Internet. Visit us on the Web at http://www.accessone.com/~vbook/hronline.htm de KF7VY

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WANTED! CB Sideband Base Station Realistic TRC-57, TRC-458, TRC-459 or TRC-490. Preferably mint and manual. Call Larry, 409-299-1897.

R-390A SALES & SERVICE: Info SASE. MILTRONIX, POB 80041, Toledo, Ohio 43608. R-390 Power Input Cables $25.00, Antenna Connectors $12.50, External AGC Mod $20.00 ppd. Mon.-Fri. 9AM-6PM EST, 419-255-6220.

HEATHKIT, DRAKE, COLLINS, more. Radios, manuals, parts. List $1.00 and SASE. Joseph Bedlovies, POB 139, Stratford, CT 06497.

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PACKET RADIO COMPUTER: 486 80 MB HDD, 2X CD-ROM, 5.25 & 3.5 disks, 9600 baud external modem, keyboard/mouse, SB16 sound card. Close-out at $450.00/B.O. Phone/fax: 612-435-8025. Lv message.

Statement of Ownership, Management and Circulation 12-1-95, CQ Amateur Radio, 76 North Broadway, Hicksville, NY 11801. Publication # 0007893. Issued 12 times a year, subscription price $24.95 per year. Publisher: Richard A. Ross, Editor Alan M. Dorhoffer, owned by CQ Communications Inc. Stockholders: Richard A. Ross, Alan M. Dorhoffer, Thomas Knietel, Arthur S. Salsberg. Circulation (Average of 12 Preceding Months): Net Press Run 102,477 Sales Through Dealers and News Agents 38,026, Mail Subscriptions 37,773 Total Paid 75,799 Free Distribution 2,011 Total Distribution 77,810 Copies not Distributed 2,910, Returns from News Agents 21,697, Total 102,477. Circulation (Single Issue Nearest Filing): Net Press Run 100,698, Sales Through Dealers and News Agents 38,535, Mail Subscriptions 38,577, Total Paid 77,112, Free Distribution 1,303, Total Distribution 78,415, Copies not Distributed 576, Returns from News Agents 21,707 Total 100,698. s./ Simon Schatzmann Circulation Director.

Advertiser's Index

(continued on page 135)

Announcements *(from page 6)*

to TCARC, W9MQB, 711 East St., Fort Atkingson, WI 53538 (414-563-6502 eves.).

Mar. 17, **Keystone VHF Club Hamfest/Computer Show**, Dover Fire Hall, Dover, PA. Contact York Springfest, P.O. Box 266, East Berlin, PA 17316-0266; or call Ted Rodes, KE3SO, at 717-259-8063, fax 717-259-7870. (Exams.)

Mar. 17, **Two Rivers ARC Hamfest and Computer Show**, ExpoMart, Monroeville, Pennsylvania. For more information, write to Two Rivers ARC, Inc., P.O. Box 225, Greenock, PA 15047, or fax William Hetrick & Associates at 412-754-0562. (Exams by pre-registration only.)

Mar. 17, **41st Annual Toledo MRA Hamfest and Computer Fair**, The Lucas County Recreation Center, Maumee, Ohio. For information, send SASE to TMRA, P.O. Box 273, Toledo, OH 43614.

Mar. 23, **Hambash '96**, Ararat Shrine Club Temple, Kansas City, Missouri. For information, contact Bill, W5NI, at 816-246-5305. (Exams.)

Mar. 23, **West Orange Hamfest**, West Orange High School, West Orange, New Jersey. For information, contact Jim Howe, N2TDI, at 201-402-6066; or Liz Howe, N2WGH, at 201-402-6066.

Mar. 23, **MCARA 20th Free Hamfest**, Martin County Fairgrounds, Martin County, Florida. For information, send SASE to MCARA, P.O. Box 1901, Stuart, FL 33495. (Exams.)

Mar. 24, **HAMCOMP '96**, Trenton State College Student Rec. Center, Trenton, New Jersey. For more information, call the DVRA Hotline at 609-882-2240. (Handicapped accessible.)

