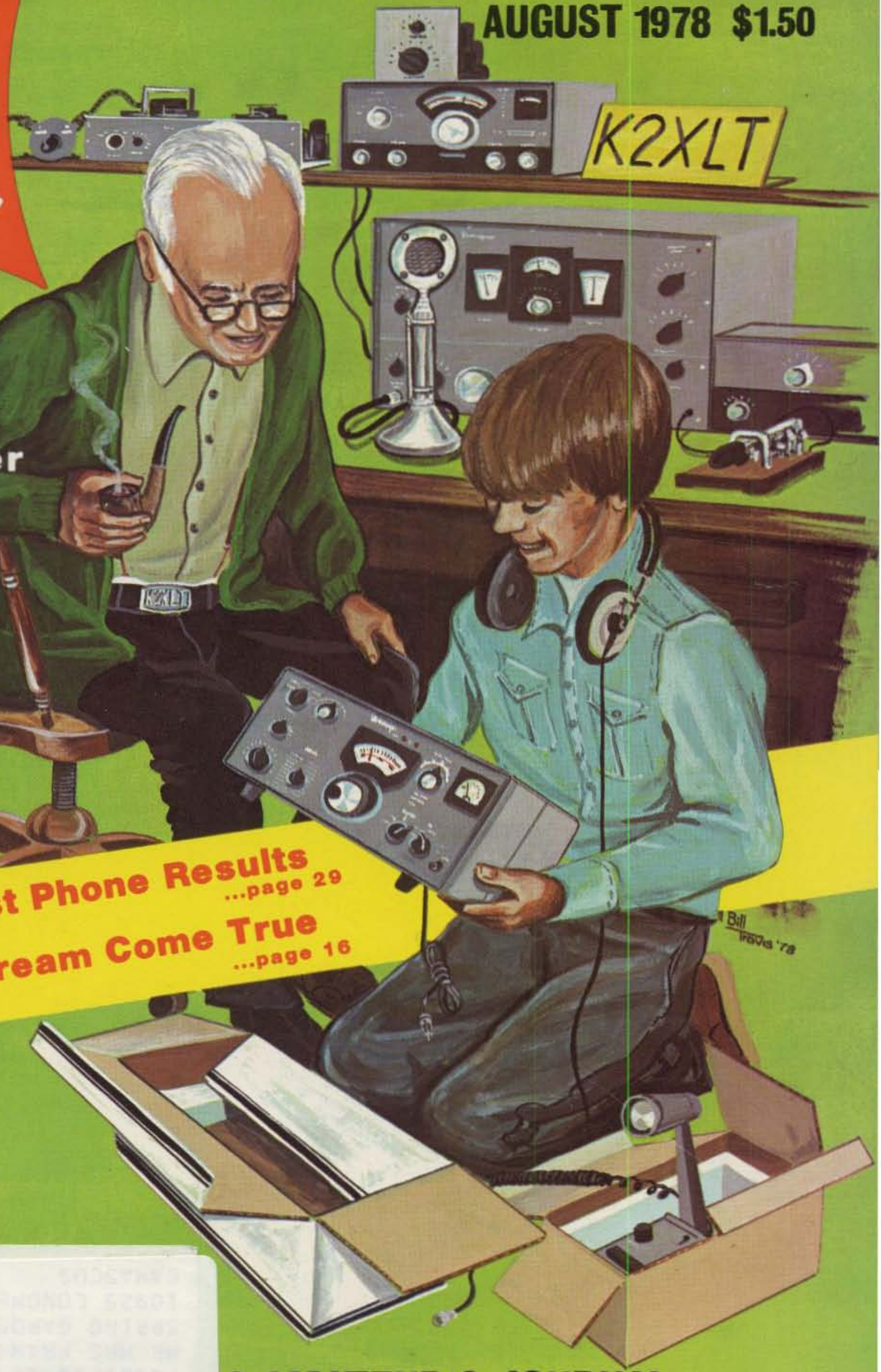
ICD 08240

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

AUGUST 1978 $1.50



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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in amateur radio

The R-599D receiver and T-599D transmitter provide greater flexibility with more features than found in a transceiver.

The R-599D receiver is all solid-state, covering all Amateur bands from 160 through all of 10 meters, as well as auxiliary band and WWV (10 MHz). With optional converters it also receives 6 meters and 2 meters. Modes include LSB, USB, CW, AM, and FM. A 2.2-kHz eight-pole filter is built-in for SSB, as well as a 500-Hz eight-pole CW filter and a 5.0-kHz six-pole AM filter. An optional 14.0-kHz six-pole FM filter is available. Also featured are an AGC control (slow/fast/off), 25-kHz calibrator, RIT, noise blanker, ANL (AM), squelch, monitor, VFO selector, and RF gain control which does not affect S-meter reading.

The T-599D transmitter is solid-state except for the driver and final tubes. It covers the 80 through 10-meter Amateur bands, on LSB, USB, CW, and AM. An AC power supply is built-in. Also included are VOX, anti-VOX, PTT, semi-break-in CW with sidetone, ALC, transverter terminal.

Enjoy split frequency control in four separate/transceive combinations with the 599D "Twins". See your local Authorized Kenwood Dealer for more information.

The 599D "Twins" are offered to the discriminating Amateur who appreciates the advantages of operating a separate transmitter and receiver.

R-599D/T-599D

Additional specifications:

R-599D

Antenna Impedance ... 50 to 75 ohms, unbalanced
Frequency Stability ... 100 Hz per 15 min after warm-up
Sensitivity ... USB, LSB, CW: 0.25 μV for 10 dB (S+N)/N on 160 to 10 M, 0.5 μV for 10 dB (S+N)/N on 6 and 2 M;* AM: 1.5 μV for 10 dB (S+N)/N on 160 to 10 M and WWV, 3.0 μV for 10 dB (S+N)/N on 6 and 2 M;* FM: 1.5 μV for 20 dB (S+N)/N on 10 M, 2.5 μV for 20 dB (S+N)/N on 6 and 2 M*
*with optional converter
Selectivity ... USB, LSB: 2.2 kHz (-6 dB), 4.4 kHz (-60 dB); CW: 0.5 kHz (-6 dB), 1.5 kHz (-60 dB); AM: 5.0 kHz (-6 dB), 12.0 kHz (-60 dB); FM: 20.0 kHz (-6 dB), 120.0 kHz (-40 dB), 14.0 kHz (-6 dB);* 40.0 kHz (-50 dB)*
*with optional FM filter
Image Ratio ... 50 dB
IF Rejection ... 50 dB
AF Output Power ... 1 W (with 8 ohms load and 10% distortion)
AF Output Impedance ... 4 to 16 ohms
Semiconductor Complement ... 2 IC's, 10 FET's, 34 transistors, 59 diodes
Power Requirements ... 100/117/220/240 VAC, 50/60 Hz, 15 W or 13.8 VDC, 1 A
Dimensions ... 270 w x 140 h x 310 d (mm)
Weight ... 5.7 kg

T-599D

Input Power ... SSB: 200 W PEP; CW: 160 W DC; AM: 80 W DC
Antenna Impedance ... 50 to 75 ohms, unbalanced
Frequency Stability ... 100 Hz per 15 min after warm-up
Carrier Suppression ... 40 dB
Unwanted Sideband Suppression ... 40 dB
Harmonic Radiation ... -40 dB
Tube and Semiconductor Complement ... 3 tubes, 1 IC, 4 FET'S, 30 transistors, 38 diodes
Power Requirements ... 110-120/220-240 VAC, 50/60 Hz, 350 W
Dimensions ... 270 w x 140 h x 310 d (mm)
Weight ... 12.5 kg

Also available is the S-599 external speaker. A perfect match and the logical accessory.

arma
amateur radio manufacturer's association

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines.

BRAND NEW

$79.95

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941 Versa Tuner II with all these features at this price:

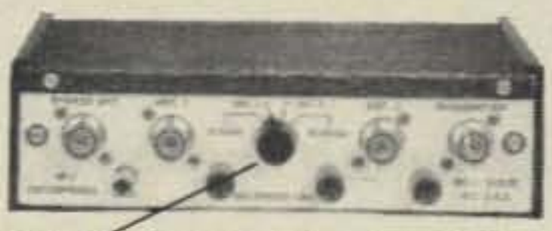
A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balance lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.



ANTENNA SWITCH lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 8x2x6 inches fit easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).

$59.95

BRAND NEW

MFJ-901 VERSA TUNER

New efficient air wound coil for more watts out.

Only MFJ uses an efficient air wound inductor (12 positions) in this class of tuners to give you more watts out and less losses than a tapped toroid. Matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF output. 1:4 balun for balance lines. Tune out the SWR of your mobile whip **from inside your car.** Works with all rigs. Ultra compact 5x2x6 inches. SO-239 connectors. 5 way binding posts. Ten Tec enclosure.

$49.95

BRAND NEW

MFJ-900 ECONO TUNER

Same as MFJ-901 Versa Tuner, but does not have built-in balun for balance lines. Tunes coax lines and random lines.

$39.95

MFJ-16010 RANDOM WIRE TUNER

Operate 160 thru 10 Meters. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz.

$39.95

BRAND NEW

MFJ-400 8043 ECONO KEYER

MFJ brings you a reliable, full fsature economy keyer using the famous CURTIS-8043 keyer-on-a-chip.

Panel Controls: Speed (8 to 50 WPM), pull-to-tune; volume, on-off; 3 conductor, ¼ inch phone jack for keying output and key paddle input.

Internal weight control lets you adjust dot-dash-space ratio for a distinctive signal to penetrate QRM for solid DX contacts. Sidetone and speaker. Internal tone control.

Iambic operation with squeeze key. Dot memory. Instant start. Self completing. Jamproof spacing. Reliable solid state keying: grid block, cathode, solid state transmitters (−300V, 10 ma. max. and +300V, 100 ma. max.).

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CIRCLE 22 ON READER SERVICE CARD

THE NEW INDUSTRY STANDARD OF PERFORMANCE . . . IS THE Wilson SYSTEM ONE!

A DX'ers delight operating 20 meters on a full 26' boom with 4 elements, 4 operational elements on 20-15-10, plus separate reflector element on 10 meters for currect monoband spacing. Featured are the large diameter High-Q traps, Beta matching system, heavy duty taper swaged elements, rugged boom to element mounting . . . **and value priced!** Additional features: • SWR less than 1.5 to 1 on all bands • 10 dB Gain • 20-25 dB Front-to-Back Ratio.

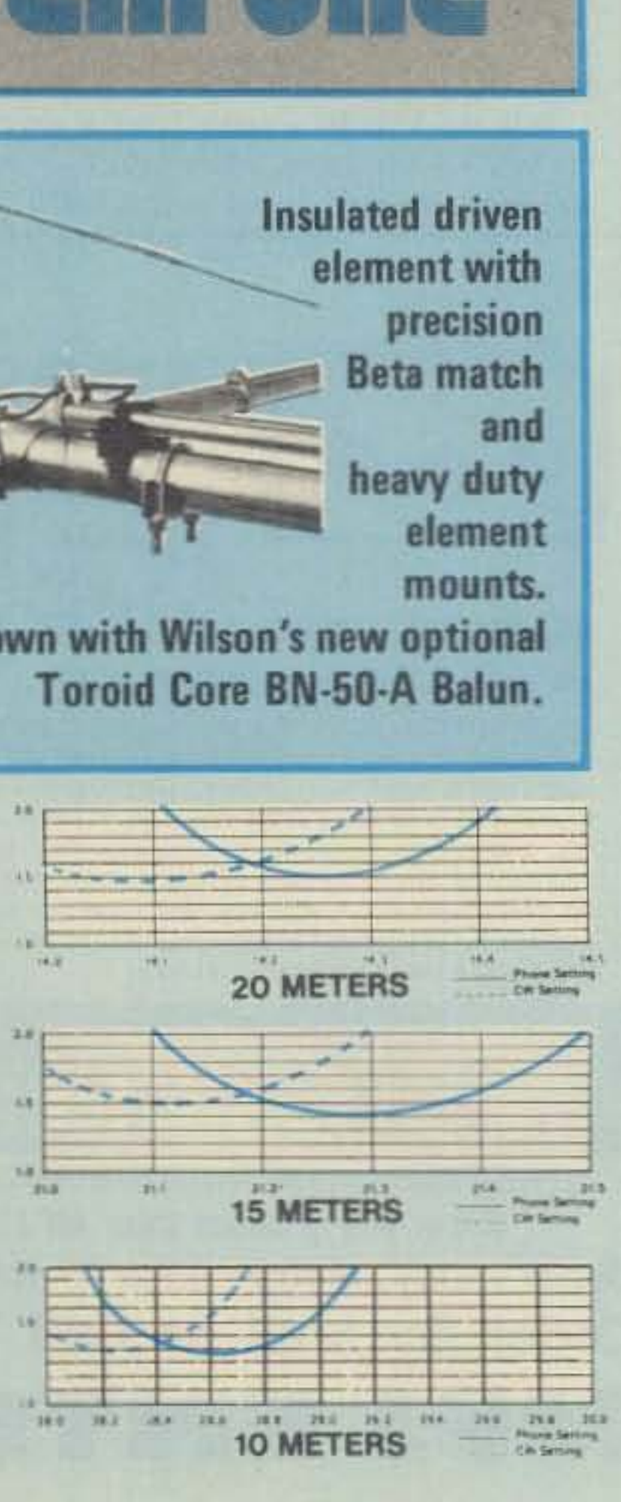
The mechanically superior construction uses heavy duty boom to element extrusion.

Advanced design large diameter High-Q Traps for minimum loss and maximum power capacity

Insulated driven element with precision Beta match and heavy duty element mounts. Shown with Wilson's new optional Toroid Core BN-50-A Balun.

SPECIFICATIONS: SY-1

Matching Method	Beta	Boom Length	26'	Required	
Band MHz	14-21-28	Boom Diameter	2" O.D.	Mast Diameter	2" O.D.
Maximum Power Input	Legal Limit	No. of Elements	5	Surface Area	8.6 sq. ft.
VSWR (at Resonance)	1.5 to 1	Longest Element	26' 7"	Windload at 78 mph	215 lbs.
Impedance	50 ohms	Turning Radius	18' 6"	Shipping Weight	65 lbs.
Gain	10 dB	F/B Ratio	20-25 dB	UPS Shipment in 2 Cartons	



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We are looking for new Dealers for certain areas of the country. If you are interested, contact us for details.

Wilson Electronics Corp.

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AUGUST, 1978 VOL. 34, NO. 8

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

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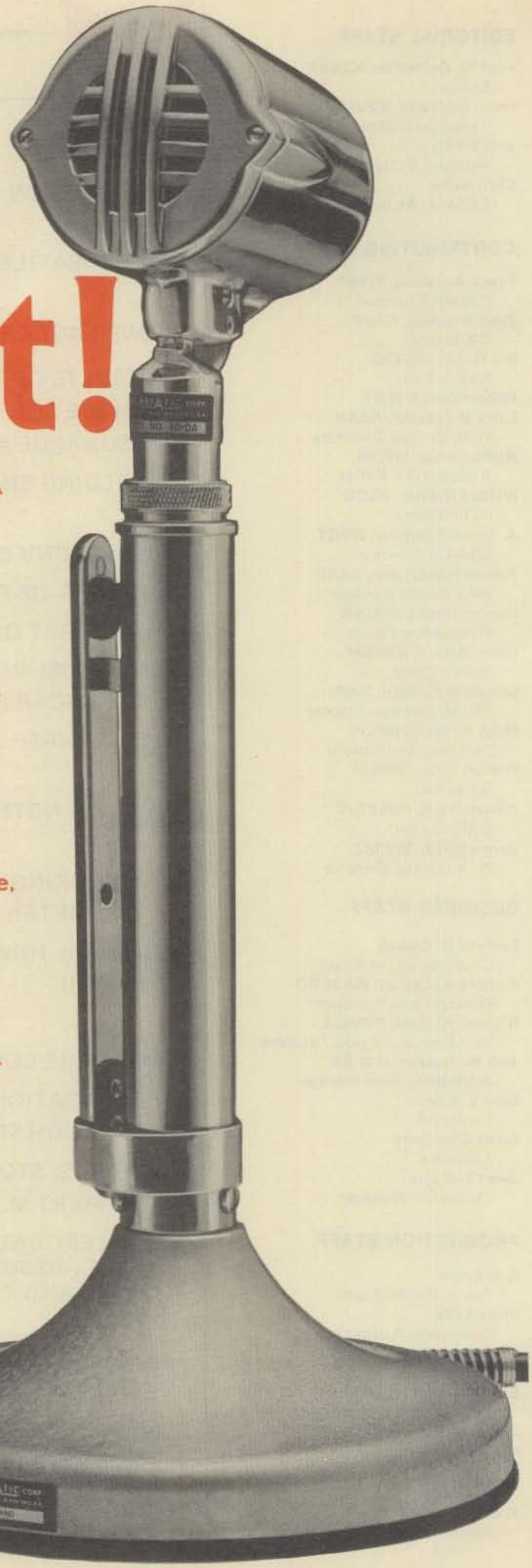
SSB at it's best!



The Astatic Model 10DA dynamic microphone provides unique sound performance for SSB.

Just great! That's the response you'll get over this semi-directional dynamic mike designed for quality conscious ham operators.

Created for SSB circuitry, Astatic's high impedance Model 10DA reproduces your voice on single side band with controlled response. It's engineered to give high attenuation of side band overlap. Cuts through heavy interference for clearer copy.

Backed by Astatic's extensive electronic expertise, the Model 10DA is quality throughout. Features VOX operation, relay or electronic switching. Frequency response of 300-3000 Hz. HI Z 40,000 ohm impedance. −52 dB output. And tough, attractive all metal construction with polished chrome finish and tilting head. Mounts on the Astatic G, UG, UG8 grips-to-talk desk stand.

You've never heard such sound quality! Ask your dealer for Astatic Model 10DA and microphone stands. Or write Astatic today.

Suggested List Price :

10DA—$70.00 / G-10DA—$93.00 / UG8-10DA—$98.00

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ASTATIC

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(416) 438-6384

Zero Bias

an editorial

We can all feel the excitement and remember the joy of our first rig, and like our young Novice on the cover, each of us has dreamt of the day when we put that rig on the air. The thrill of not only hearing exotic call signs, but of now being able to send our squeaky signals across the globe, (or across town). To actually talk to these people seemed almost beyond belief. No matter where we finally wound up in amateur radio or where our interests lie today, the lure of DX probably got us there.

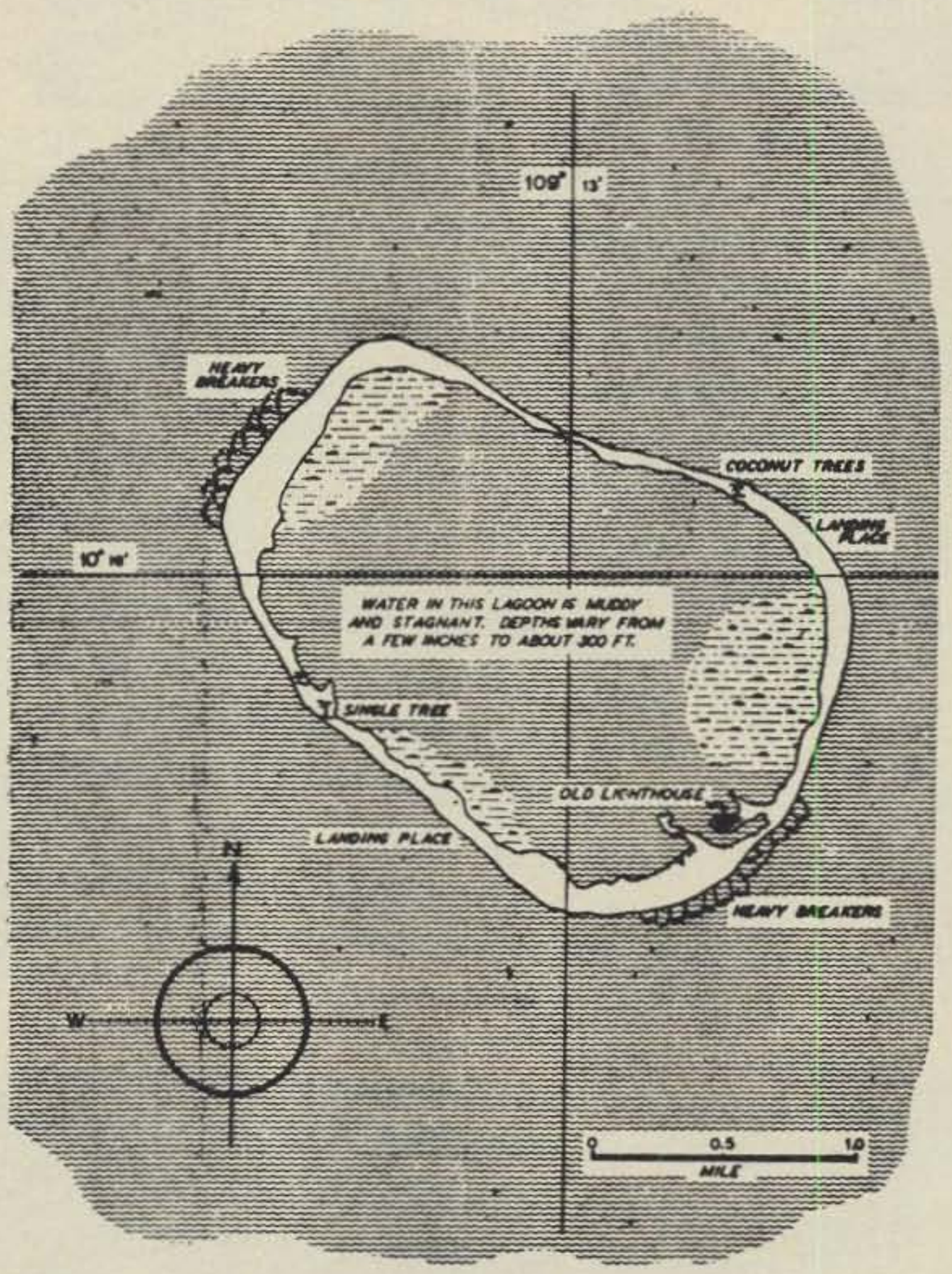
This month we present the two biggest and most awaited stories in amateur radio of the year. First, we have the results of the 1977 CQ World Wide DX Phone Contest, our biggest Contest ever. There were 2 new world records, 11 continental records and 4 U.S. records set in this contest, plus the almost unbelievalbe 21,000,000 (yep! 21 million points) score turned in by EA8CR. Our tremendous turnout represents the result of a super-human effort put out by the contest team, headed by Larry Brockman, N6AR, and Bob Cox, K3EST.

The second major DX event of the year, (we like to think so) and the one that avid DXers have waited over twenty years for, is the return of amateur radio to Clipperton Island. Friends became enemies, social engagements were forgotten, and all of the normal human amenities were put aside in order to talk to a tiny speck of rock off the coast of Mexico. There are now more resident experts on the flower and fauna, geological and historic background, navigational and logistical problems of Clipperton than existed at any other time in recorded history. The excitement was unbounded and the imagination stirred by this multi-national expedition reached a point of near frenzy.

Charlie Signer, WA9INK/6, presents the first of a two part article on the Clipperton Island DXpedition. Part One deals with the concept, planning and the twenty year struggle to return to Clipperton. You'll see how an international crew was put together for one of the most outstanding feats of cooperation amateur radio has seen in years. I venture to say that there is not one among us who wasn't envious of the guys who got to go and secretly wished for the opportunity. The lure of the challenge and the chance at adventure gets to all of us, even armchair operators. If you think it's easy to pick up and just go to a far off place, you're in for a big surprise. Charlie fills us in on what it took basically to get to Clipperton in this month's installment. Next month we will see what it took to operate and live on this little island. As you can see from the illustration below, dating back to W6CAE's article "Clipperton Is No Picnic" in the June 1954 issue of CQ, Clipperton is no island paradise.

So, for our new Novice or not-so-old-timer we offer the results of dreams come true. A listing in the world's biggest contest results and the story behind amateur radio's craziest and most exciting weeks. What's your dream?

73, Alan, K2EEK



A hydrographic chart of Clipperton Atoll. The water in the completely enclosed lagoon is muddy and stagnant, and ranges in depth from a few inches to about 300 feet. The "island" is the top of an active volcano, whose sides fall precipitously to a maximum depth of over 3,100 feet. This, in addition to the reef-like framework of the atoll, which is surrounded by heavily breaking surf, makes anchorage and landing very difficult.

KENWOOD

...pacesetter in amateur radio

The TS-820S . . . known worldwide as the Pacesetter. Amateur Radio Operators universally respect its superb quality, proven through thousands of hours of operating time under all environmental conditions. The TS-820S has every feature any Amateur could desire for operating enjoyment, on any band from 160 through all of 10 meters.

TS-820S

You can always tell who's running a TS-820S. Its superb quality stands out from all the other rigs on the band . . . and when the QRM gets heavy, the TS-820S's adjustable RF speech processor, utilizing a 455-kHz circuit to provide quick-time-constant compression, will get the message through. RF negative feedback is applied from the final to the driver to improve linearity, and third-order products are at least —35 dB. Harmonic spurious emissions are less than —40 dB and other spurs are less than —60 dB. RF input power is 200 W PEP on SSB, 160 W DC on CW, and 100 W DC on FSK. Receiver sensitivity is better than 0.25 μV for 10 dB S/N. The TS-820S is known for its superb receiver selectivity, and its famous IF shift easily eliminates heavy QRM. That's why the TS-820S is the DXer's choice.

See your local Authorized Kenwood Dealer today.

TS-820S VFO-820S SP-820

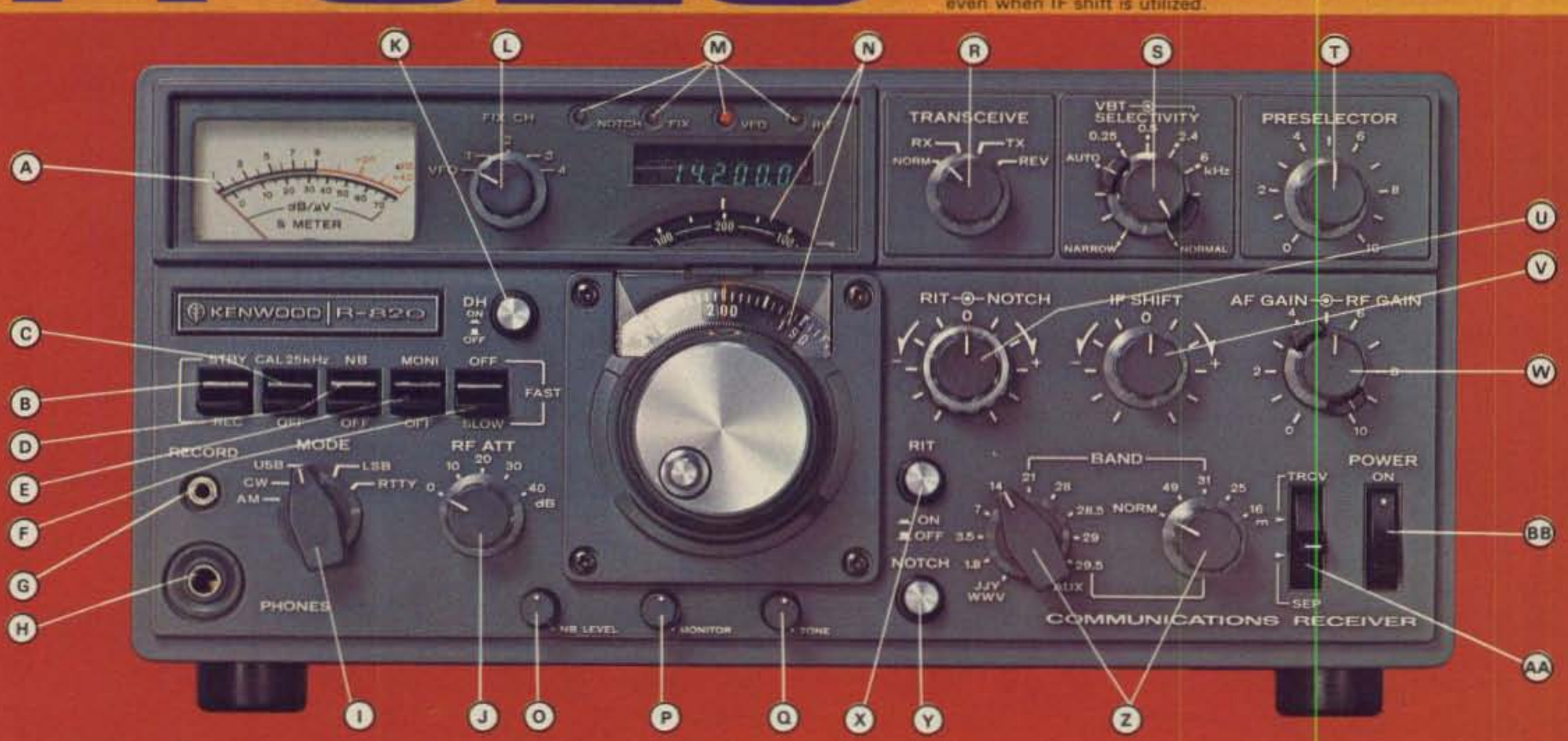
Kenwood's unbeatable combination. The VFO-820 solid state remote VFO adds greatly to the versatility of your TS-820S. It has its own RIT circuit and control switch and is a perfectly matched accessory. The SP-820 deluxe external matching speaker includes audio filters for added versatility on receive and two audio inputs.

INTRODUCING THE ULTIMATE IN RECEIVER DESIGN ... THE KENWOOD R-820

With more features than ever before available in a ham-band receiver. This triple-conversion (8.33 MHz, 455 kHz, and 50 kHz IFs) receiver, covering all Amateur bands from 160 through 10 meters, as well as several shortwave broadcast bands, features digital as well as analog frequency readouts, notch filter, IF shift, variable bandwidth tuning, sharp IF filters, noise blanker, stepped RF attenuator, 25 kHz calibrator, and many other features, providing more operating conveniences than any other ham-band receiver. The R-820 may be used in conjunction with the Kenwood TS-820 series transceiver, providing full transceive frequency control.

R-820

A **S-METER** Easy-to-read, calibrated to S9 + 40 dB full scale and dB/μV.
B **STANDBY/RECEIVE SWITCH** Disables audio circuits during transmit mode with associated transmitter.
C **CALIBRATOR SWITCH** Built-in crystal calibrator, settable to WWV, provides signal every 25 kHz.
D **NOISE-BLANKER SWITCH** A specially designed crystal filter eliminates noise pulses such as ignition-noise interference.
E **MONITOR SWITCH** RF sampling allows user to hear his own voice when using associated transmitter.
F **AGC SWITCH** Automatic-gain-control circuit switchable to slow or fast response, or completely off.
G **RECORD JACK** Makes recording off the air simple.
H **HEADPHONE JACK** Provision for plugging in headphones.
I **MODE SWITCH** Selection of AM, CW, upper or lower sideband, or RTTY.
J **RF-ATTENUATOR SWITCH** 10 dB steps of attenuation from 0 to 40 dB, to prevent overloading from nearby stations, and for precise signal comparison.
K **DIGITAL HOLD** Locks counter and display while VFO is tuned to another frequency. Helps return to "hold" frequency.
L **VFO/CRYSTAL SWITCH** Permits VFO control or crystal control on four selectable frequencies.
M **LED INDICATORS** Light-emitting diodes indicate activation of notch filter, crystal-controlled reception, VFO control, and RIT.
N **DRS DIAL** Satin-smooth VFO tuning dial system provides easy analog frequency readout (useful when digital hold is activated). LSB, USB, and CW frequencies are accurately read from the same pointer.
O **NOISE-BLANKER LEVEL CONTROL** Controls level of blanking, for maximum effect in eliminating noise interference.
P **MONITOR CONTROL** Adjusts level of RF sampling.
Q **TONE CONTROL** Varies audio-output frequency response.
R **TRANSCEIVE SWITCH** Selects frequency tuning from either the receiver or TS-820 series transceiver.
S **VBT/SELECTIVITY CONTROLS** Separate controls on the same shaft provide variable bandwidth tuning as well as selection of four IF filters: 250 Hz*, 500 Hz*, 2.4 kHz, and 6 kHz* (*optional). CW filters function in 455-kHz IF for superior shape factor.
T **PRESELECTOR** Peaks tuned circuits in RF amplifier stage for increased selectivity and sensitivity. RF amplifier coil is dual-tuned.
U **RIT/NOTCH CONTROLS** RIT allows receiver to be tuned off frequency, while not affecting transmit frequency, when in transceive mode with TS-820. Notch control tunes notch within IF passband for eliminating interference. Notch frequency remains the same, even when IF shift is utilized.



V **IF SHIFT** Varies (shifts) IF passband away from interfering signal.
W **AF GAIN/RF GAIN** Separate controls adjust volume and RF gain.
X **RIT SWITCH** Allows tuning off frequency with RIT control, and return immediately to VFO frequency by pushing switch.
Y **NOTCH SWITCH** Takes variable notch filter in and out of circuit.
Z **BAND SWITCHES** Selects frequency bands from 15 MHz (WWV), 160 through 10 meters, the 49, 31, 25, and 16-meter shortwave broadcast bands, and an auxiliary band.
AA **TRANSCEIVE/SEPARATE SWITCH** Enables receiver VFO to control the receiver and TS-820 (or TS-820S) frequency (or the TS-820 VFO to control both), or both can function independently.
BB **POWER SWITCH** Turns receiver on and off.

R-820 PERFORMANCE SPECIFICATIONS

Frequency Range:
160 meters (1.8-2.0 MHz)
80 meters (3.5-4.0 MHz)
40 meters (7.0-7.5 MHz)
20 meters (14.0-14.5 MHz)
15 meters (21.0-21.5 MHz)
15 meters (21.0-21.5 MHz)
10 meters (28.0-28.5 MHz)
10 meters (28.5-29.0 MHz)
10 meters (29.0-29.5 MHz)
10 meters (29.5-30.0 MHz)
19 meters (15.0 (WWV)-15.5 MHz)
49 meters (5.9-6.4 MHz)
31 meters (9.4-9.9 MHz)
25 meters (11.5-12.0 MHz)
16 meters (17.7-18.2 MHz)
Auxiliary band

Modes: AM, CW, USB, LSB, RTTY
Sensitivity: 160-10 m, 19 m, SSB, 0.25 μV at 10 dB S+N/N
AM, 1.5 μV at 10 dB S+N/N
49, 31, 25, 16 m, SSB, 0.5 μV at 10 dB S+N/N
AM, 3.0 μV at 10 dB S+N/N
Selectivity: CW (with optional 250-Hz filter), 250 Hz (—6 dB), 500 Hz (—60 db)
CW (with optional 500-Hz filter), 500 Hz (—6 dB), 850 Hz (—60 dB)
SSB (2.4-kHz filter), 2.4kHz (—6 dB), 4.4 kHz (—60 dB)
AM (6-kHz filter), 6 kHz (—6 dB), 12 kHz (—60 dB)
Image Ratio: 160-10 m, 19 m, 80 dB
49, 31, 25, 16 m, 60 dB
IF Rejection: 160-10 m, 19 m, 90 dB
49, 31, 25, 16 m, 50 dB
Power Requirements: 100/120/220/240 VAC, 50/60 Hz, or 12-15 VDC
Dimensions: 13-1/8" (333 mm)W x 6" (153 mm)H x 13-3/16" (335 mm)D
Weight: 26.4 lbs (12 kg)

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

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Announcing

• **Jacksonville, FL** — The Jacksonville Hamfest Assn. is happy to announce the 5th Annual Jacksonville Hamfest to be held on August 5th and 6th, 1978, at the Jacksonville Beach Municipal Auditorium. Activities include the usual swap tables and exhibitors' displays. Advanced tickets are now available for $2.50 per person ($3 at the door) with swap tables available for $5 per day. The Hamfest site is only one block from the Atlantic Ocean and those attending can bring their families for the weekend. All inquiries should be directed to: N4UF, Hamfest Chairman, 911 Rio St., Johns Dr., Jacksonville, FL 32211.

• **Amarillo, TX** — The 1978 Edition of the Golden Spread Amateur Radio Convention will be held on Friday evening, August 11, Saturday, August 12, and Sunday, August 13, 1978. The Convention will be held at the Holiday Inn West Motor Hotel, 601 Amarillo Blvd., West, in Amarillo. The sponors of the Convention are the Panhandle Amateur Radio Club of Amarillo. Door prizes will be awarded throughout the Convention. Pre-registration is $4 and at the door tickets will be $6. Deadline for display space is July 29, 1978. For further info write: GSARC, P.O. Box 10221, Amarillo, TX 79106.

• **Willow Springs, IL** — The Hamfesters' 44th Annual Picnic and Hamfest will be held on August 13, 1978, at the Santa Fe Park, 91st and Wolf Rd. Exhibits for OM's and XYL's and their famous "Swappers Row". Tickets at the gate will be $2. Tickets in advance are $1.50. For Hamfest info or advance tickets (send check or money order, SASE appreciated), to Bob Hayes, W9KXW, 18931 Cedar Ave., Country Club Hills, IL 60477.

• **Concordia, KS** — The Kansas Nebraska Radio Club would like to announce that they will again have two full days of activities on August 12 and 13, 1978, at the Cloud Couty Community College. Saturday morning will be filled with FCC exams and Sunday will be filled with technical talks, a flea market, and a prize drawing. For any further info, please feel free to contact: Robert O'Connell, O'Connell Electronics, 903 Broadway, Concordia, KS 66901.

• **St. Charles, IL** — The Fox River Radio League Hamfest will be held on Sunday, August 27, 1978, at the Kane Co. Fairgrounds. Tickets will be $2 at the gate and $1.50 in advance. Contact: Don Berridge, WB9PAC, 2303 Deerfield Way, Geneva, IL 60134.

• **LaPorte, IN** — The LaPorte County Summer Hamfest, sponsored by the Michigan City and LaPorte Amateur Radio Clubs, will be held on Sunday, August 27, 1978, at the LaPorte County Fairgrounds. Dealers may set up beginning at 6:00 a.m. and the general public is welcome beginnning at 8:00 a.m. LaPorte is 50 miles southeast of Chicago on Indiana No. 2. Talk-in on .01/.61, .37/.97 and .52 simplex. Donation is $2 at the gate. Fore more info contact: LPARC, P.O. Box 30, LaPorte, IN 46350.

• **Rochester, PA** — The Beaver Valley Amateur Radio Association's first Annual Hamfest will be held on Saturday, August 19, 1978, from 9 a.m. to 5 p.m. at Brady's Run Park located 5 miles north of Rochester, PA on Route 51. Advance tickets are $3 or 3/$8. At the gate tickets will be $4 or 3/$10. Seller's fee is $1. There will be a flea market and prizes including Kenwood, Midland, and Dentron. For more info write: Wayne R. Sphar, WA3ZMS, Sec'y BVARA, 1200 Atlantic Ave., Monaca, PA 15061.

• **Lexington, KY** — The Bluegrass Amateur Radio Club is sponsoring its Annual Central Kentucky Hamfest to be held on August 13, 1978, at the Lexington National Guard Armory located adjacent to the Bluegrass Field on Airport Road. There will be door prizes, speakers, exhibits, and a grand prize. For more info contact: The Bluegrass Amateur Radio Club, Inc., Club Station K4KJQ, P.O. Box 4411, Lexington, KY 40504.

• **Mansfield, PA** — The Tioga County Pa. ARC Hamfest will be held on Saturday, August 26, 1978, starting at 9:00 a.m. at the Tioga Co Fairgrounds on Rt. 6 between Wellsboro and Mansfield. The admission is good for all special programs and the XYL and children are free. In addition to the usual flea market and displays, a bingo table and other items of interest will be available. Talk-in on 19/79, 52 simplex and CB 5. For more info write: Denny Vorhees, WA3FWQ, RD 2, Box 117A, Millerton, PA 16936.

• **Newburgh, NY** — The Mt. Beacon Amateur Radio Club's 5th Annual Hamfest will be held on Saturday, August 19, 1978, from 9 a.m. to 5 p.m., at Stewart Field. Rain or shine, flea market and auction. Admission will be $1, sellers $2, and under 12 free. Additional information may be obtained from: Ron Perry, WA2CGA, RD 1, Glen Ave., Fishkill, NY 12524.

• **Idaho Falls, ID** — The 46th Annual WIMU Hamfest is scheduled for August 4, 5, and 6, 1978, at Mack's Inn, located 25 miles south of West Yellowstone, MT. Advance registration is $6 for adults and $2 for children, before July 25, 1978. Late/regular registration will be $7 and $2.50. There will be a special prize drawing for pre-registration. Please send pre-registration to: WIMU Hamfest, 3645 Vaughn St., Idaho Falls, ID 83401.

(Continued on page 94)

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C. TEN-TEC KR50 Ultramatic Keyer — $110 The keyer you control. Dual memories, individually defeatable, for operation as full iambic (squeeze) keyer, with single memory, or as conventional keyer. Self-completing characters. Adjustable automatic weighting (50 to 150%) determined by speed setting, paddle force (5-50 gms), speed (6-50 wpm), and 500 Hz side-tone level (to 1 v.) 117 VAC, 50-60 Hz or 6-14 VDC.

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E. TEN-TEC KR5-A Electronic Keyer — $39.50
Same as KR20-A less side-tone and power supply. 6-14 VDC.