Mar. 23–24, **1996 ARRL Oklahoma Section Convention**, Maxwell Convention Center, Exhibit Hall A, Tulsa, Oklahoma. For information call Merlin Griffin, WB5OSM, at 918-272-3081 (leave message). (Exams.)

Mar. 24, **WECAFEST 1996**, Yonkers Raceway, Yonkers, New York. Contact Tom Raffaelli at 914-741-6606.

Mar. 24, **Sterling-Rock Falls ARS 36th Annual Hamfest**, Sterling High School Fieldhouse, Sterling, Illinois. For information, contact Lloyd Sherman, KB9APW, Sterling-Rock Falls ARS, P.O. Box 521, Sterling, IL 61081-0521, or call 815-336-2434. (Exams.)

Mar. 24, **18th Annual LCARA Hamfest**, Madison High School, Madison, Ohio. For information, call Bob at 216-257-2036. (Exams.)

Mar. 30, **Elizabethtown Hamfest**, Pritchard Community Center, Elizabethtown, Kentucky. For information, contact Leon Priest, P.O. Box 342, Vine Grove, KY 40175 (502-351-4721).

Mar. 30, **Chestnut Ridge Radio Club Flea Market**, Education Building, Saddle River Reformed Church, Upper Saddle River, New Jersey. For information, contact Andy Woerner, K2ETN, at 201-261-3783, or fax 201-261-1038.

Mar. 30, **Middle Tennessee ARS Hamfest**, National Guard Armory, Tullahoma, Tennessee. For info contact Ernest Moore, AD4AT, 614-728-9473.

Mar. 30, **Columbus ARC Hamfest**, Bartholomew County 4-H Fairgrounds, Community Building, Columbus, Indiana. For information, contact Marion Winterberg, WD9HTN, 11941 W. Sawmill Rd., Columbus, IN 47201 (812-342-4670).

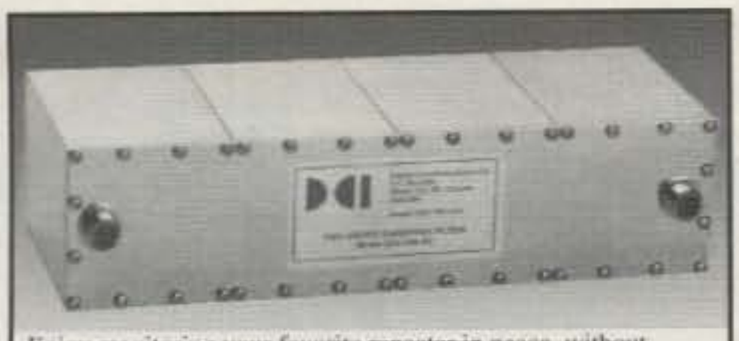
Mar. 30, **Michgan City Hamfest and Computer Flea Market**, Michigan City High School, Michigan City, Indiana. Contact Ron Stahovia, N9TPC, 213 S. Dickson St., Michigan City, IN 46360 (219-872-6594).

Mar. 30, **Ham Radio Auction**, Waterford Senior Center, Waterford, Connecticut. Call Tony, AA1JN, at 203-859-0162; or Mike, N1HFX, at 203-546-9498.

Mar. 30–31, **ARRL Maryland State Convention**, Timonium Fairgrounds, Timonium, Maryland. For more information dial 410-HAM-FEST for voice or FAX-Back information. Outside Maryland dial 1-800-HAM-FEST. (Exams.)

Mar. 31, **The Southington ARA Annual Fleamarket**, Southington High School, Southington, Connecticut. For more information, contact Chet, KA1ILH, at 860-628-9346. (Exams.)

Mar. 31, **LAMARSFEST 1996**, Lake County Fairgrounds, Grayslake, Illinois. For information, contact Frank Avellone, W9GLO, LAMARSFEST '95, 650 Green Bay Rd., Lake Bluff, IL 60044 (708-234-4124 until 10 PM). (Exams.)