F. TEN-TEC KR1-A Deluxe Dual Paddle — $35
Same paddle as KR50; for iambic or conventional keyers.

G. TEN-TEC KR2-A Single Lever Paddle — $17 Same paddle as KR20-A; for "TO" or discrete character keyers.

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K. NEW TEN-TEC 262M AC Power Supply with VOX — $145 Solid-state; built-in ammeter. Output 13 VDC ±0.5V., to 18 A. Regulation better than 1%. Electronic circuit breaker. Mic. input: 2 megohms. VOX gain and delay control. Adjustable delay, 0.1 to 1 sec.

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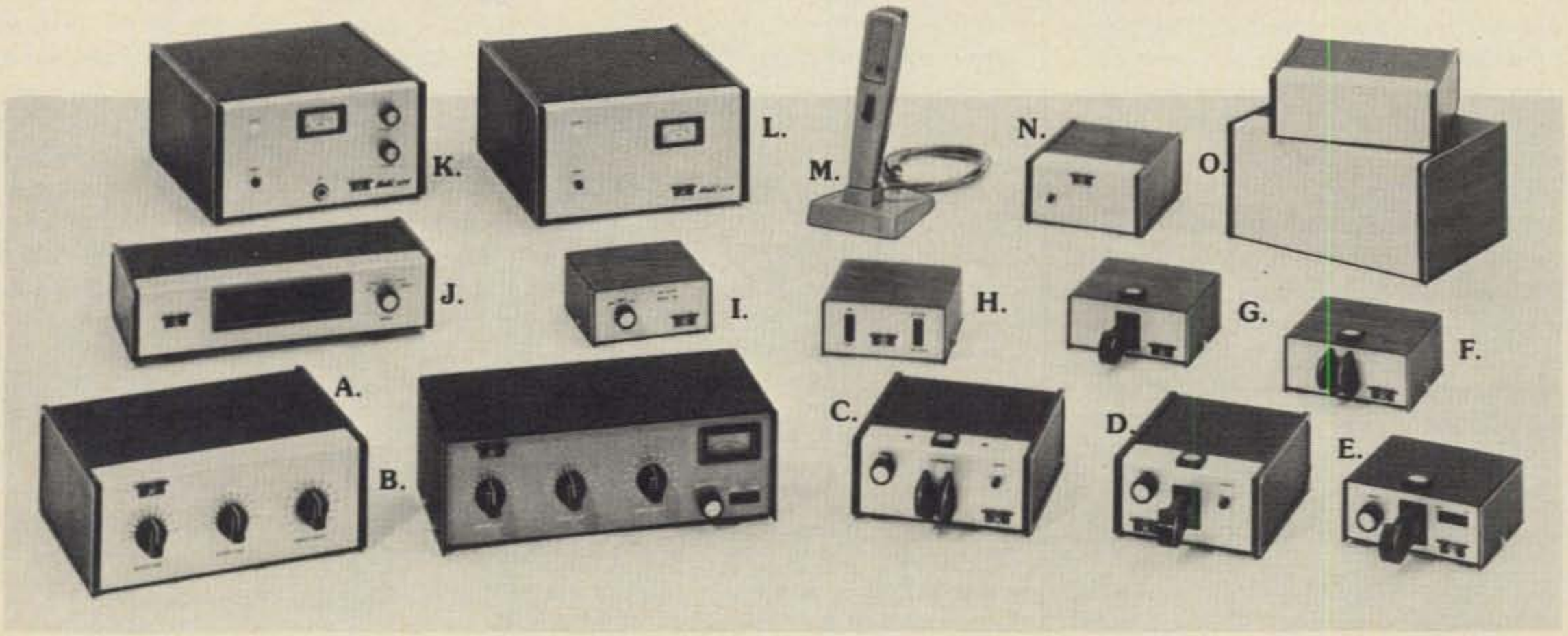

Our Readers Say

DenTron Fights Back

Editor, CQ:

Please find the enclosed copy of Dentron Radio Company's filing in a most important matter before the FCC.

Our filing specifically addresses the matter of the FCC s ban on 10 meter coverage Linear Amplifiers.

Before the
Federal Communications Commission
Washington DC 20554

To. Mr. William Tricarico, Secretary
Federal Communications Commission
1919 M' Street, Northwest
Washington, DC 20554

Petition For Reconsideration
Docket No. 21116

We at DenTron Radio Co., Inc. of Twinsburg Ohio, respectfully request the reconsideration of the Commission on Docket No. 21116, which prohibits the marketing of external radio frequency power amplifiers capable of operation on any frequency from 24-35 MHz.

It is our contention that this regulation will not accomplish its noble goal of ending the illegal use of power amplifiers by unlicensed persons operating in the 27 MHz CB Band. We further contend that this docket would harm us financially through the limitation of manufacture, marketing, and technical viability of our products by limiting frequency coverage marketable to commercial users both in the United States and abroad. Den Tron Radio Co., Inc., firmly supports Commissioner White in her dissent, contending that the addition of the marketing ban along with Docket No. 21117 (Type Acceptance) is regulatory overkill.

The key issue, after all, before the Commission was not the administration of the Amateur Radio Service instead, the issue was the resultant interference to Television and other services casued by CB Operators illegally using power amplifiers. The Commission's own study of the interference problem clearly concludes that the heart of the interference problem was not the Amateurs but rather the CB Operators' failures to comply with the FCC regulations. The Field Operations Bureau Study* found that illegal CB operations caused approximately 45 percent of all CB-TV interference cases. Once again, as Commissioner White points out in her dissent, CB linear amplifiers are already illegal according to the Commission Rules To carry the point even further, and to close loopholes in the regulations through which illegitimate manufacturers channeled amplifiers built for the specific purpose of illegally boosting CB Transceivers, the Commission approved Docket No. 21117. The Type Acceptance standards established by that docket clearly cover the question of illegal CB linear amplifiers and therefore we feel that Docket No 21116 is unnecessary and unduly punitive to the small Amateur Radio industry, of which DenTron is very much a part.

Amateurs themselves have aided the FCC in its efforts to enforce the existing regulations and have always been nobly self-regulating. The neighboring 28 MHz Amateur band is badly needed with the lower Amateur bands becoming increasingly overcrowded. The sunspot cycle, a recognized measure of radio propagation conditions, promises growing use of 28 MHz by Amateur operators. But that use will by hampered the FCC's decision to punish Amateurs in this manner for the wrong-doings of CB'ers. It was not the Amateur Radio community which made the mistake of allocating the CB Band at 27 MHz, right next to the Amateur Band 28 MHz, it was instead the Commission itself. The FCC, faced with widespread interference problems from CB, has correctly sought to institute some new solutions; the Commission made it clear that care would be taken not to hand the small Amateur Radio industry the "bitter pill" it had earlier doled out to the CB industry (that of severe economic consequences as a result of inadequate and ill-timed regulations). There is no need to recite the history of that story, but instead there is the need for the Commissioners to reconsider Docket No. 21116 before the same fate befalls the Amateur Radio industry.

DenTron has already begun to feel the financial hardships that are bound to result from the institution of this docket and is reluctant to endure any further hardship in this matter. As a recognized legitimate manufacturer of Amateur Radio equipment, DenTron is fully willing to co-operate with the FCC and is determined to abide by FCC regulations. We therefore support Docket No. 21117 and have worked very hard to provide your Laurel Laboratory facility with equipment and specifications for complete evaluation of our applications for Type Acceptance. We intend to continue to do so. We concede that hardships which promise results are justifiable hardships; we believe that we can endure the hardships of Type Acceptance, just as we believe that the FCC's goal of controlling the CB interference problem can be accomplished through Type Acceptance. Our position then, is that if Type Acceptance is established for the specific purpose of eliminating the pseudo-manufacturers of CB linears rather than harming the legitimate Amateur Radio manufacturers we can support it. Otherwise, DenTron Radio Company cannot.

To further support our position, we cannot see what purpose the Linear Amplifier Ban can serve in reaching the FCC's goal of contolling the CB interfernce problems. There is simply no substantial evidence that this Ban will accomplish its intended purpose; we re-

(Continued on page 94)

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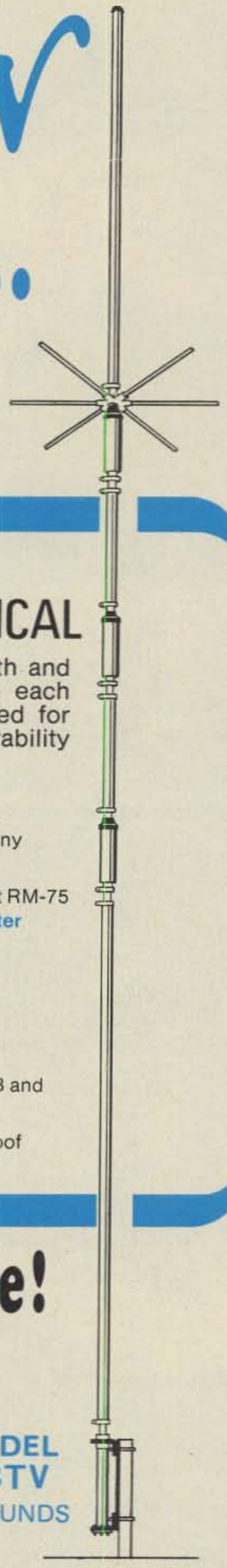

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- Feed with **any length** 50 ohm coax.
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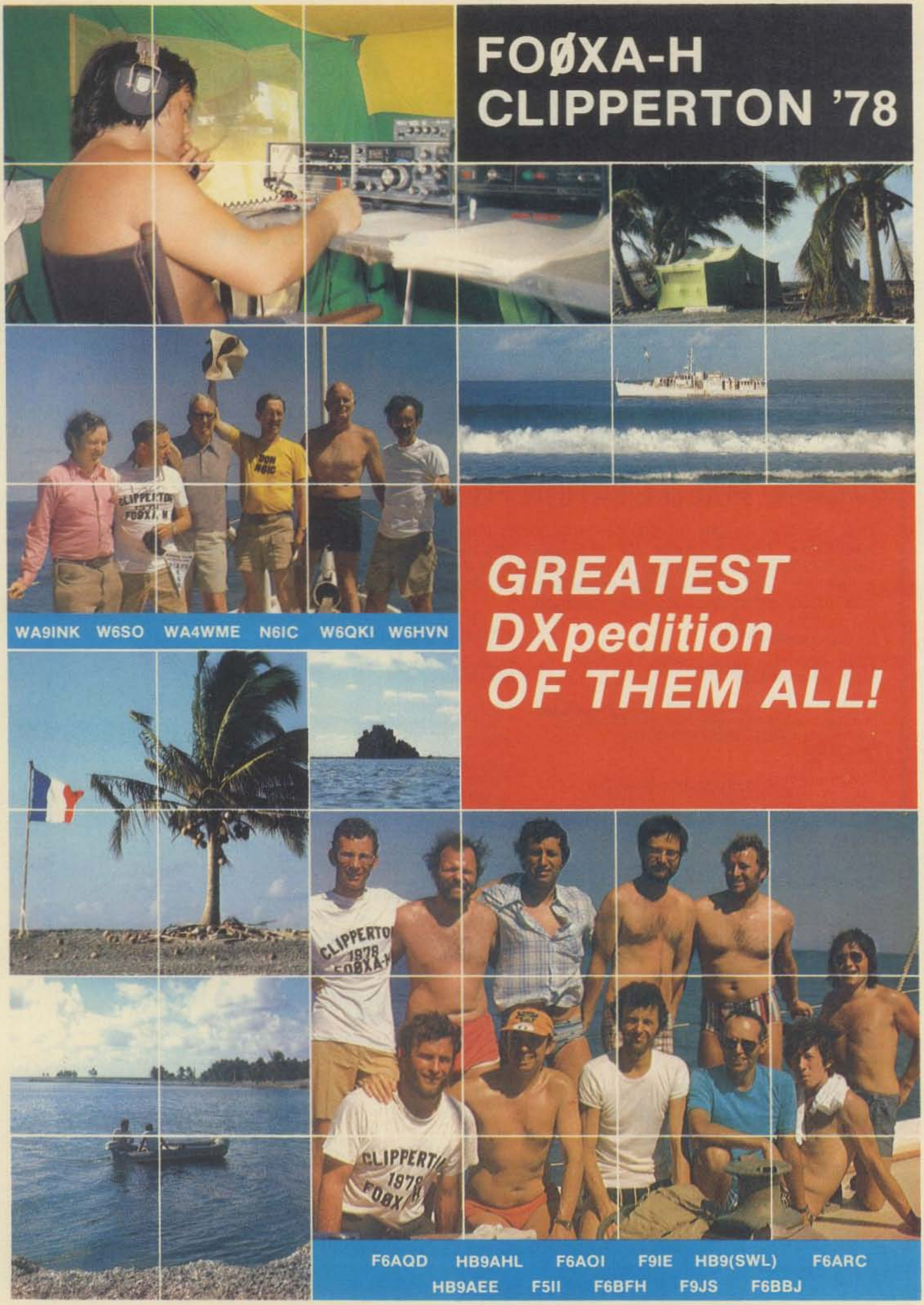

WA9INK W6SO WA4WME N6IC W6QKI W6HVN

F6AQD HB9AHL F6AOI F9IE HB9(SWL) F6ARC
HB9AEE F5II F6BFH F9JS F6BBJ

GREATEST DXpedition OF THEM ALL!

ATLAS 350-XL
Champion of Clipperton!

If you were one of the fortunate 29,069 hams who worked Clipperton Island in March of 1978, you've worked an Atlas 350-XL transceiver. The 350-XL was selected by the DXpedition logistics team, headed by Don Bostrom, N6IC, because it had all of the necessary features required for the operation contained in one compact package. This included primary and auxiliary VFO's for split frequency operation, digital frequency display with accuracy of ± 50 Hz, VOX for SSB and full break-in for CW, sidetone, more than 200 watts output (twice that of most other transceivers), all solid state design permitting efficient operation from a storage battery if necessary. And above all, rugged design and construction that permits hour after hour of continuous operation without failure.

"The 350-XL is a fine, rugged transceiver . . . even works after a salt water bath . . ." Willy, HB9AHL

One very important point we want to make clear . . . the Clipperton DXpedition was financed by the 16 operators who went there, and by many generous donations from DX clubs, radio clubs, individual hams, and others. Atlas Radio was not a financial sponsor, except to the extent of loaning equipment. Other manufacturers provided similar support.

"As equipment logistics manager, my selection of the Atlas 350-XL proved to be the perfect choice . . ." Don, N6IC

Needless to say, we at Atlas Radio were very pleased when the team chose the 350-XL as the transceiver for all 3 stations. At that point, how could I (W6QKI) turn down the invitation to join the team, and to share in a tremendous adventure? Did I go along to keep our radios working? Well, truthfully I brought along a box full of spare parts and pieces. Happily I can report that the box could have stayed at home. And there are 15 witnesses who will verify this. Their unanimous and whole hearted endorsement of the 350-XL is most gratifying.

Many of you will be interested in how the 3 stations were organized. Number 1 station was set up in the metal Quonset-type building which the French put up in 1957 during the IGY scientific work conducted on the island. This station worked strictly 20 meters 'round the clock for 7 days, SSB and CW. It included a Dentron MLA-2500 Linear which was used much of the time to break through to Europe and other distant points. The antenna was a Wilson 4 element monobander about 30 feet high. Power was supplied by a 2500 watt Honda gasoline generator. This station ran continuously for 7 days, and made 11,158 contacts! Problems, zero!

"Unbelievable performance and reliability under extremely adverse portable conditions and constant use by DXpedition multi-operators . . ." Hugh, WA4WME

Incidentally, we took one box ashore which contained 3 fans. They were intended for blowing air on the transceiver heat sinks. The box is still on the island, unopened! Ambient temperature outside was 85 degrees F. Inside the metal building? Up to 95 degrees!

Station Number 2 was located about 200 feet from Number 1, and was set up in a tent. It worked 10 meters daytime, 80 and 160 meters at night. A Dentron MLA-2500 Linear was used, mainly on 80 and 160, some of the time on 10 meters. A 3 element Wilson monobander was used on 10. A doublet was used on 80 meters, later changed to a Delta loop by F6ARC, a KLM vertical with ground radials worked very well on 160 meters. A Dentron MT-3000 antenna tuner was used on 80 and 160. Power was supplied by a Sears 2200 watt generator. This station averaged 21 to 22 hours operation each of the 7 days. Problems? The digital frequency display made signs of acting up. One of the IC's was replaced. A 5 minute job. The rig had been liberally sprayed with salt water on the trip in through the surf, as also was the Dentron linear. Total contacts from station Number 2 were 6401 on 10 meters, 1644 on 80 meters, and 202 on 160 meters.

"Clipperton: The best location for DXers. Atlas 350-XL: The best equipment for hardest DXpedition. Result: One of the best DXpeditions ever . . ." Jack, F5II/FOØXB

Station Number 3 was located in a tent about 300 feet (and 5000 crabs) from Number 2. It operated on 15 and 40 meters. Foreign broadcast QRM was very rough on 40, so most operating time was on 15 using a Wilson 3 element monobander. No linear was used at this station because the generator would not provide enough power.

So, if you heard Clipperton on 15 or 40 meters, it was strictly barefoot. A Dentron MT-3000 tuner was used with a KLM vertical on 40 meters. Station Number 3 ran all week on a generator that delivered 155 volts AC when receiving . . . and only 75 to 90 volts during transmit! We were unable to adjust the problem, so simply let it go. Didn't bother the rig. Total contacts on 15 meters numbered 7194, second only to 20 meters! 40 meters netted 2450 contacts.

This report hardly is complete if we don't mention 6 meters and Oscar. N6IC and W6SO were the Oscar specialists. Unfortunately, some equipment difficulty (not Atlas) limited Oscar contacts to only 20. Rather disappointing, but the best we could do, and the guys really tried. 6 meters just never produced an opening. We monitored everyday without ever hearing a signal.

"I cannot say enough about the excellent performance of the Atlas equipment. Under the most trying conditions of operation the gear came through with flying colors. With 16 operators pushing switches and twisting knobs 24 hours a day for 7 days, the equipment never faltered. Truly remarkable. The success of the DXpedition was due in large to the faultless operation of the 350-XL . . ." Hoppy, W6SO

All in all, we feel the performance record on the HF bands is something to brag about, and hope you'll pardon us for indulging. One final thing to boast about was really unexpected. The ride through the surf back to the ship was quite a ride. Everyone, and everything thoroughly soaked. Much of the gear was full submerged. But all 3 of the 350-XL's worked normally after drying out! Being very low on fresh water we could not afford to wash the gear down. All we could do was dry them out in the sun. Obviously, as soon as we got back we had to wash out the salt and clean the sets up. But, they were used "maritime-mobile" on the trip back to San Diego.

The Clipperton '78 DXpedition was undoubtedly the biggest expedition and adventure of its kind ever put together, and turned out to be a smashing success in all respects. All the gang at Atlas is mighty proud at how well the 350-XL proved itself, truly a great performer; a real classic that will set the pace for years to come.

73 Herb Johnson W6QKI

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(714) 433-1983
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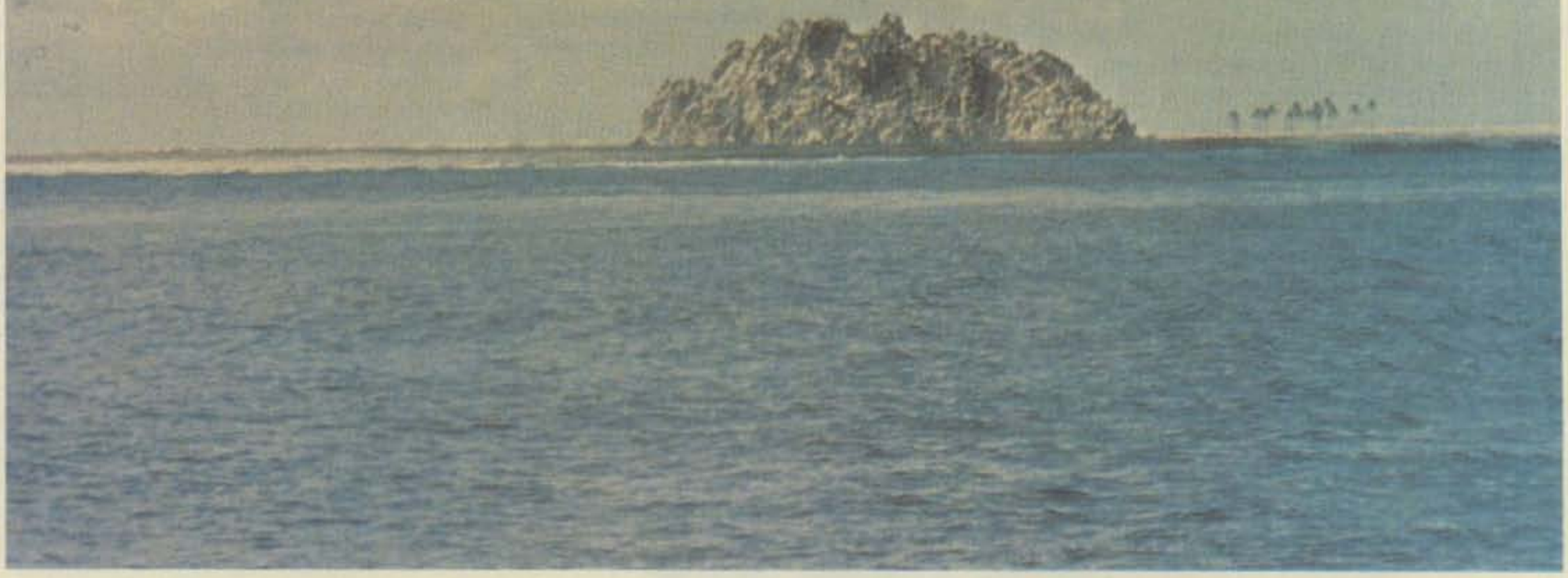
Clipperton Island—A Dream Come True

BY CHARLES SIGNER*, WA9INK



Of the great number of places throughout the world that have been designated as possible sites for amateur radio expeditions, few have been as closely associated with the concept of adventure as Clipperton Island. This mental connection with the exotic has a lot to do with the physical remoteness of that ringlet of rock and sand over 700 miles from the nearest port of call. In recent years a virtual blackout of any human activity on the island has led Clipperton to be the subject of amateur radio legends that have been passed by word of mouth over the airwaves in lieu of any concrete knowledge on the subject.

Those of us who participated in the 1978 DXpedition to Clipperton, like most amateur radio explorers hoping to activate the most unusual spots on the world, in the beginning knew very little about the island except that it was there. The only thing we were sure to find if we went to Clipperton would be adventure, since only those who were interested in adventure would want to go there in the first place.

Newly-licensed amateurs of the 1980's who dust off this copy of *CQ* will no doubt have some difficulty understanding why serious DXpeditioners would get so excited about Clipperton. in the 1980's Clipperton will still rank rather high on the list of countries most needed by DXCC Honor Roll laureates. Let me assure them that in terms of amateur radio activity in the 1970's no point on the globe seemed more deserving of DXpedition activity than Clipperton, and there were several reasons for this.

To that relatively miniscule percentage of the followers of DX activity who had come close to having contacted every country in the world but still lacked a precious few, Clipperton Island represented not only one more step to the summit but a seemingly unbreachable stumbling block. The handful of amateurs who had reached the top all had contacts with Clipperton from the only two authorized DXpeditions to the island in the 1950's, and anyone who had come into amateur radio since the 50's was therefore automatically excluded from the ultimate thrill of having confirmed contact with every land on the globe.

"...the primacy of CQ in the DX field is...matched perhaps by no other publication." -WA9INK

In the minds of a larger number of amateurs who could remember, there were the lingering memories of the difficult FØ8AJ DXpedition in 1954 by Bob Denniston, WØDX, and a group of other Iowa amateurs who managed to land on Clipperton after two attempts. They produced 1104 contacts under very trying conditions. That expedition was the subject of the cover story in July, 1954 *QST*, which followed an ominous description of the island in *CQ* the month before. Widespread advertising by the supplier of equipment for FØ8AJ, the Hallicrafters Company, tended to immortalize the group of Midwesterners who had pulled a success out of an ordeal. A somewhat better prepared FØ8AT operation was later made in 1958 under the sponsorship of the San Diego DX Club in conjunction with an International Geophysical Year expedition. While the results of FØ8AJ were not published in the major amateur publications of the time, the operators came back with stories passed over the air about the numerous hazards they had experienced on the island.

By 1977 Clipperton was the only island near North America that had not been activated since the development and growth of DXpeditioning in the 1960's. To a new generation of amateurs, Clipperton looked accessible enough on the map, sitting only a few inches from California. It had somehow escaped the efforts of various groups, rumored at the rate of two or three a year, to have found some secret solution to putting the island on the air at last after almost two decades. Some of these rumors were sheer fantasies, while others seemed to indicate that serious planners had finalized the logistics, only to fail for lack of authorization from the officials in Tahiti who are responsible for the island. With each succeeding disappointment, a Clipperton operation seemed more and more to be an impossible dream.

While many of the rarest DXCC countries were sure to be activated eventually after a

*2118 28th Street B, Sacramento CA 95818

change in political atmosphere, and while authorization to other remote areas only awaited groups with enough time and money to make the trip, Clipperton seemed to be the most difficult of all to get on the air, because those who would get there would have to face a very strong licensing impediment and a logistical nightmare at the same time.

The beginning of 1977 found me in a new position at *Worldradio*, an amateur radio newspaper published in Sacramento, California. Soon after my arrival in Sacramento, Hugh Vandegrift, WA4WME and then DA1VH, wrote offering me bits of information that might be of interest to the readers of the newspaper. Among the tips that he offered was that Jacky Billaud, F6BBJ, had somehow stumbled onto a final solution to obtaining a license for Clipperton. Hugh said that I might be able to put Jacky together with the right contacts in California through *Worldradio* to provide logistical support for a Clipperton effort based in France.

Although I had been in California only a couple of weeks and knew little about planning a large scale expedition, I was immediately seized by the challenge of the development and execution of a large and complex international operation that a Clipperton attempt would almost certainly be.

Both experience and instinct told me that after 19 years of refusals of requests from groups around the world for permission to operate on Clipperton, the French authorities must have had some very important reason for keeping amateurs away from the island. If there was any hope at all of gaining the necessary authorization that chance would lie with amateurs close enough to persons in the final decision-making position in the French government. At the same time, I realized that while Clipperton is officially a part of French Polynesia, any decision authorizing a Clipperton operation could be made only at the highest level in Paris. Consequently, only a group of amateurs locally known in Paris to the proper officials as capable of carrying out a successful mission needed have any serious hopes of being authorized to operate on Clipperton.

Another misconception that I was able to avoid was that the amateur license is the most important goal in obtaining permission to operate on Clipperton. Actually, the amateur license is only a formality for those who obtain official permission to land on the island from the French government in Paris. Amateur licenses for Clipperton are issued by French Polynesian officials only with special permission from the Ministry of Posts and Telecommunications in Paris. That special permission is available to those who present a letter of authorization to land on the island.

In recent years the solution to getting the necessary DXpedition landing permission has been increasingly complicated by the recent experience by civilians on the island and by the history of difficulty left by the only two authorized amateur operations. The 1954 DXpedition landed on the island after one aborted attempt, and after it came upon the island it had to be rescued by the Mexican Navy. This 1954 experience must have been a bitter pill to the French officials not only because for several weeks they had to worry whether they would be liable under international law for the lives and safety of a group of hobbyists but because the presence of Mexican officers on the island is not deemed desirable. For many years Mexico laid serious claim to Clipperton but in 1931 had to accept with considerable displeasure an arbitration by the King of Italy awarding sovereignty over the island to France.

Left to right: F6AYO; John Bacich, W6RTN; Jacky Billaud, F6BBJ. (Photo by WA6QDN)

The only other published accounts of civilians landing on the atoll since 1931 were of a short stop by Franklin D. Roosevelt in 1937, the 1958 IGY expedition, and various scientific expeditions such as one by Jacques Cousteau. All of these visits were made using large, expensive yachts and other equipment normally carried by well-financed professional groups. Even though these visits took place with no loss of life, the impressions they left were that Clipperton simply was not the type of place for people who did not know what they were doing. In a very literal sense, Clipperton was a place to be visited only by real professionals, not amateurs.

I wrote to Jacky that I thought I might be in a a good position to help him because my experience of living in France might give me a better idea of the French point of view on Clipperton than most American amateurs might have and that my position at an amateur publication with strong readership on the West Coast might help him focus attention to his needs in that region. Jacky responded that indeed certain officials in the French government were certain to approve a French Clipperton operation if and when the proper logistical support could be arranged. I was tentatively named the sole representative of the French DXpedition team which he represented. This was an *ad hoc* group of some of the best French DXers, known as the Clipperton DX Club.

At the time I was further encouraged about the prospects for a French Clipperton operation because of various television programs and newspaper articles in France about Clipperton. An International court case had recently established the precedent that if an island were not administered by the country that claimed it, the island might after a period of time be considered open to claim by other governments. The addition of a large economic zone with increasingly valuable fishing and oil rights around Clipperton had made France the third largest country in the world in terms of total land and sea area under its sovereignty. At one point, a call was made for French citizens to volunteer for settlement on Clipperton. Although nothing was said about Clipperton in the American press, to me it seemed as though a Clipperton operation from France was only a matter of months away.

Although I knew the negotiations in Paris with the French officials would still be difficult and tricky, I decided that much time might be saved if I wrote openly on the subject of Clipperton in *Worldradio*. In my first article, in the March 1977 issue, I made an appeal for support expecting to create great interest. Although many people had read that column, in the end there was very little response. It looked as though I were trying to make some sort of name for myself by making up fantasies about Clipperton, and such rumors were old hat, especially on the West Coast.

It was obvious that the only way the logistic support could be found would be for me to search privately for the things we needed, starting first with the Clipperton yacht and then research on the island itself. What the French authorities seemed to be looking for

Left to right: F9IE, F6BFH, F5II, F6AQO, F6AOI, WA9INK, F6BBJ, F9JS. F6ARC is holding the T-shirt. The picture was taken at a banquet sponsored by W6RTN on the Sunday before castoff. (Photo by WA6QDN)

American Clipperton DXpeditioners: (left to right) Charles, WA9INK; "Hoppy," W6SO; Hugh, WA4WME; Don, N6IC; Herb, W6QKI; Doug, W6HVN.

was not so much the final plan that we would come up with but rather an indication of competency on the part of the French Clipperton team in planning such a complex and dangerous mission. Since the French team was halfway around the world from California, it was largely up to me to provide them with information from California. A suitable Clipperton vessel and other pertinent scientific information would show that they were more than casual students of Clipperton.

In my new role as the American manager of what was to be an operation on an international scale, I knew that the secret to putting a Clipperton expedition together lay mainly not in assembling the necessary elements of success by myself but in identifying individuals potentially interested in participating in a Clipperton DXpedition and who possessed talents and interests that would benefit the overall mission. I personally had never been on a yacht in my life, I had never landed on an island smaller than Corsica, and as far as my knowledge of electronics was concerned I was strictly an "appliance operator." During the planning of the Clipperton operation it would be my role to identify and invite certain outstanding individuals into our effort and to coordinate their support and my own efforts with the needs of the team working in France.

The first person I approached for advice about Clipperton was Doug Murray, W6HVN, owner of M-Tron, an amateur equipment store in Oakland. Every time I would see Doug I would become more and more impressed with his credentials as a potential DXpeditioner. Doug is an extremely energetic individual whose experience in Austria during the 1950's at OE13USA, then the only station in the country authorized to work other countries, encouraged him to spend three months on the *Yasme* with Danny Weil planning Clipperton. At one point Doug also put together the logistics for Clipperton on his own but failed to get a license. I had the impression that Doug knew the island about as well as anyone without actually having been there, and I was certain that he would be a termendous help in planning the landing and setup on the island of our DXpedition.

Another man I would turn to for help was Hugh Vandegrift, WA4WME, whom I had met in West Germany when he was DA1VH. Hugh is an extremely determined individual who will stop at nothing before he accomplishes what he set out to do. He always comes up with fresh approaches to problems. Hugh had spent much of his vacation time in Monaco, where he handed out 200 contacts an hour as 3AØFN and at night practiced his second favorite hobby, crashing parties at the most exclusive Monagasque hotels. As a Department of Defense civilian, Hugh is experienced at planning logistics for military-type operations on a professional basis, a definite plus if we were to attempt a Normandy Beach landing at Clipperton. Hugh is also an accomplished diver. I would have been hard pressed to find a more qualified person than Hugh for a place on the Clipperton team.

In May 1977 I was invited to give a talk at the Lockheed Hamfest in Burbank on my amateur experiences in Europe. Sharing the spot with me on the DX program agenda was Don Bostrom, N6IC, who presented an excellent film on his DXpeditions to Wallis Island and New Caledonia. After I had mentioned that the Clipperton DX Club had been officially organized that week at the REF national convention in France, Don came up to me and expressed an interest in our expedition plans.

As I came to know Don better in the weeks that followed I became convinced that he would have to be a prime candidate for a place on the Clipperton team not only because he was an experienced yachtsman, a good DXpeditioner and an electronics engineer specializing in antennas, but because he seemed to be interested in supporting the Clipperton mission even if he were not on the final list of American participants. This was exactly the kind of attitude I was looking for in the individuals that I would recommend to be on the Clipperton yacht because I really could not guarantee anyone a place on the Clipperton team and because I felt that anyone who had to be promised a ticket to the island would be more interested in himself than in the mission. Only a real team effort could assure a safe and successful Clipperton operation.

Don was able to send me some general information about the island that I had not seen. Together we tried to identify possible strategies for transportation to the island. Basically what we needed was a yacht to take us to Clipperton and wait off the island for about a week before bringing us back to the mainland. A further requirement that we had from France was that the vessel would have to be available at a moment's notice in case we had to evacuate the island unexpectedly, and it would have to be capable of returning even under the most severe conditions. At first we still considered an attempt from Mexico as the FØAJ team had done, but we had to rule out that possibility on the ground that it would be too unreliable and too expensive to transport large amounts of equipment through a country that frowns on amateur operation by visitors. Fishing vessels also had to be ruled out because we could not find one that would be able to stand idly by waiting for us to finish our operation on the island.

As I called many charter outfits listed in popular yachting magazines, Don continued the search in San Diego with the help of his yachting friend, John Benya. John was able to get a sportfisher charter group to quote as a Clipperton trip at extremely high cost. This was an accomplishment in itself, since all the navigation guidebooks describe Clipperton as an extremely hazardous place to approach. Few owners of suitable yachts were willing even to entertain the thought of a Clipperton trip.

At the same time, I discovered Don Gumpertz, K6OF, the owner of the *Westward*, a 90-foot 1924 vintage teak yacht in which he had circumnavigated the globe a few years before. Don was not in a position to consider a Clipperton trip because of the state of repair of his yacht, but he suggested that I call an old friend of his, Herb Johnson, W6QKI, president of Atlas Radio Co. and a well-known member of the San Diego Yacht Club. I had already thought of calling Herb after seeing his article in *Ham Radio Horizons* on maritime mobile operation and his book on the same subject.

I had not yet taken my hand from the telephone after talking with Don Gumpertz when the phone rang once again with Herb Johnson on the line returning my call. Since Herb is known as one of the busiest men in amateur radio I was not sure if he would be able to return my call. I was hoping that I could interest Herb in the Clipperton planning not only because he was a rare cross between avid yachtsman and experienced radio amateur but because he might be able to help us identify a suitable Clipperton yacht through his contacts in San Diego yachting circles. Time was running out, and Jacky Billaud was calling me from France telling me that the French team needed documentation on a yacht soon if they were to have the

landing permission and amateur license in time for the next season of calm weather at Clipperton, during the months of January to April 1978.

Herb was able to find a vessel named the *Phillippa*, a 110-foot former U.S. Navy submarine chaser based in San Diego, and within a couple of weeks he sent me a spec sheet on it. Although the estimated charter cost, about $37,000, was still astronomical, we had at last discovered a vessel built to military specifications that the officials of the French Navy and other French officials involved could recognize and appreciate. The *Phillippa* seemed capable of withstanding even the most difficult of voyages, and since it had backup systems for everything I knew, a plan that included such a yacht would be difficult to reject.

Perhaps the most refreshing thing about the *Phillippa* was that its owner, Phillip Fishman, was not the least bit hesitant about chartering the *Phillippa* for Clipperton, and in fact he seemed anxious to see it used in such a hazardous mission as a means of enhancing her reputation. In early September I went down to San Diego with Don Bostrom to meet Mr. Fishman and his representative, Judy Palmer, to discuss the proposed charter and to see the only remaining film from the 1958 FØ8AT expedition at the home of one of that expedition's operators, Bob Bucaro, W6KSJ.

With John Benya and Don Gumpertz also watching, Bob showed us a wild pig's tusk and told us that he wished he could go with the next DXpedition to the island but that he would not want to test his luck by going there a second time. Bob was nice enough to prepare a list of suggestions, most of which were to watch out for various hazards on the island. Bob described the island and his film depicted the island as an extremely forbidding place surrounded by hundreds of man-eating sharks and inhabited by viscious wild pigs, thousands of goony birds and millions of crabs. The description of storms and the extremes of humidity and temperature did nothing to change our overall impression of Clipperton as a very unhospitable place, but we were all wondering if Clipperton could really be quite that bad. In fact, a few of the stories about Clipperton that we had heard led us to believe that we were heading for a place not much different from Santa Catalina Island. In the end Bob's accounts tended to increase our appetite for the intrigue of filtering out fact from the legends that surrounded the island.

I flew back to Sacramento with Bob's notes on 1958 and sent them together with a full documentation on the *Phillippa* to France for use in the final negotiations in Paris. Jacky had indicated that we would probably have a "green light" for the Clipperton operation by the middle of October, and I anxiously awaited the results. October arrived and passed, and then November slipped away as I tried to explain the delay to the other members of the American Clipperton crew and to Judy Palmer, who in turn kept trying to explain the delay to Mr. Fishman.

By Christmas various reports were circulating that either a group headed by Jacques Cousteau or some group in Texas had obtained permission for a Clipperton DXpedition. I spent many hours trying to figure out whether or not these rumors had any merit. I finally decided that they could not be true since our contacts in the various French ministries would know if either a Clipperton amateur license or the landing permission had been issued.

European Clipperton DXpeditioners: (top, left to right) Francois, F6AQO; Willy, HB9AHL; Andre, F6AOI; Bernard, F9IE; Henry, SWL; (bottom, left to right) Fredy, HB9AEE; Jacques, F5II; Alain, F6BFH; Jean-Charles, F9JS; Jacky, F6BBJ; Olivier, F6ARC.

Following a similar report on the front page of the *West Coast DX Bulletin*, Don Bostrom called me on December 28 to ask my opinion, and I told him that these rumors interestingly included elements of our own planning and that instinct alone led me to believe that something good or bad would break loose soon. At the same time, I knew that the necessary lead time, a bare minimum of ten to twelve weeks to put the Clipperton equipment and financing together, was running out for the latest part of the calm weather season at Clipperton, the beginning of April. I decided that I would have to write to Judy Palmer to forget a Clipperton charter in 1978 if I didn't have some word from France by the first of the year.

On December 29, 1977 the mail included a letter from Jacky stating that on December 18 the landing permission for the purposes of our amateur radio expedition to Clipprton had been accorded to Jean-Charles Sacotte, F9JS, and that the amateur licenses for the DXpedition would be available in a short time. I thought that receiving that letter from Jacky marked the greatest day of my life, since having it made me feel as though I had caught a tiebreaking pass over the goal line in the last second of the Superbowl.

I was surprised to see the inclusion of three Swiss in the list of European participants that Jacky sent me. This contingent was led by Willy Ruesch, HB9AHL, who had made a request to the French authorities for a Clipperton DXpedition once again in 1977 as in previous years, but this time just as the French team's plan was nearing fruition. The Swiss had approached the French authorities with a plan including a yacht in Costa Rica which Willy had already used on his 1975 TI9FAG DXpedition to Cocos Island. The Department of Overseas Departments and Territories asked the French team to put together a joint expedition with Willy's group, and this was done, but using the California approach that I had worked out.

The situation I faced at the beginning of 1978 was a challenging one. I had only a short time to set an actual time frame for the operation, to put together somewhere over $30,000 to pay for the yacht costs, and to arrange for the equipment for the amateur operation on the island.

The Europeans were anxious to get to Clipperton at the beginning of March, but I suggested that the week before Easter might be the best time because that period coincided with the Spring equinox, traditionally a time of year when one could expect good conditions on all bands at the same time. The week before Easter also seemed good for a once-in-a-lifetime opportunity such as Clipperton because Easter vacations would offer a greater number of amateurs to be on the air. Not coincidentally, the time I suggested was about as early as we could hope to have all the money and equipment together for such a big operation, and about as late as we could go without risking stormy weather.

The financial problem was the trickiest one of all because we had to find a formula in which all of the participants, who ranged in income from wealthy to poor, could pay their own way and still feel they had an equal stake in the operation. I proposed such a plan, which called for the participants to pay over $20,000 of the yacht cost with the rest of the yacht fund coming from outside sources. In practice, we would need around $10,000 in contributions from amateurs and clubs around the United States, and I had only about ten weeks to get it.