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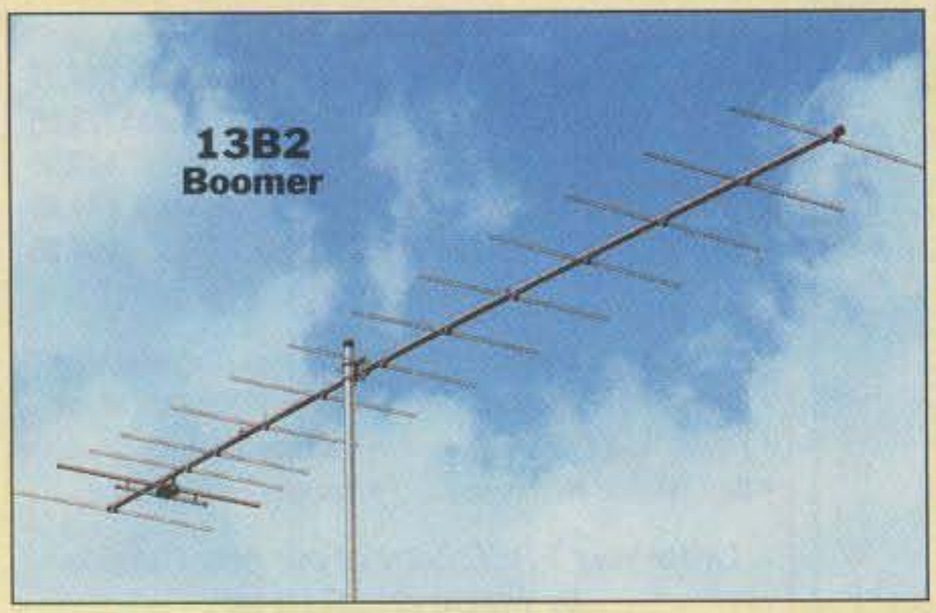

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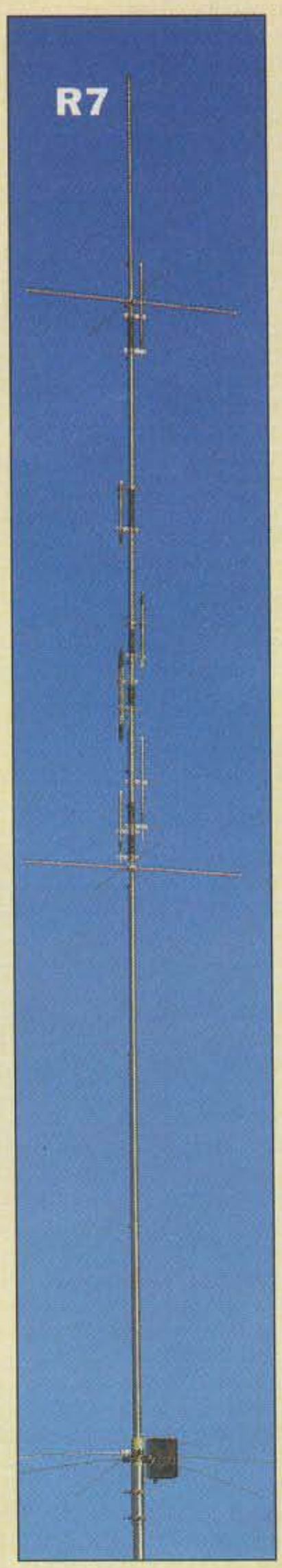