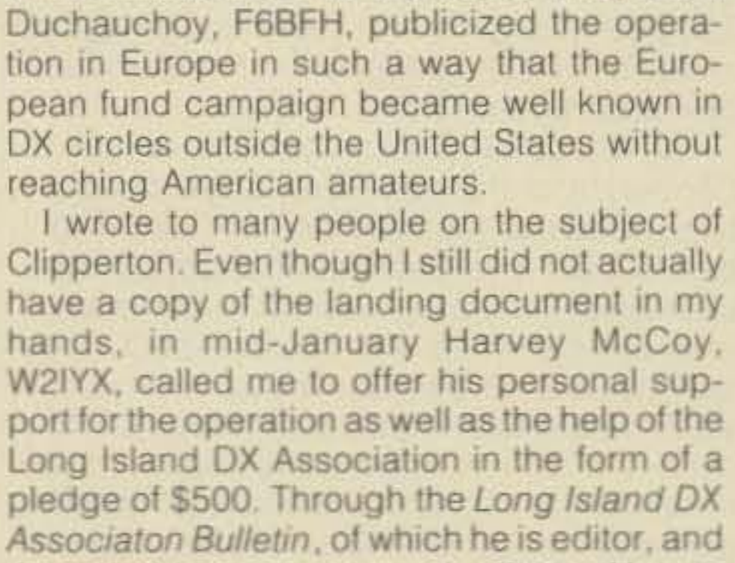
Since Jacky Billaud had taken off once again for the Indian Ocean on a DXpedition he hoped could publicize the Clipperton operation to follow, Jacques Caillet, F5II, be-

The Phillippa anchored off Clipperton.

came my liason with the French team. I explained to Jacques in our weekly telephone conversations that I felt the main problem in gaining public financial support was not the availability of such help but a matter of making people believe that this Clipperton story was based entirely on fact. Amateurs who might otherwise be willing to contribute to a Clipperton effort tended to be skeptical not only because of the long series of rumors about Clipperton but because many potential contributors had already been "burnt" by proposed DXpeditions that had sought and received support but never materialized. The support of amateurs around the North American continent would have to be as much a matter of faith for them now, just as it had been for those who had worked on the Clipperton planning from the beginning.

I felt that the first thing to do was to announce the DXpedition in very general terms not giving the identities of the European or American operators in order to centralize the coordination at a single point in Sacramento. More than one source of information would have led to misunderstandings through lack of communication. At the same time, Alain Duchauchoy, F6BFH, publicized the operation in Europe in such a way that the European fund campaign became well known in DX circles outside the United States without reaching American amateurs.

I wrote to many people on the subject of Clipperton. Even though I still did not actually have a copy of the landing document in my hands, in mid-January Harvey McCoy, W2IYX, called me to offer his personal support for the operation as well as the help of the Long Island DX Association in the form of a pledge of $500. Through the *Long Island DX Associaton Bulletin*, of which he is editor, and through his own personal efforts, Harvey helped us publicize the upcoming Clipperton trip with great skill. The donations that Harvey was able to generate made the difference between success and failure in the overall fund-raising campaign and therefore the entire Clipperton mission itself.



Bernard Chereau, F9IE and Olivier Cado, F6ARC, preparing the Clipperton logs on the Phillippa.

During the course of the pre-DXpedition period we also had the support of Hugh Cassidy, WA6AUD, who through his *West Coast DX Bulletin* helped us confirm in the minds of the world's top DXers that the Clipperton operation was indeed a certainty. The reputation for reliability and accuracy that Cass has acquired as a DX editor over the years has earned his publication the status of a standard by which all other DX publications are judged. When I received a personal contribution from Cass for the Clipperton Fund I knew that our DXpedition had been accorded something of an apostolic blessing.

Gus Browning, W4BPD, who I always considered to be the Father of DXpeditioning, went so far as to reprint in full the letters I had sent him in *The DX'ers Magazine*. Geoff Watts also gave us special mention in his *DX News Sheet*, an honor bestowed only for the most important DX efforts. By mid-February my own appeal, which included offers of tokens of appreciation to contributors in the form of souvenirs of the island, was reaching the readers of *Worldradio* as well.

Although printed media can go a long way to reach those who might be interested in supporting an important operation such as Clipperton, what was really needed was the personal touch of representation in the major DX organizations throughout the United States and Canada. I wrote to all of the members of the *CQ* DX Advisory Committees, and largely thanks to their individual appeals on our behalf, almost all of the major DX clubs throughout the continent contributed to the Clipperton DX Club's cause. I had known that *CQ* is recognized as the leader in coverage of DX subjects, but as a result of the outpouring of these DX Advisory Committee members support, I came to realize that the primacy of *CQ* in the DX field is really based upon a very strong, unseen network of support spread throughout the North American continent matched perhaps by no other publicaton.

During the last two months before the Clipperton operation I found myself spending many hours recording contributions large and small from every state of the United States, all provinces of Canada and from Japan. Making up the deposit slips for the Clipperton DX Club bank account in Sacramento, I realized that perhaps never before had there been such a strong and widespread expression of support, in such a short time, in response to the challenge that DXpeditions offer and require. As we came closer to the amount that we would need to get off the dock on March 14, it was clear that if our goal was being reached it was just as much due to the steady stream of small individual contributions that was coming in. I am convinced that most of these private expressions of faith in us came in simply out of good will and love for the DX hobby. We had contributions from SWL's, Novices, amateurs with no equipment and Honor Roll members who had confirmed Clipperton. All this for a DXpedition that did not yet even have a callsign.

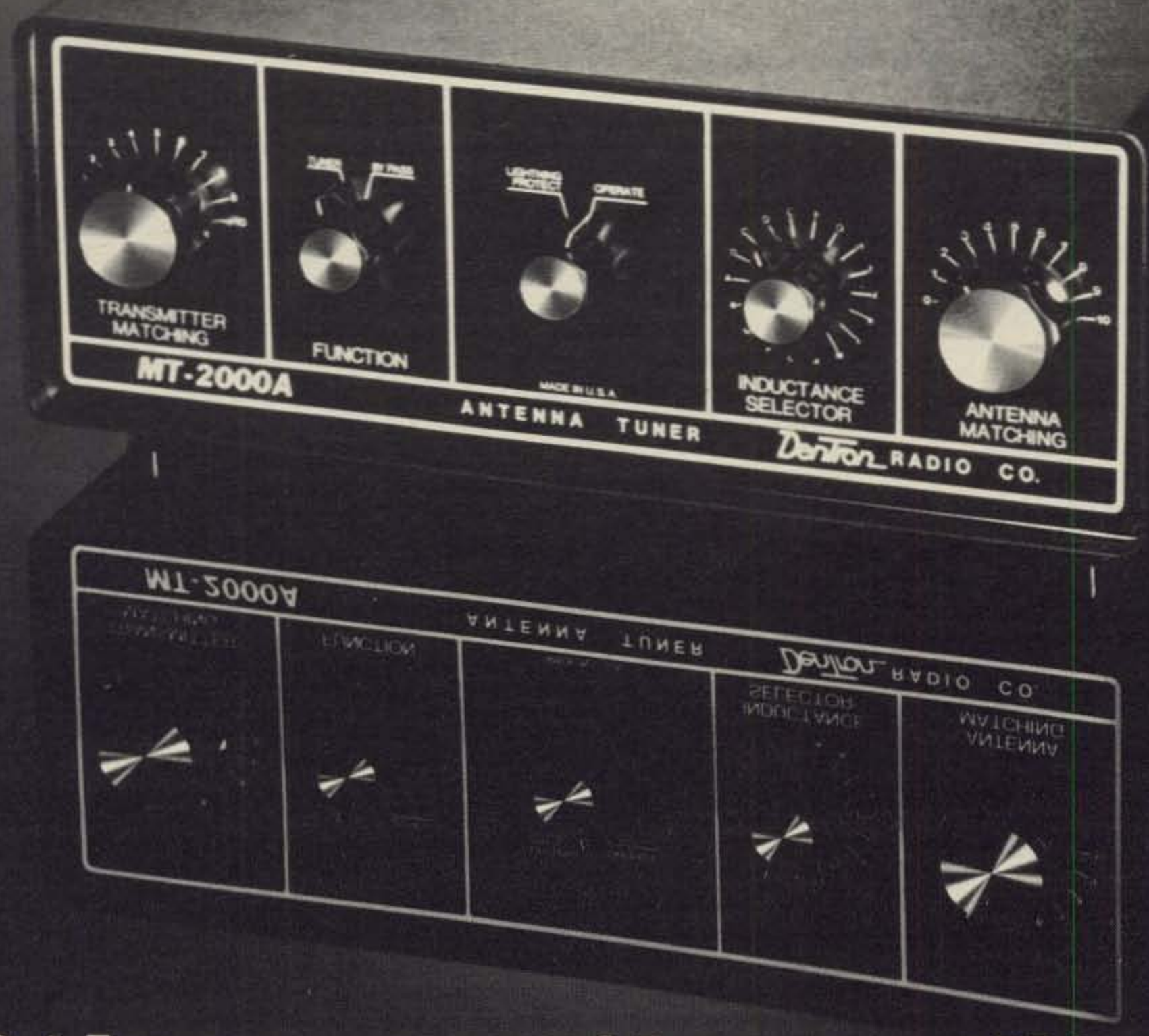
Although we knew that we would have no trouble getting the Clipperton amateur licenses in time for the DXpedition, by late February we were getting a little nervous because the callsigns for the operation had not yet been received from Tahiti. I kept impressing Jacques each week with the need for the callsign as a means of wiping out any remaining doubts in the minds of the public that this DXpedition was for real. I learned that the delay was due in part to the request by the French team for the callsign FO8C, which they were told was reserved for military purposes. At long last, François Muller, F6AQO, called me from Paris with not one but eight callsigns, FOØXA through FOØXH, one each for eight of the European operators. I thought that using so many callsigns on the island would be very confusing and cut down on the number of different stations to be contacted from the island because of duplication. The French team had the same idea, and the next day I learned that a compromise had been reached by which all operators would use the same callsign on a given band and mode, with the different bands and modes being arbitrarily assigned one of the callsigns. Most of us would have preferred to use only one callsign for the whole operation, but I found out later that French amateur regulations forbid the use of a single callsign on more than one band at a time.

In January, when we had the green light for Clipperton, the time had come to finalize our plans for equipment to be used in the amateur operation at Clipperton. We had been able to do almost nothing about equipment up to that point because there would be no need for equipment without permission for a DXpedition. In our discussions on the subject, Don, Doug and I foresaw the possibility of up to four separate stations on the island. The criteria for our selection of components were that the various parts of each of the stations would be identical and therefore interchangeable and that we should rely on solid state circuitry as much as possible so we could operate from batteries if necessary.

In May, 1977, long before I met Herb Johnson, I placed a tentative order for an Atlas 350-XL for the Clipperton operation believing that the reliability in general of Atlas transceivers and the great flexibility of this newest model would be perfect for a Clipperton operation. Following the authorization for our DXpedition, we asked Herb to supply a number of 350's for the DXpedition, and even though he was a little surprised that the participants would not want to bring equipment that they were used to from home, Herb offered us as many Atlas transceivers as we might need. Herb also sugested that with several stations operating within a small radius of each other we might have a problem of hearing each station's intermediate frequencies at the same time, so he had the transceivers modified to have different IF's. Only someone who handles a large number of transceivers every day would have thought of that.

I also had a telegram from Warren Elly, WA1GUD, of Dentron offering us all of the Dentron tuners and linears that we might need. I was always impressed with the Dentron line, so I was very glad to take up that offer. Dentron has quite a number of active hams working at its plant in Ohio, and they seemed as excited about the Clipperton operation as we were. Warren also special ordered some doublets with heavy-duty wire supplied from Crescom in New Jersey, and he also asked John Seney of Cush-Craft to help us out with the OSCAR antennas that we

If they copy the style, they can't match the quality.



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Author Charles Signer, WA9INK, on board the Phillippa, sitting comfortably under his pith helmet.

needed. Although we were quite flattered with this treatment, Warren said that Dentron would be glad to help out any major DXpedition in the same way.

Among the other manufacturers that offered their support were Jack Curtis of Curtis Electro Devices, who offered us the use of some of his famous Curtis keyers. Bob Locher, W9KNI, was quite enthusiastic in offering us some of the great Bencher paddles that Doug Murray so highly recommended. Herb Koch, K3VA, of Redi-Kilowatt offered us a couple of his new and very interesting programmable keyers. From KLM came two verticals that we desperately needed for a successful 160 and 80 meter operation. Yaesu also offered us the use of one of their exciting FT-901 transceivers, which we really hated to turn down because our game plan had already been set by the time we learned of their offer.

Wilson Electronics donated a full set of monobanders for the bands 20 through 6 meters, as well as the use of a few of their 2-meter handhelds, all of which would be put to good use at the island.

Although much of the equipment that would be used at Clipperton passed through my hands on paper, there was really no way in the world that I could have handled all of the equipment, tested it out and transported it from Sacramento to San Diego. Don Bostrom took charge of all the equipment and carefully made sure that it all fit together into working stations once we would hit the island. Don spent many hours planning and transporting that mountain of electronic components, generators, tents, and other often-overlooked equipment to the yacht in San Diego. Probably more than any other member of the Clipperton team, Don would be responsible for actually getting the Clipperton stations on the air.

The Phillippa flying Old Glory and signal flags which spell out "DX."

Almost before I knew it, the time was fast approaching when the European operators would actually start arriving in California. Although the rate of contributions to the Clipperton yacht fund was hovering at the rate of about $100 per day, time was running out, and with only a week to go before cast-off from San Diego we were still a distance away from the total cash we would need to pay for the Clipperton charter, fuel and the special Clipperton insurance through Lloyd's of London, all of which had to paid in advance. I still had not received a check from Willy Ruesch in Switzerland representing the European participants' money, and beyond that we were about $3000 away from the minimum we would need to get away from the dock on March 14. I began seriously considering contingency plans that I had made which would have forced us to cut the operating time at the island at the rate of $1500 per day.

On the last day before I had to meet the first European arrivals in Los Angeles, I received both the check from Willy and a letter from Don Scliesser, K6RV, containing a very generous contribution from the Northern California DX Foundation. Not only was the Foundation the largest contributor to the Clipperton fund, but never during the course of our campaign did support come at a more timely moment. In a very real sense, many of those who were able to work Clipperton did so thanks to the members of the Northern California DX Foundation.

That day, March 8, also marked the arrival of Jacques Caillet, F5II, François Muller, F6AQO, and Alain Duchauchoy, F6BFH, in New York, where they were met by Jack Gutzeit, W2LZX, Harvey McCoy, W2IYX, and other members of the Long Island DX Association and the North Jersey Dx Association for two days of whirlwind sightseeing in the Big Apple and later a reception in their honor courtesy of the two groups. At that time François was able to show Don Search, W3AZD, of the ARRL DXCC Desk the original copies of the landing permission and one of the Clipperton amateur licenses to make the DXpedition "official."

The following day I drove down to the home of Don Bostrom in Sherman Oaks, where I fianally met Willy Ruesch, HB9AHL, Alfred Furrer, HB9AEE, and the Swiss Henry Schaub. Except from two short letters that I had received from Willy , the Swiss team had been really an unknown quantity to me, and I did not know quite what to expect from them. I soon became quite impressed by their serious attitude about the overall Clipperton mission. They made it known that they were not in the United States just to have a good time but that they were anxious to get to San Diego right away to make the final preparations for the expedition. Their previous experience at places like Cocos and Mount Athos was evident in the considerable amount of documentation on Clipperton which they showed me and in their preparation of checklists of things to remember that only those who had actually been on DXpedition before would think of.

Almost before I knew it the Swiss had rented a car and were off for San Diego. In the early afternoon of March 9 I met Jacques, François and Alain at the airport, and it was only then that my mind was grasping the fact that the Clipperton DXpedition was now entering the transition from the planning stage to reality. Those three that I met that day might have looked like any other Frenchmen in a crowded airport, but to me they were three very unique individuals: Jacques, a medical doctor who was known as one of the greatest phone operators in the world; François, whose special talents in negotiation had been critical in obtaining the authorization for the Clipperton project; and Alain, a film producer who had acted with great skill as my European counterpart as the public relations officer of the Clipperton DX Club.

The next amateur to arrive for the DXpedition was the one with whom I had worked the longest but knew only by correspondance, Jacky Billaud, F6BBJ. Meeting a person under such circumstances makes one a bit nervous because of the underlying fear that a good impression developed about that person may be shattered by visual reality. In this case, however, Jacky turned out to be the sophisticated, young, confident world traveler that I had pictured, the most experienced DXpeditioner in the rather elite group of French amateurs that would be the first French civilians to live on Clipperton in several decades. To us who had come to know him, Jacky seemed to be the true successor to a vanishing generation of solo DXpeditioners whom the world followed wondering where they would turn up next.

The four Frenchmen and I drove down to San Diego to finalize the charter and to coordinate our planning with the Swiss. At that time I met A.J. "Hoppy" Hopkins, W6SO, the last of the six Americans to be invited onto the Clipperton team. While we liked to atribute the selection of the other Clipperton particpants to good judgment, finding Hoppy was really a matter of good luck. Early in March we were still short of the desired number of six Americans in the American contingent, and with each day slipping away it was becoming more and more difficult to find qualified amateurs whom any one of us had actually met and who were in a position to consider coming with us at such short notice.

Hoppy, a retired government worker living not far from the port of San Diego, was recommended by John Benya and Don Bostrom as a last-minute choice for a place on the Clipperton team. I took their word for it that Hoppy was a good c.w. man, but in the end he turned out to be much more, an invaluable help in getting the almost unbelievable amount of food shopping done and taking care of things that only some one who lived in San Diego would be able to do in a short time. Even though Hoppy was the oldest participant in the mission at age 67, he was as much a trooper as any other in his enthusiasm and effort for the Clipperton mission. If we had not found Hoppy we would never have been able to accomplish in only a few days work that easily could have been expanded into a month.

Returning to Los Angeles that night we greeted the last four French amateurs to come for Clipperton. Among them was Jean-Charles Sacotte, F9JS, the authorized leader of the expedition and the one who had been working for many years to obtain the Clipperton landing permission and licenses. Jean-Charles is a highly placed official of the

Ministry of Justice in Paris and a rare individual in that he could fit comfortably within a group of individuals of greatly differing backgrounds yet be looked to for a good decision on any given problem. Among the professional duties of Jean-Charles are periodic trips to Andorra, where he is a member of the principality's supreme court, a status which affords him Andorra's only permanent amateur license, C31DB.

Of the others that arrived that night, Olivier Cado had the only callsign that I could always recall in a list of French contest operators, F6ARC. I could call Olivier the greatest operator in France, but if I did I would somehow feel as though I were cheating him. I have met some really great DX operators in my 15 years as an amateur, but none were faster or more disciplined than Olivier. After seeing Olivier operate at Clipperton, Doug Murray would dub Olivier with the nickname "El Tigre."

Bernard Chereau, F9IE, and André Figon, F6AOI, consider themselves less contest operators and more serious chasers of rare DX stations. These last two are a couple of "big guns" of France who are constantly standing by to leap at a "new one." André had not been mentioned on the list of expected arrivals from France, so at first he was something of a mystery man to me. Later I would learn that it was André who had put up the tremendous new six-element quad at the QTH of Jean Lanfranchi, FC9UC, who not coincidentally enjoys the unofficial title of "the European most easily heard on the West Coast."

The last days before cast-off from San Diego tend to blur together even for those of us who took notes, because with the arrival of Doug Murray and Hugh Vandegrift in Los Angeles by Sunday morning we were feeling the full complexity of moving a large number of people who could not all speak each other's language, their baggage, and a ton of amateur transceivers and other equipment that we had not been able to transport to the yacht in San Diego. We all had individual matters to take care of, things to see and buy, and our situation was complicated somewhat by the fact that most of us were in an area that we did not know well. Without an outline of activities made in advance and without a common feeling for the mission we would never have been able to transform the chaos into a self-sufficient 110-foot floating international community in such a short time.

Sunday, March 12, we had the official kickoff of the DXpedition in the form of an early-afternoon reception organized by John Bacich, W6RTN. At that unofficial function of the Southern California DX Club I had the pleasure of introducing the French team, Doug and Hugh to the "big guns" who had come to wish us well before we would see them on the air from Clipperton. At that time Doug surprised us by presenting each of the DXpedition team members with what would be later considered as the official Clipperton DXpedition T-shirts.

At long last, we managed to get everything and everybody on board the *Phillippa* as scheduled on Tuesday, March 14. After a San Diego TV news team had taken films of the team and the yacht for the local news that night, the much dreamed of moment of cast-off from San Diego for Clipperton arrived with W6BZE, N6BB, W6FF and other members of the San Diego DX Club on the pier to bid us *bon voyage*. The event was to be enhanced shortly as we docked again at the San Diego Yacht Club, where Herb Johnson treated us to a dinner at a 40-foot table in the club's main dining room. Willy brought out the special memorial plaque which was to be mounted on Clipperton Rock. We had several toasts to the plaque and the team, not really knowing if the mood of that festive occasion would be felt under the difficult and potentially dangerous conditions that we might find on the island. That night we slipped quietly out on the *Phillippa* beyond the lighthouse into the open sea leaving all visual contact with the safety of the civilized world behind.

The next morning we all woke up early partly because the sky seemed so clear but mostly because our enthusiasm for the beginning of a unique mission could not be dulled by the wine of the night before. To many of us, this was out first time on a yacht on the high seas. Of course, one of the first projects was to get on the air maritime mobile, and using the call F5II/MM the first of many daily contacts was established using an Atlas 350-XL, a Dentron MLA-2500 linear and 14-AVQ vertical.

As it became know that F5II/MM was on the air en route to the rarest country in the world, we began to stir up quite a bit of interest on 20 meters, and soon this maritime mobile station was answering pileups as though it merited DXCC status by itself. Not only was the amateur world coming to realize that Clipperton was now only a matter of nautical miles away, but the "big guns" were already sharpening their horns for the total madness of the pileups which would break loose only six days from them.

Beside our daily contacts with FC9UC and updates on our activity to our friends in Europe and the United States, among the chores we had to keep us busy were standing watch on the bridge of the *Phillippa* and the production of souvenir philatelic covers which we would later take onto the island. With the large number of amateurs aboard wishing to operate, a second Atlas was put into use from the rear of the yacht. Don and Hoppy, both OSCAR men, tried to work the new OSCAR 8, which had then been in orbit only a few days.

Following the failure of the yacht's a.c. generator, we were not able to use a linear, but we still were able to operate the Atlas barefoot on d.c. power with good results.

One of the most critical elements in planning any sea voyage is the choice of a skipper and crew. In the case of a Clipperton charter, it was necessary to find a professional licensed crew not only for insurance purposes but because we needed to have as many operators on the island as possible to insure a maximum contact total. About a month before the operation it was my pleasure to meet Jeff Clough, a U.S. Navy lieutenant commander who in his spare time is the captain of charters in the San Diego area. I was quite impressed with his helpful attitude in his planning of our exact course before the expedition, and I was convinced that his military vessel experience might benefit what was to be a paramilitary mission. As our trek toward the island continued it would become clearer that our confidence in him was well placed.

Our crew also included Henry Torrez and

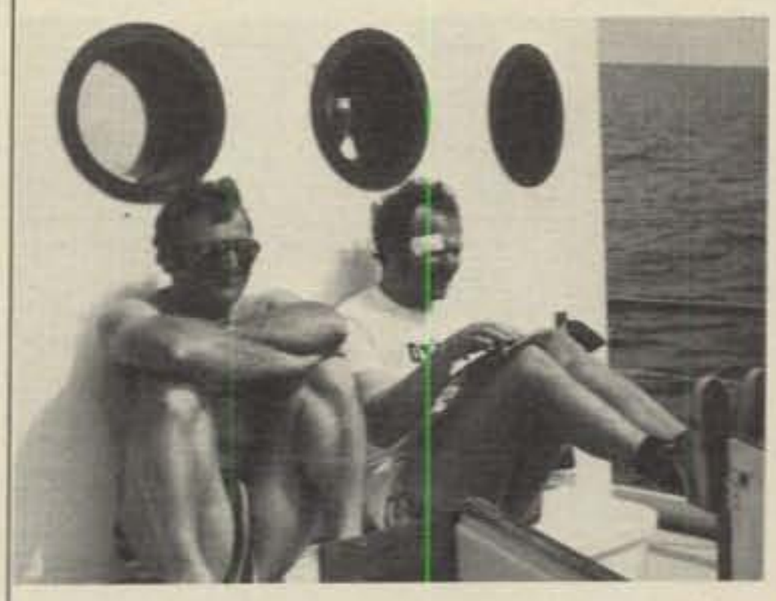
Jacques, F5II, enjoys some maritime mobile operation on board the Phillippa.

Kim Edmunds, who had served on the *Phillippa* before. Our cook, Roy Talamentez, was to become an important part of our mission not only through his dawn-to-dusk efforts to keep us fed but through his talents as a diver. Roy is one of the few people I have ever met whou could dive 250 feet and return without decompression troubles.

The only real mishap to be encountered en route was an accident on deck during a salt water shower, when Willy slipped and fell suffering a large cut on his forehead. As the expedition physician, Jacques had to stitch Willy up using no anaesthetics. Willy came through it all with no complaint, and at least he was able to go home with a "battle wound" to show off.

As our voyage continued towards our goal, the ocean turned from absolute calm to a more agitated sea with twenty foot swells. Most of us were becoming uncomfortable from touches of seasickness and from the heat, especially in the lower cabins. It became increasingly difficult to keep things down with the sometimes violent rocking of the yacht, and we were getting anxious to set

(Continued on page 91)



At the left, Henry Schaub, the Swiss diver. Seated to the right is Willy, HB9AHL, sporting the injury he suffered during a salt water shower. His recovery was hastened a bit by reading about a non-metal chassis.

John Schultz presents plans for building a simple, yet very versatile matchbox.

A Versatile All-Band Antenna Tuner

BY JOHN J. SCHULTZ*, W4FA

Antenna "tuners," "couplers," "matching networks," or whatever you prefer to call them, practically disappeared from the average ham shack when transmitters with a pi-network output circuit replaced the old transmitters with a link coupled output. Now, antenna tuners are back in vogue; and strongly so judging by the profusion of commercial models available. Fortunately, an antenna tuner is an accessory item that any amateur can consider as a home-brew project. A prime example is the antenna tuner presented in this article. No critical construction is involved for the 160-10 meter range and all of the components needed are readily available. The "not-just-another-antenna-tuner" described in this article is not the ultimate tuner that one can construct. But, with the use of relatively few components it is certainly one of the most versatile tuner designs yet presented.

The tuner makes use of relatively few parts—a tapped toroid or air type inductor, a single variable capacitor and a multiple pole switch (resistors for a dummy load are optional). However, a great deal of its versatility is due to the use of a **binding post matrix.** By the use of wire or plug-in "links" between selected binding posts, one can form various circuit configurations to suit the impedances to be matched. This versatility often provides better results than when one uses a fixed matching circuit such as the usual L or pi network or when the inductive element in the matching circuit acts in the form of a loading coil for an antenna.

*Box L, FPO New York 09544

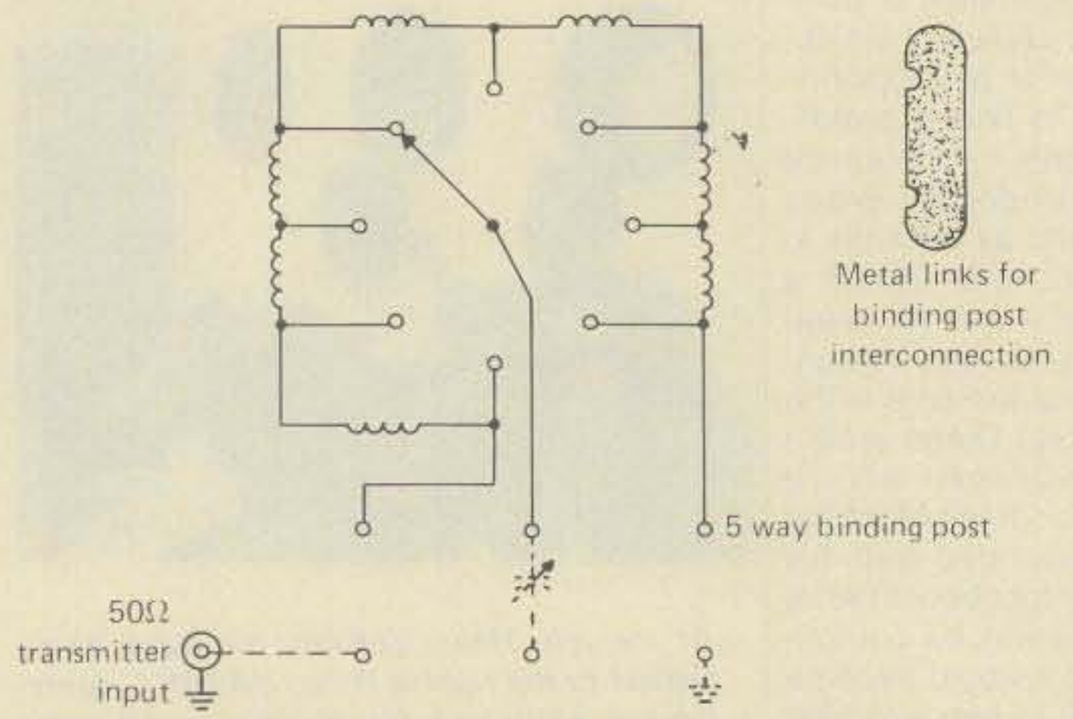


Fig. 1 – A binding post matrix is the key to the versatility offered by the antenna tuner.

It is not possible to present a single diagram for the tuner since its components can be configured in different ways. Fig. 1 shows the binding post matrix and how the main components are connected to the binding posts. By properly interconnecting the binding posts, any of the six network configurations shown in fig. 2 can be obtained. Each of these networks has its own advantages, as discussed later, depending upon what load one is trying to match. Note that any of the networks of fig. 2 can be developed by only vertical or horizontal interconnection of the binding posts shown in fig. 1. No diagonal interconnection of any binding posts is necessary. Therefore, by equispacing the binding posts and by the use of a maximum of three identical interconnecting links, one can quickly form any network.

The components, layout, etc., that one can use for construction of the unit can vary widely depending upon the power level used, the range of impedances to be matched and the bands to be covered. Obviously, it is not possible to cover all the combinations. However, the following is some detailed information on construction that can be used for a unit that will very conservatively handle a 150 watt output transmitter over either the 80-10 or 160-10 meter range and match anything from random long wires to short, unloaded whips. By a bit of judicious parts hunting, the total cost can be held in the $20 range. But, one will have a unit that will perform as well or better than more expensive commercial units.

One of the main components in the tuner is the tapped coil. The toroid core type of inductor has a number of advantages—highly self shielding, a high value of inductance in a compact form, good efficiency (if not used with excess power) and economy as compared to air inductor stock. The only problem is that one has to wind the toroid core. This need not be difficult, however, if approached properly. Fig. 3 is a diagram of the toroid core and how it can be wound. The T200-2 core has a 100 turn inductance index of 120μH. Therefore, the turns necessary to achieve any desired inductance are:

$$N = 100\frac{L\ (desired)}{120}$$

Using #14 wire to wind the T200-2 core one can get between 30 and 50 turns on it depending upon the insulation used on the wire and one's ability to make tight windings. This would represent an inductance value of between 11 and 30μH. The 11μH value is satisfactory for almost any application from 80-10 meters while the 30μH value is desireable if one wants

to include 160 meter operation. As shown in fig. 3, the core is wound so it can be tapped every 3 to 5 turns using 3 to 5 turn section windings. The key to making life easy in winding the core is to cut lengths of wire only long enough to wind each 3 to 5 turn section individually. Twist and solder together the ends of each section as you go along to form the tap points. This makes winding of the core extremely simple as compared to trying to wind the whole core with one length of wire and then breaking out the tap points later. Teflon insulated #14 wire is, of course, extremely good for r.f. usage and the thing to use if one can obtain it at a reasonable price in short lengths. In reality, such wire is not commonly available. However, #14 plastic insulated solid copper household wire is commonly available and also Teflon *tubing* at most electrical supply houses. So, stripping the #14 house wire of its usual insulation and covering it with the #14 Teflon tubing makes an excellent, low cost r.f. wire. If the Teflon tubing is not available, one can cover #14 solid copper wire with PVC-105 plastic tubing. Although not as good as Teflon, the PVC tubing has excellent dielectric strength and is very reasonable in cost (about $2.00 per 25 feet from suppliers such as Burstein-Applebee, 3199 Mercier St., Kansas City, Mo. 64111).

A good switch is important, especially if one is going to work into low impedances such as those presented by antennas less than ¼λ long. Even at the 150 watt power level one can develop several amperes of current flow. General purpose instrument switches such as the Mallory #31112J (1 pole, 12 position) are satisfactory and economical (about $2.00). However, if one can readily obtain a steatite insulated switch such as the Centralab PA-2000 (1 pole, 12 position), the small difference in price (about $1.50 more) is more than worth it for the improved r.f. insulation characteristics. Both of the switches mentioned are of the "shorting" type where a contact is made before the previous contact is broken as the switch is rotated. This characteristic is particularly desireable for use in a tuner to avoid switch contact pitting since one normally would adjust the tuner with the transmitter being left in a key-down position. If one cannot readily obtain a 10 to 12 position switch, two switches with less positions (such as 1 pole, 6 position units) can be wired in series to provide the same capability as a switch with more positions.

The variable capacitor used should have a voltage rating of 1000 volts and preferably at a maximum capacitance of 300 pF if even extremely low impedances are to be matched down to 160 meters. However, for most applications a maximum capacitance of 150 pF will suffice. One nice advantage of the binding post matrix used is that one can readily add fixed values of external capacitance if a situation is encountered where the variable capacitor does not have sufficient range.

If one chooses the components carefully, they can be easily assembled in an attractive, dual color, but yet economical, utility cabinet such as the Radio Shack #270-252 unit which measures 4 × 2⅜ × 6 inches. The binding post matrix, using the usual "5-way" binding posts, is mounted on the rear of the enclosure with 1 inch center-to-center spacing between the posts. If this matrix is shifted slightly high and to one side on the rear of the enclosure, there is room to mount the SO-239 coax input connector on either the right or left lower corner of the rear panel. The variable capacitor must be insulated and the best way to do this depends, of course, on the mechanical configuration of the capacitor used. In most cases, the easiest way to accomplish this is by mounting the capacitor on a small piece of plexiglass fastened to the bottom portion of the enclosure and then using an insulated shaft coupling to the front panel for the capacitor control. The Radio Shack enclosure is particularly handy for assembling the tuner since the bottom, front and rear portions of the enclosure are formed of one metal piece. The insulated shaft coupling needed can sometimes be hard to find locally. A good hint to remember is that the needed coupling can be

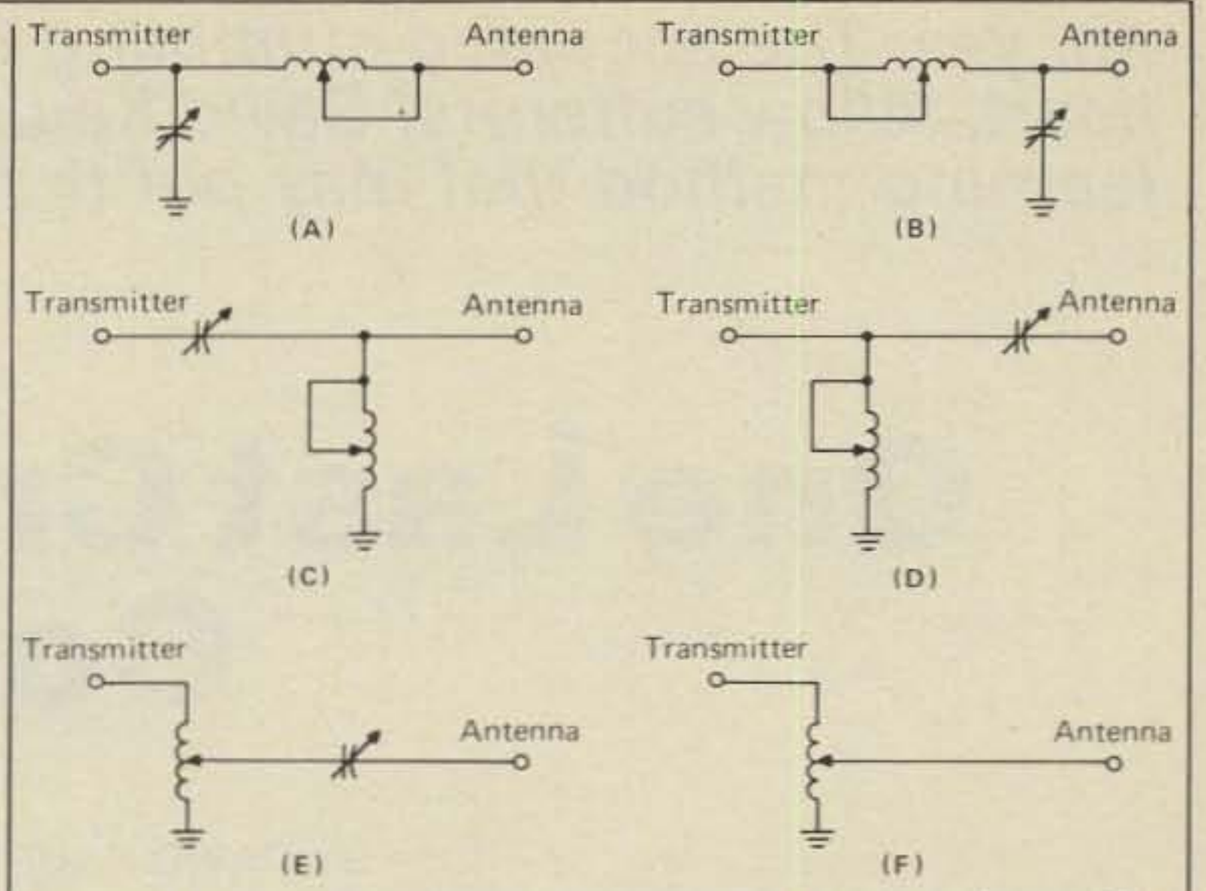


Fig. 2 – These are the main networks which can be formed by interconnections of the binding post matrix.

easily home-brewed by using epoxy cement to fasten back-to-back any two all-plastic knobs which have flat surfaces. The toroid coil can either be suspended directly by its wiring to the coil switch or placed on the bottom portion of the enclosure. In the latter case, it should be suspended off the bottom of the enclosure about ½ inch by some insulating material such as plexiglass. The usage of the tuner is conventional in that a s.w.r. meter is used between the tuner and a transmitter. The tuning network is adjusted for proper transmitter loading and as close as possible to a 1:1 s.w.r. The antenna lead is connected to whatever binding post is being used to form the antenna side of any of the networks shown in fig. 2. In the case of a coaxial antenna line, the center conductor is connected to the antenna side of the network and the shield to the grounded binding post. A general rule of thumb is that the network which uses the least amount of inductance while still providing a low s.w.r. and proper transmitter loading will be the most efficient one to use. However, there are all sorts of exceptions. If different settings of the variable capacitor and/or the tapped inductor in different network configuartions provide a flat s.w.r. and proper transmitter loading, note down the settings of the components. Field strength measurements or on-the-air checks can be made to determine the best setup to be used.

If one has some rough idea of the impedance that an antenna might present on a given band, it might be possible to save time by going directly to certain of the network configurations shwon in fig. 2. Networks A and B of fig. 2 are conventional L networks. Network A is usually useful when

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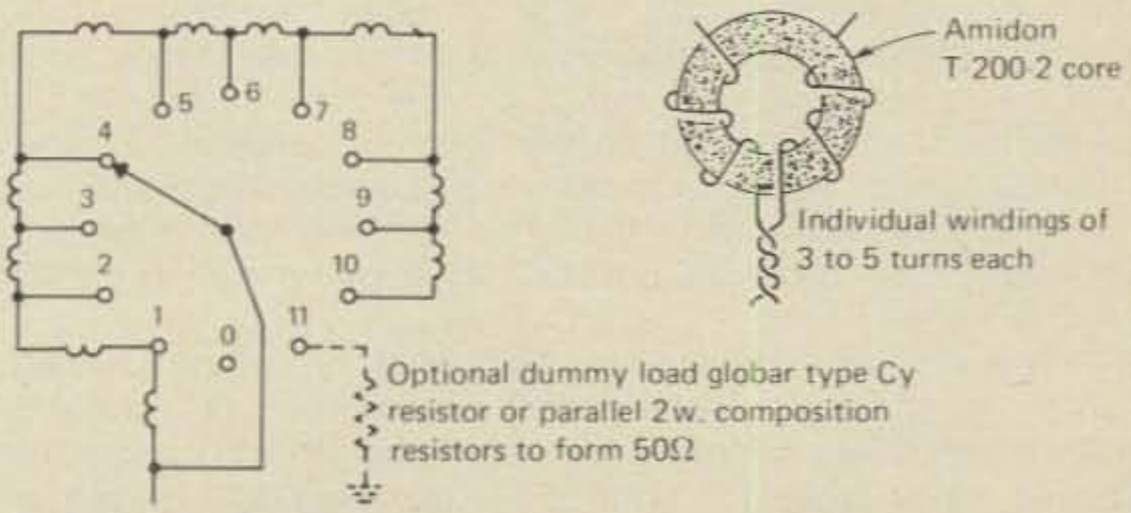


Fig. 3 – Details of winding the tapped, toroid inductor. Further information is given in the test.