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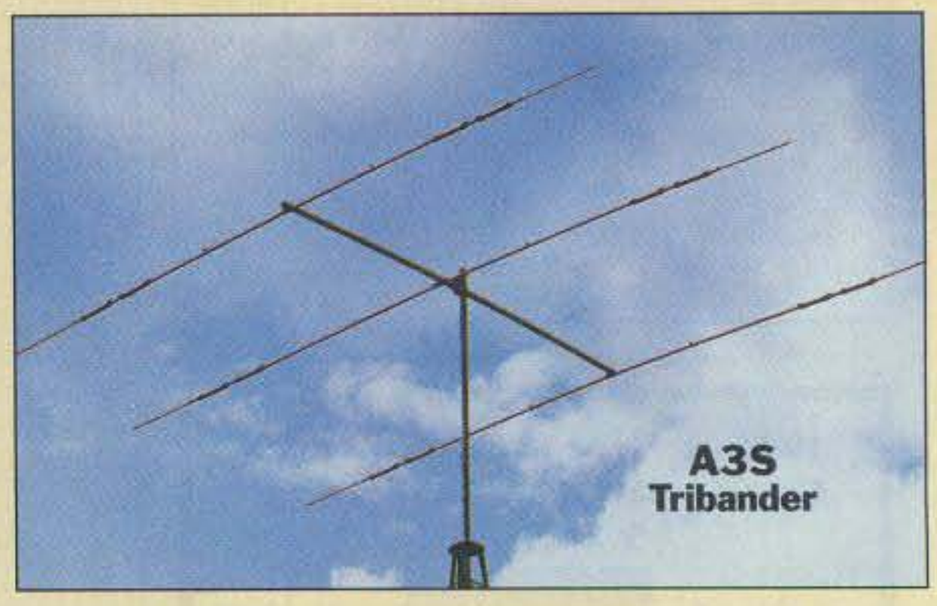
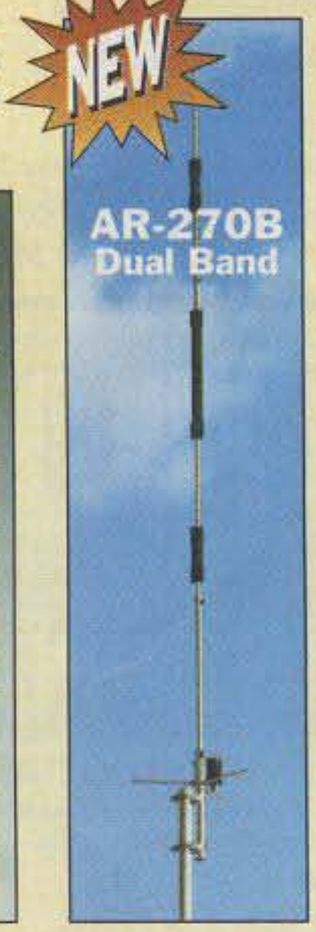


HF TRIBAND BEAMS. ***A3S*** - The most popular compact 10, 15, 20 meter beam. ***A4S*** - A high performance 18' long wideband beam. Both models come with stainless steel hardware and have optional 40 meter add-on kits.

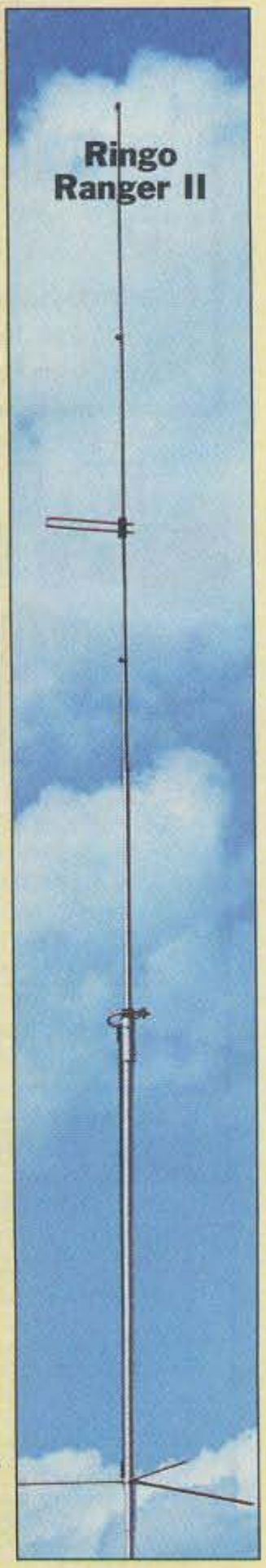
Dual Band Mobile.
CS-270M - Designed for durability and great performance.