Ah, yes. The accursed stumbling block–Morse Code. Take heart, fellow sufferers! David Kaufman to the rescue with a learning method that may put the code at your fingertips.

One Last Crack at the Code

BY DAVID KAUFMAN*, WA3WBI

Whether you wish to become an amateur or whether you are one now and wish to upgrade your ticket, you have to deal with the code. If you are like most of us, you have made efforts—probably very orderly and probably very intense—and you have had indifferent success. You have read of plateaus, of the success of repeated efforts, and of the benefits of listening to code cassettes and W1AW. And still you are not successful. It has always occurred to me that there must be something terribly wrong with a discipline which has so many extremely enthusiastic postulants who fall away at the pre-Novice or Novice levels because they cannot master five or thirteen word code. If you are such a one, join the club—but do not despair. There *is* a way to conquer the code, and it is not all that difficult. Old timers refer to it as a language they speak; if that is so, and if it is *approached* as a language, mastering code becomes a far easier task.

My own initial dissatisfaction with amateur radio is probably typical of prospective amateurs who approached code the wrong way the first time around—it demonstrates clearly what *not* to do. I first heard good code at the home of a friend, Phil—now a silent key. Phil's hand hardly seemed to move as the code flowed easily out of his keyer. He spoke to me while he sent and received, telling me both about his shack and the conversation he was having with an amateur in Georgia. He said that with him code was a *language* and he just *spoke* it. All good code men did. Not much of what he said meant anything to me—my awareness of the code came from movies where whole paragraphs were sent with a few blips of a key by a gum chewing sailor called "Sparks." But I spent one of the most exciting evenings of my life with him that night.

That code was beautiful. It was like Bach—clean, crisp, so correct it would satisfy anyone's rage for order. I could not get the sound of it out of my mind. And I was determined to become an amateur.

The next morning I hurried to the library, found the *Brittanica*, looked up the code, and spent a half-hour writing each letter of the alphabet vertically and beside each the words: *dot dash, dash dot dot dot*, etc. Why not—hadn't we all somehow learned at least that the code is a series of dots and dashes? Didn't we all know from the movies that the international distress signal (Sparks *did* get that one right) is *dot dot dot dash dash dash dot dot dot?* What better way to learn? And whoever heard of "didah" anyway?

I devoured all the combinations in a frenzy, aching to be an amateur, and for a week called out a series of dots and dashes for every printed word I saw—on stop signs, cereal boxes, book jackets. I bought a cheap key and began to make the sounds as I looked at printing—first looked at the letter, visualized my chart, and said the dots and dashes as I made the sounds with my key.

It was a disaster.

I had created for myself too many steps—had made it necessary to see the letters and *translate* into or out of the code, rather than just go about spelling.

Actually I was dealing with a code *of a code* of a sound—one step too many, a time consuming one at that. And I had to have print to look at to do any good at all. I could not communicate but only translate, and only at about three words a minute. I was discouraged, to say the least. And it never even occurred to me that I had gone about it incorrectly.

Then came a second disaster. I found a copy of the *Handbook* and was frightened away completely—it told me more about amateur radio than I wanted to know. I felt I could never learn the code *or* the theory. And I felt so stupid I could not even bear to ask Phil where I had gone wrong.

All of that did in my hamming for many years.

Some ten years later I returned to amateur radio. In the interim I had spent several years teaching a foreign language, and this time, applying language instruction techniques, I went through a reasoning and learning process which took me from about three words a minute to about twenty-seven in a short time, and I wish to relate the essentials of what I have learned.

To begin, the difficulty with the whole business of code is not in memorizing the code alphabet—anyone can do that in just a short time with a minimum of effort. The problem lies in *increasing speed*, in improving the inductive process of putting letters into words, in "speaking" code, if you will. And in any effort to increase speed, some things must be known and understood about code before progress can be made.

First, the Roman alphabet and the international Morse alphabet both accomplish the same job. They represent basic sounds, with the Morse alphabet based letter by letter on the Roman alphabet. Also, it is by convention only that a letter represents a given sound—for example, that in the Roman alphabet the velar stop is represented by the letter *K*; that same sound could be represented as well by the letter *M*, if convention chose. And it is written in the international Morse alphabet by the letter —•—, pronounced *dahdidah:* and *that* Morse letter could *also* be pronounced *K*, if we chose. In other words, symbols have only the sound and meaning we give them.

It seemed to me that the essential difference between the two alphabets is that the Roman alphabet, even at its worst, is broadly mnemonic; that is, the pronounced letter recalls or

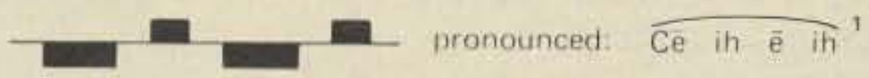
*80 Shady Drive, Indiana PA 15701

imitates or suggests the sound it represents, while the international Morse alphabet does not. It is made up of two pronounceable sounds used in combinations to represent Roman letters (and thus sounds).

And it also seemed to me that that difference is what causes most difficulty in sending and receiving. If each letter in the code alphabet *sounded* like the Roman letter (and thus the sound) it represents, one could easily become proficient at code. For example, using the Roman alphabet, if I spelled aloud to you letter by letter, "THE BOY IS TALL," as fast as I could, you would have no difficulty understanding me, even if I spelled as rapidly as a word every two seconds (that is thirty words a minute, incidentally). You *know* the letters, and would immediately induce the words as they were spelled out. Thus, if you did not have to go through the extra step of going from *dahdidah* to *K*, but only dealt with the letter *merged in some way with the code character*, you would save a cognition step; that is, you would not have to recognize the code and remember the letter and then the sound and assemble the word. You would hear the letter and then the sound and assemble the word. You would hear the letter and then the word inductively. It should be easy to see the difference—and the speed gain.

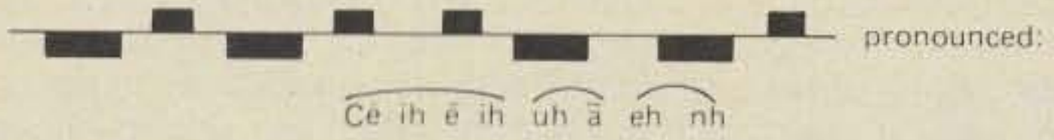
This merging of code and letter alphabet is the first of two keys to fast code; it is facilitated by dealing in the main with the set of symbols we know best—the Roman alphabet letters. What is needed is a method of pronouncing each letter in a way which contains the specifics of the code character for that letter. When merged, with practice, a lot less practice than traditional code learning methods, one will quickly increase speed and gain an almost offhand ability to send and receive code.

The easiest way to merge the two alphabets is, as I have said, to use the Roman alphabet and impose the beats of the international Morse alphabet upon each letter, rather like the slur in music. As an aid to pronouncing (aloud or in the head), suppose a music scale of one line and all dashes imposed below the line, all dots above it. For example, take the letter *C* on such a scale:



pronounced: $\overline{\text{Cē ih ē ih}}$[1]

Similarly, the word *can* would be as follows:



pronounced: $\overline{\text{Cē ih ē ih}}$ $\overline{\text{uh ā}}$ $\overline{\text{eh nh}}$

The complete alphabet and numbers in this system would be as ***shown in fig. 1.***

This merging (or your own variant of it) can be quickly memorized. And you should be sending with your keyer *at the same time* as you practice voicing this new alphabet. Stretch the letters over the sent Morse letter beats of the keyer. This practice is extremely important.

The second key to my method is this—the quickest way to learn the code and to increase speed is not by receiving but by *sending*. Use your keyer! Send to the dummy load, send to the keyer oscillator, send to your dog—but send, SEND, **SEND!** Do not look at print as you send; make up words and sentences. Send your biography, send jokes, send songs you know, but **SEND.** And do not say "didah" and so on as you

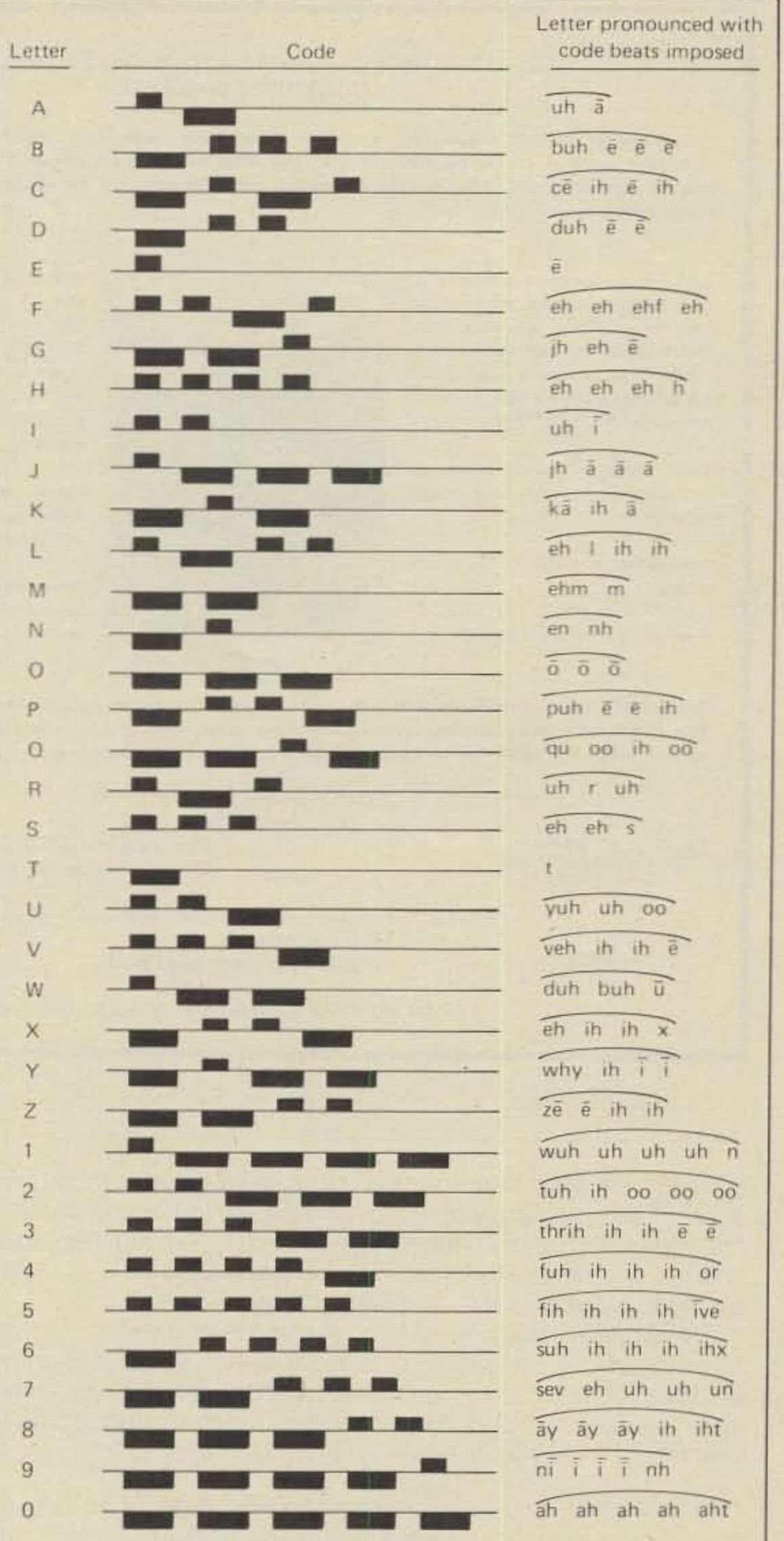


Fig. 1 - The complete alphabet, including numbers.

send—say (aloud or in your head) the Roman letters with the code beats imposed as you key. As you progress your hand will become your voice in this new language.

The point is that you must practice sending sufficiently so that in time as you visualize the letters or words your hand will form them on the keyer. *That* facility will enable you to receive code as well—in effect you will be speaking and hearing a language. And the key to it is sending with the keyer. Practicing with the keyer constitutes *active* learning rather than *passive*, and it is active learning which stores information in the brain.

It is certain that to learn a language, any language, you must practice speaking it. And when you speak it you also hear it. Language instruction clearly indicates this. And it must be done repeatedly until facility comes.

And as this facility develops you will find that you do not need to say the letters but just think or visualize them, and

---

[1]As a convenience to learning, all vowels may be assumed to be short except those which are overscored, in which case they are long.

[2]One must keep in mind that the chart is an aid in pronunciation of the "code-letter" only; ultimately when copying, only script letters are written.

your fist will form them on the keyer, in effect automatically. You will be speaking with your hand. Soon you will be dealing with groups of letters—the morphemes: *ity, tion, ing, the, and*, and so on. Soon after that you will be limited only by your ability to spell and the sensitivity of your keyer.

This facility will come with receiving the code also. As you learn to "speak," (again as in language) you will hear and you will also *understand* rather than just *recognize* what you hear; writing it down will become a casual process. You will come to command a new language.

In time (did you ever hear of someone who could go forty or more who *wasn't* an old timer?) you will progress to your top speed, and you will do it quicker, with a more solid foundation. A foundation based on proven techniques of language learning. And that is all there is to it.

Usually at the end of an article on learning code the author gives the reader presumptive advice on how to proceed. Most such advice is effete nonsense, and causes more trouble than you might imagine. Usually such advice can be disregarded. For example, we often read that the student should use a hand key at first and later go to a keyer, as if that will make his knowledge more secure. Advice like this is akin to requiring one learning to drive to begin with a horse and wagon rather than an automobile—as if somehow that will make him a better driver. Beginning with a keyer simplifies the learning process, correctly forms the dots, dashes, and spaces for you, and thus hastens progress. You will develop speed more quickly with a keyer. One also reads that the shack must be neat, orderly, and well-lighted. While this advice is not as destructive to learning as the suggestion about hand keys, it is nonetheless not necessary. Be only as neat and orderly as you *are; then* you will be relaxed and receptive to learning.

It *is* important that you follow the punctuation symbols exactly and do not develop an "accent." Nothing is more destructive to the ability to receive code rapidly than to try to copy an operator who sends a *slash* or a *question mark* when he means *error*, and does it with a key which does not give proper bit spacing. If the eccentricities are severe enough, the material becomes uncopyable. Old timers may cherish their cute accents and eccentricities, but they are not for you. You must send correct code.

One last comment. Code tapes have their place, as does practice with W1AW; I used them both, but please remember that the proper way to study a language is to speak it—use your keyer. Listening helps, obviously, but you could listen to Russian language records for ten years and not learn the language. First you must gain some proficiency in the language at hand—you must *know* what you are hearing, not just *rocognize* it.

To conclude, I would stress the following points:

1. Impose the code beats over the Roman letter.
2. Use the keyer (voicing the letters) as you send, and never look at print when practicing.
3. Practice sending to increase speed in both sending *and* receiving.
4. Use a keyer, if at all possible. It will shorten your task considerably.
5. Develop no accents or eccentricities.

This method, with practice, will allow you to quickly become proficient at sending and receiving code fluently, almost unconsciously—much like Phil did—as a language.

1977 CQ World-Wide DX Contest Phone Results

BY LARRY BROCKMAN†, N6AR (ex-WA6EPQ), and BOB COX*, K3EST

As evening dawned on the Western Hemisphere on a late October day, a certain excitement filled the air. Rumors had it that this was the day that goblins would rise out of nowhere and fill the night air. To be sure, those goblins did appear, but only at the dawning of the *CQ* W.W. phone contest, and only then to fill the airwaves. A record 2,100 logs, (up 7% from 1976) were received here for this year's bash. As active participants, we can attest to the pandemonium that burst out everywhere on the h.f. bands.

In particular, the 10 meter activity this year was incredible compared to last year. Yet, the potential for ten meters in the next few years has only just surfaced.

Altogether, there were 2 new world records, 11 continental records, and 4 USA records set in this year's competition. Yet, the big story is the EA8CR operation—a six band multi-multi effort that still leaves echoes in our ears. They were all over the place, literally everywhere on all the bands, with booming signals to boot. After all the dust had settled, they had racked up 21 million points, and that will take some doing to beat in the future. PVRC members are reported to be game for the task, possibly as soon as next year.

Single Operator All Band Winners

Our congratulations to Clarke Greene, K1JX, for his second successive first place finish in the single operator, all band, worldwide category, with a fine 6.0 M score from PJ9CG. Running second with 5.1 M was Chip, K7JA, who took the helm at KG6SW. Chip has now moved to Japan and you can be sure he has plans for challenging Clarke in the future. Charles Jones, now at 9L1SL/A after several years at 6W8, finished third with an impressive 3.7M score, followed by HC1BU and VP2VDH.

It was W3WJD, operated by Walt, WA3LRO, who grabbed top honors in the USA all band, single operator category. Walt set a new USA record at 2.38 M, just barely edging the highly coveted 2.35 M record set by Gordon Marshall, W6RR, in 1972. Walt used a little West coast style operating, as he padded his substantial multiplier with a phenomenal JA run on 21 MHz. Running second for the second year in a row was Larry, N7DD, followed by East coasters N1GL, K2BU, and K1DG.

Multi-Operator, Single Transmitter Winners

This proved to be a big year for this category, ever and ever becoming more popular throughout the world. Four new continental records were set by a highly competitive group of contesters. FMØFC, staffed by fellow *CQ* WW Contest Committee member, John Kanode, N4MM and K4GKD, N8II, FM7AV, and K7ZZ, came out on top at 6.8 M, just under the World record set in 1974 by PY2CAB. Nevertheless, they set a new North American record. Second in this category was 4L6M (another prefix for UF6) at 6.0 M, operated by George, UA6APW and the UK6APA contingent. Congratulations on a

*7164 Rock Ridge Terrace, Canoga Park, Calif. 91307
†5801 Huntland Road, Temple Mills, Maryland 20031.

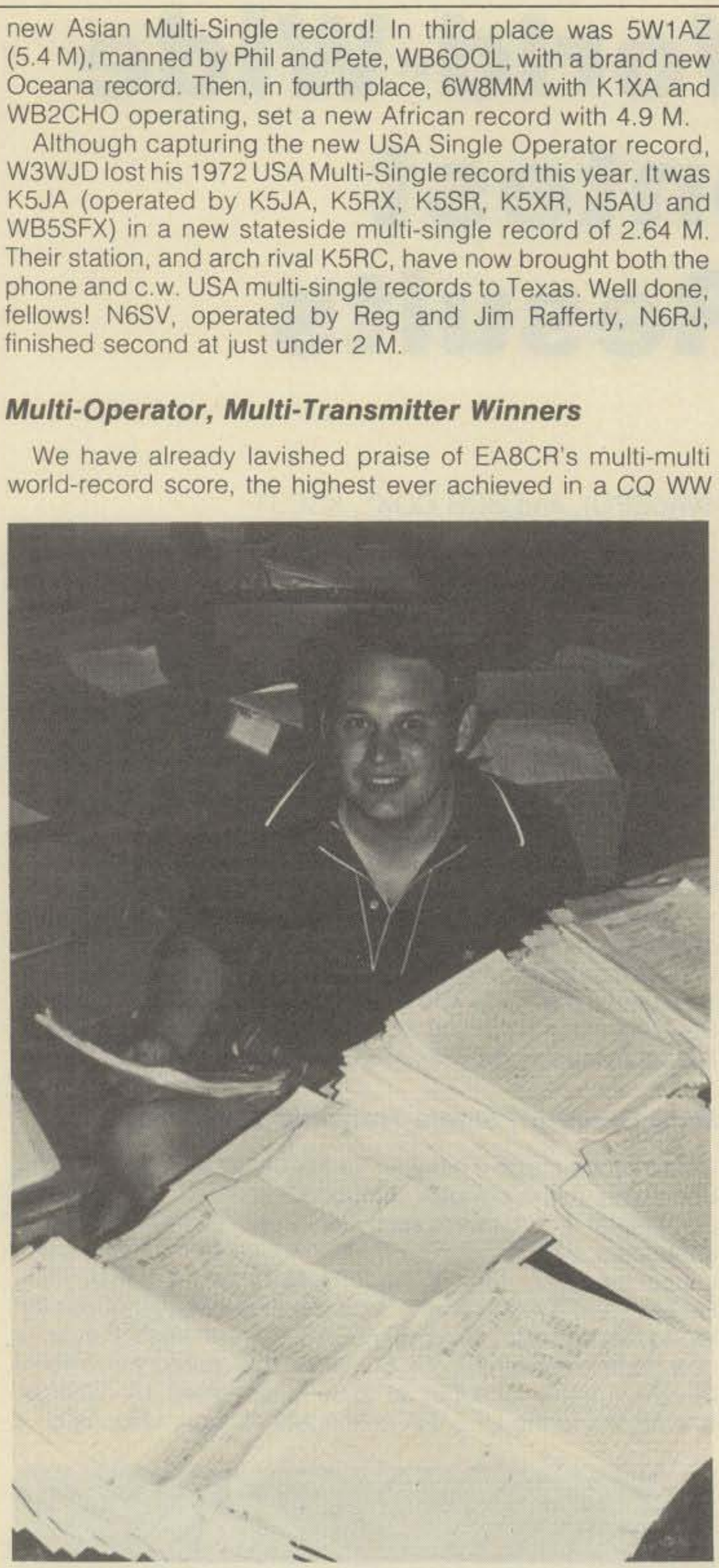
The whole EA8CR success story is told in these two pictures — good operators, lots of good gear, great antennas, and a super QTH, not to mention the planning. The group picture (on the left) depicts (from left, top row) EA8BW, EA8OZ, EA8-2560-U, EA8LO, OH3XZ, EA8CR, EA8PT, OH2BH, OH2MM, OH2BAD, and all that gear! The photo on the right shows the elevated special QTH, with the clouds well below in the background. A discerning eye will pick up the multiple antennas.

new Asian Multi-Single record! In third place was 5W1AZ (5.4 M), manned by Phil and Pete, WB6OOL, with a brand new Oceana record. Then, in fourth place, 6W8MM with K1XA and WB2CHO operating, set a new African record with 4.9 M.