Dual Band Ringos. ***AR-270*** - Only 45 inches tall! A must for the new dual band transceivers covering 70 cm and 2m. ***AR-270B*** - This new dual band features high gain with a low angle of radiation and stands only 7.7 feet tall.
ARX-270U/N - High performance, 16.5 foot, fiberglass with exceptional gain. Three piece construction assembles in minutes.

R7 **10, 12, 15, 17, 20, 30 & 40 METERS HALFWAVE VERTICALS**
Amateur radio's most popular vertical design now gives you 7 band performance including 30 & 40 meters, without ground radials. Only 22 feet tall, R7's small footprint and ground independence give you "mount anywhere" flexibility. R5, with the same great features as the R7, covers 10, 12, 15, 17 and 20 meters.

RINGO RANGER II. Still the worlds favorite 2 meter, 70 cm or 220 MHz omni antenna, with more gain. A must for your FM or packet station. Models: ***ARX-2B, ARX-220B, ARX-450B, ARX-450BN***



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EDSP RX/TX

All-Mode HF Transceiver

FT-1000MP

The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP, founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.

Specifications

- EDSP (Enhanced Digital Signal Processing)
- Shuttle-jog Rapid Tuning Enhancement
- Directional Tuning Scale for CW/Digital mode and clarifier offset display
- Dual In-Band Receive w/ Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
- User-programmable Tuning Steps w/0.625 Hz High Resolution Low-Noise DDS Circuit
- Custom Feature Set-up via New Menu System
- Adjustable TX Output Power: 5-100W (5-25W AM)
- True Base Station: Both 100-117 or 200-234± VAC 10%, 50/60 Hz and 13.5 VDC Power Inputs

Blending digital and RF technology, the FT-1000MP features a Yaesu exclusive: Enhanced Digital Signal Processing (EDSP). Beginning on the receive side with Yaesu's industry-standard high-intercept front end design, the RF signal is then fed to the IF stages, where an impressive array of 8.2 MHz and 455 kHz IF filters (including a built-in Collins SSB Mechanical Filter) establish the tight shape factor so important in obtaining high dynamic range and low noise figure. Finally, the EDSP system provides specially-designed filter selections and response contours for maximum intelligence recovery.

Only with this combination of EDSP, independently selectable 8.2 MHz and 455 kHz IF filters, and a low-noise DDS local oscillator system can receiver performance without compromise be obtained. You can customize your FT-1000MP by choosing from 2.0 kHz, 500 Hz, and 250 Hz optional, cascaded IF filters, then zero in on weak signals using Yaesu's exclusive Shuttle-jog Rapid Tuning Enhancement and high-resolution (0.625 Hz) DDS VFO. Without question, the FT-1000MP is the most technologically advanced HF rig today.

EDSP operates in both transmit *and* receive modes. On receive, the EDSP produces enhanced signal-to-noise ratio and significantly improved intelligence recovery during difficult situations involving noise and/or interference. The result of hundreds of hours of laboratory and real-world experimentation, EDSP's 4 preset random noise reduction protocols and 4 digital filtering selections are controlled by easy-to-use concentric controls on the front panel of the transceiver. High, low, and mid-range cuts for voice work are teamed with razor-sharp CW bandpass filters and an automatic notch filter which identifies and attenuates undesired carriers or heterodynes. Also operational in the transmit mode, EDSP provides 4 performance-enhancement pattern selections for different operating circumstances, ensuring best readability of *your* signal on the other end of the path.

Once again, Yaesu's engineers have reaffirmed the vision and dedication of JA1MP which began nearly 40 years ago. See the incomparable FT-1000MP today.

YAESU

Choice of the World's top DX'ers

FT-1000/D

Legendary 200W
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"The Dream Station"

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