Although capturing the new USA Single Operator record, W3WJD lost his 1972 USA Multi-Single record this year. It was K5JA (operated by K5JA, K5RX, K5SR, K5XR, N5AU and WB5SFX) in a new stateside multi-single record of 2.64 M. Their station, and arch rival K5RC, have now brought both the phone and c.w. USA multi-single records to Texas. Well done, fellows! N6SV, operated by Reg and Jim Rafferty, N6RJ, finished second at just under 2 M.

Multi-Operator, Multi-Transmitter Winners

We have already lavished praise of EA8CR's multi-multi world-record score, the highest ever achieved in a *CQ* WW



Larry Brockman, N6AR, appears buried in an avalanche of logs as he worked on scoring the Phone results. These are part of the record number of entrees for the 1977 Contest.

Contest, phone or c.w. Some of the pictures they sent in help tell the story better than words, so we have included them for ready reference. However, several other very fine multi-multi efforts were fielded as well and should not go without mention.

Both HH5HR, operated by a North Florida group, and W2PV broke the old North American record, with HH5HR on top with just a hair under 10 M. W2PV, at 7.3 M, took the USA high all time record as consolation. The gang at 4J9B, in their first ever multi-multi phone effort in the *CQ* WW, set a new Asian record at 5.9 M—remember, that's with one point JA QSOs. Best of luck next year to Sam, Willy, and all the other operators at 4J9B/UK9AAN.

George, UA6APW, sends along this picture of the antennas at 4L6M—this years World second high Multi-single effort.

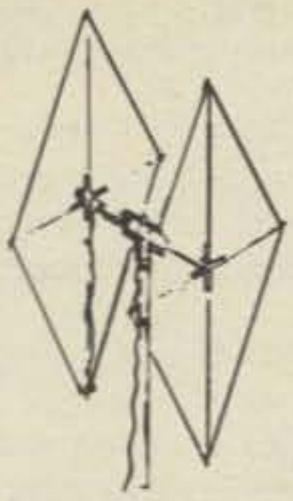
Single Band Competition

Although 10 meter activity was definitely on a popularity upswing, the low band activity remained brisk as well. The 160 meter winners were DJ8WLA (Worldwide) and N4EA (Stateside) in what must have been hours of frustrating listening experiences. In the 3.8 MHz competition, Pedro, KP4RF (formerly KP4AST), ran away with it with a fine 245 K score, while John, W2VP, broke the all time USA record with 108 K. The latter score is particularly impressive in light of the noticeable absence of Europeans in most of the stateside 80 meter logs due to band noise. Our compliments to Randy, KH6XX on his second place Worldwide finish and a new Oceana 3.8 MHz record of 116 K.

On 40 meters, Doug, KX6LA, broke his own 1976 7 MHz record from VR3AH with a new World and Oceania high of 406 K. Congratulations, Doug, and although you sent your certificates back to us from last year, we will try a little harder this year with a note on the certificate indicating the World high status. W7KW took USA high 40 Meters and proved that his station is not just hot air.

On 20 meters, top billing went to Sergio, YV2AMM with just under 1 M, despite very stiff competition from 8PØA, Alan, who fell shy by just 3 K points. By the way, Alan, had you duped your log, yours would have been the winning entry. We'll have more to say about duplicates later on. Bob, K2HFX,

The operation at KC4AAA took on a real international flavor this year. In the picture are operators WB6SMS, WN9VZM, K6DYD, ZL1TOJ, and UA3DHO (left to right).



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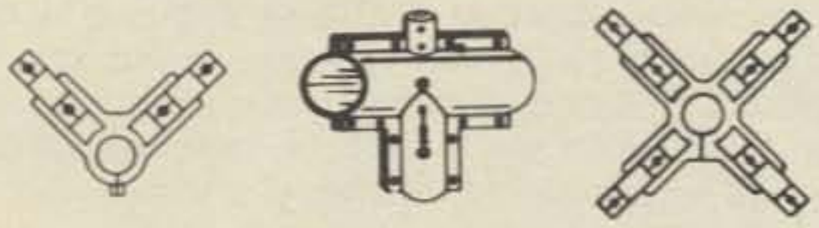

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	(1)	1½" Boom to 1½" Mast T-Mount	$16.10
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	(1)	2" Boom to 1½" Mast T-Mount	$24.69
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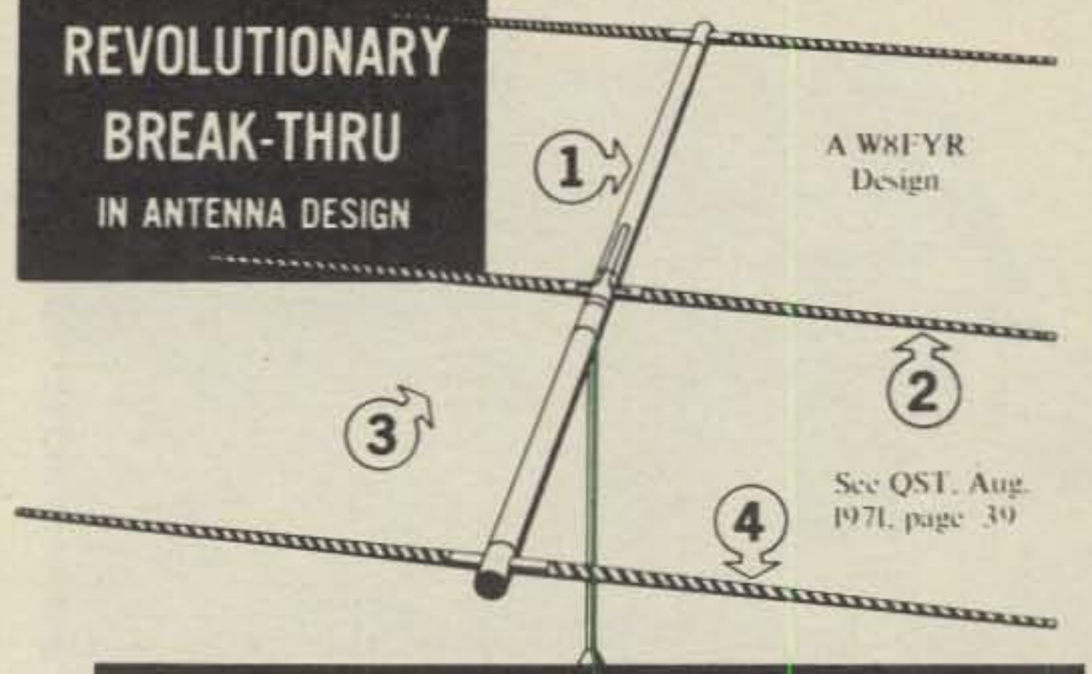

A W8FYR Design

See QST, Aug. 1971, page 39

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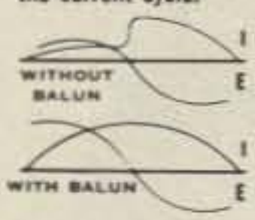

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CIRCLE 21 ON READER SERVICE CARD

Despite this incredible disaster, ZS6YS still managed to field a credible score in the Multi-single category – good show!

Mike, KM6FC, a welcome multiplier in any log, obviously believes in Drake.

Fourth World high single op, all band entrant HC1BU does it with Collins – whatever turns you on!

finished tops in the USA on 20 with 388 K, an exceptionally fine effort for a 204BA antenna at 55 ft. with all the competition. Bob says he operated the full 48 hours and still had steam to spare—more power to you Bob.

The highest single band scores were 21 MHz entries this year. The Worldwide winner was Drago, YU3ZV with 1.05 M, which set a new European record; while Jim, WA6EKL captured the USA high with 458 K, not quite enough to topple W2AH's 1972 record of 486 K.

On the top band it was Paulo, PY1MAG, in a very close race with Sergio, IG9SKO (Lampedusa Island, Africa, Zone 33), with Paulo the winner at 657 K. Sergio's only consolation is a new African 28 MHz record. Neil, WB6PXP, took the USA prize on ten Meters from the Rainbow Ridge QTH in between the devastating wind storms that have kept them out of the all band competitions of late.

High Points

There were some noticeable high points in this year's contest. Like the SMØAGD/YI check log! We conjecture that Eric was suspicious we would look askance at those YI contacts in the European logs without positive proof. Well done, Eric. Your small but fortuitous contribution has cleared the cobwebs from avid DXer's' linears; sporadic threats of their plans to enter next year's contest have been heard. After all, if this contest is the place to work YI, then anything can happen in the contest.

We also received a note from a WD5 apologizing for his low score, and inquiring if a VS6 on 10 meter phone from W5 at 13Z was good DX? Good grief man, how could you wait so patiently for one hour for him to finish his ragchew. Of course that's good DX, expecially for that time of the day.

Then there was the chap who dropped us a line and asked which magazine the *CQ* W.W. contest results would be in—*QST* or *73*? One wonders how he got our address in the first place.

Those 10 meter band openings showed real signs of sunspot highs, with even a few spotty reports of W6 to Europe QSO's Just a handfull, to be sure, but a sign of much more to come.

Low Points (Duplicates)

What a hornet's nest we stepped on when we passed our rule on dupe sheets (cross check sheets) last year. All kinds of mail and all kinds of confusion have developed. Let's try to clarify our position.

If your log contains over 200 contacts on any band, then you must submit a cross check sheet (dupe sheet) for any such band. For most of us, a cross check sheet is straightforward and unambiguous. It is an ordered list of the contacts made (all of them), on a form that is alphabetized or ordered in some other logical manner, such as the ARRL form CD175.

Some entrants claim to have removed duplicates from their logs, but neglected to send in their cross check worksheets (dupe sheets). They claim that there are no dupe sheet forms available from *CQ*. We realize that for the time being that is the case, but we are working on that problem now. Bob Cox, K3EST, is currently heading a subcommittee to come up with the proper format for dupe sheets. However, because our contest is international, a standard form for use by all is not that easy to formulate. We plan to present an article later that treats cross-checking procedures in some detail, and gives some samples of a suitable format. Until then, we suggest you use existing forms or make up your own. By the way, any of your suggestions on this matter would be most appreciated.

In any event, no matter how messy or unorthodox your forms are, we prefer that you send them to us with your log. It makes our log checking much easier, and it helps you to

establish that you have duped your log, thereby avoiding possible disqualification.

Speaking of duplicates, it is with regret that we wish to relate an example to you on why we consider duplicate removal so important. Our rule of thumb is that 3% duplicates is too many, but some entrants were running above 5% with just a partial check of their logs. That is incredible, more than 1 duplicate out of every 20 contacts. The point is that the margin of victory is often less than the 5 to 7% duplicates observed. The only fair way to determine the real winner is to thoroughly dupe all such logs. However, for a 2,000 to 3,500 contact log, that's a real chore. Our log checkers have as many as 200 logs each to check, so that duping them thoroughly is out of the question. It is the entrant's responsibility to dupe his own log. Thus, we will disqualify such entrants rather than do their work for them.

JA Problems

In the last several years W to JA QSOs on 80 Meter phone have become more and more difficult to achieve. A 10 kHz. segment centered at 3798 kHz. has been authorized for use by the Japanese government. So, the JA boys have all jumped into that segment rather than their old home ground below 3600 kHz. However, it doesn't take many big bruisers calling CQ JA, (Multi-Multi or otherwise) to wipe out such a small band. This year tempers were beginning to show a little. There were some really nice guys showing some really nasty behavior, not at all representative of them. To solve this problem, we suggest that the W, VE, and other Western Hemisphere stations stay out of the 10 kHz. segment, and we call on the JA boys to return to below 3600 kHz.—at least for the contest. We passed this idea by the W6s at this year's California DX Convention at Visalia, and the consensus was overwhelmingly in favor of such restraint.

Requests to the CQ WW Contest Committee

We urge all of you who plan to submit requests to the committee for logs, summary sheets, and rules to do so well in advance of the contest each year—the earlier the better. Delays in response to your requests are inevitable, due to the procedure used. The requests are first bundled up and then sent to the contest directors for a response. One way to shortcut some of the delay is to mail your requests regarding the WW contest directly to one of the directors (N6AR or K3EST). Lastly, all requests must be accompanied by an adequate amount of return postage.

Credit Where Credit is Due

An especially heavy load of logs was processed very fairly and efficiently by an excellent staff this year, and we would like to take this opportunity to acknowledge their efforts. Deciphering this year's mounds of hyrogliphics were: K6NA, Glenn Rattmann; N2AA, Gene Walsh, N4MM, John Kanode; K2SS, Dave Donnelly; W3GRF, Lenny Chertock; N6CW, Terry Baxter; W3ZZ, Gene Zimmerman; N6TJ, Jim Neiger; W6PVB, Fred Morris; K5RC, Tom Taormina; N6SV, Reg Toume; and N6VV, Lew Jenkins. The latter three are new members of the CQ WW Contest Committee as of 1977. Thanks for a job well done fellows. Also Frank, W1WY, our illustrious Chairman, who keeps the pressure on us to process the certificates faster, deserves at least honorable mention.

1977 CQ WW CW Results

Look for the c.w. contest results in next month's issue. The club competition appears to be a real cliff hanger this year, with a new upstart, the Yankee Clipper Contest Club making a strong bid to break into the traditional Frankford and PVRC ranks. I'm sure you'll want to know the final verdict. We'll see you next month.

73, Larry, N6AR and Bob, K3EST

Phil Williams, part of the 5W1AZ crew, is shown here hard at work during the competition. Congratulations on a job well done.

K1XA of 6W8MM, World fourth high in Multi-Single, is shown grabbing a bite to eat in between QSO's.

Pete, N6CJ, Jose, XE2MX and Phil, N6ZZ, are shown here just after the contest at XE2MX. Jose looks like he took it in stride, but the crazy Americans look bushed!

No 33 or 34

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
PJ9CG	0/0 /0	458/22/55	549/21/52	877/28/96	1414/27/72	1179/23/64
KG6SW	0/0 /0	120/14/16	398/15/23	604/29/75	1935/36/77	1682/29/53
9L1SL/A	0/0 /0	60/11/27	225/21/53	756/30/87	1135/25/83	792/20/62
HC1BU	0/0 /0	120/13/24	192/17/31	868/26/60	1077/23/69	1246/17/29
VP2VDH	4/1 /4	278/10/19	670/18/42	611/19/46	1324/19/58	1643/15/40
9Z4NP	3/2 /3	121/10/15	141/15/21	839/18/51	860/34/67	764/16/45
W3WJD	7/4 /5	74/18/38	110/23/60	507/33/88	867/29/96	148/21/64
KH6NO	0/0 /0	116/9 /10	256/15/22	459/18/39	1217/16/24	1552/19/31
DJ4PT	33/3 /9	269/10/46	302/22/56	480/27/71	968/28/70	125/21/56
UB5WE	0/0 /0	222/11/48	231/20/58	793/32/93	715/27/83	110/20/58

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
W3WJD	7/4 /5	74/18/38	110/23/60	507/33/88	867/29/96	148/21/64
N7DD	6/5 /3	69/14/22	202/20/40	329/34/75	730/29/72	459/24/48
N1GL	10/5 /5	86/14/35	75/19/46	528/32/90	590/28/88	105/20/48
K2BU	0/0 /0	50/16/31	71/22/42	567/30/97	521/26/82	120/18/54
K1DG	1/1 /1	84/12/27	24/9 /24	572/29/88	756/29/87	73/17/54
W6XR	1/1 /1	14/9 /9	42/15/19	519/28/75	771/23/52	340/22/38
N2LT	12/5 /8	34/12/20	82/21/45	301/29/73	658/27/89	112/18/56
W6RR	0/0 /0	34/15/17	64/20/33	267/28/65	575/28/69	433/25/61
K7RI	5/3 /3	62/14/16	197/16/20	359/24/49	881/21/37	268/19/37
K5GA	8/5 /6	54/15/28	97/20/46	258/29/77	426/26/75	330/24/65

WORLD TOP MULTI-OPERATOR—SINGLE TRANSMITTER

FMØFC	50/8 /12	543/21/59	482/19/48	1128/32/108	1690/28/92	1846/20/61
4L6M	0/0 /0	237/8/58	715/21/67	2397/35/116	320/28/91	269/25/71
5W1AZ	4/2 /4	68/14/17	658/23/34	1131/34/95	1250/28/48	2043/24/43
6W8MM	0/0 /0	60/9 /12	383/15/40	1245/30/81	953/22/69	1730/23/78
DLØWU	10/3 /10	165/11/50	289/24/69	737/31/109	1439/31/96	87/17/67
CY3KZ	56/3 /3	445/14/27	314/14/23	923/31/99	1553/31/91	96/18/49

USA TOP MULTI-OPERATOR—SINGLE TRANSMITTER

K5JA	16/5 /10	82/20/40	101/25/57	321/32/86	693/29/100	589/29/91
N6SV	4/3 /2	85/19/30	292/22/38	257/27/69	967/26/71	224/23/41
W1ZA	8/4 /6	118/15/45	69/22/57	685/35/114	472/28/87	85/20/56
W4DR	18/7 /10	36/13/23	128/23/76	396/34/98	514/25/91	125/21/65
K1PR	11/3 /6	106/18/35	80/20/47	352/30/84	596/28/92	168/22/71
WØFG	11/6 /8	14/10/15	186/24/42	236/30/71	730/22/69	275/25/54

WORLD TOP MULTI-OPERATOR—SINGLE TRANSMITTER

EA8CR	123/10/26	737/22/83	1038/22/79	2466/37/144	2992/32/110	2934/30/102
HH5HR	132/7 /16	640/15/46	1164/24/81	2742/31/115	1952/30/95	1813/22/53
W2PV	35/6 /9	376/19/49	221/23/69	1740/38/137	1663/32/124	356/23/76
DKØKX	86/3 /14	528/15/56	519/21/73	2004/39/133	1502/34/110	220/18/64
VP9DX	171/7 /10	600/11/39	578/20/58	1552/34/96	1576/27/81	1887/22/54
HI8RCD	100/8 /15	603/14/23	597/22/50	1990/30/81	1709/22/61	2198/16/45

USA TOP MULTI-OPERATOR—MULTI TRANSMITTER

W2PV	35/6 /9	376/19/49	221/23/69	1740/38/137	1663/32/124	356/23/76
K1OX	23/5 /9	358/19/53	206/21/65	1009/34/119	1280/28/112	343/20/82
K2GM	84/9 /12	169/17/39	245/28/76	1262/38/128	928/30/107	188/21/65
W1ZM	16/5 /7	313/17/49	208/23/69	910/36/117	1177/33/113	207/21/71
W4BVV	19/5 /9	123/19/41	166/22/59	598/36/105	960/31/105	280/25/83
K3WW	26/3 /6	117/16/36	176/23/72	837/37/119	696/29/95	241/23/76

DX QRM

The main problem during winter was a rotator . . . the temperature dropped down around −100F . . . *UA3DHO* (op at KC4AAA). Next year we're computerizing the logs . . . *CY1NN*. Everyone involved had a great time . . . *CY1UNB*. Lets hear it for JA's . . . *VE3AKG*. This was our first attempt at this contest. We entered it solely to annoy our local competition . . . *VC9UM*. Suggest W/VE should not be allowed to work each other. Would seem more like a DX contest . . . *VE4EW*. Typical ham, used a guy wire clamp to fix a burned out power service wire . . . *VE6HN*. KL7RW on 10 was a reality and not a figment of someones imagination . . . *KZØDX*. Hope the W's are not angry that we did also work some DX. . . *OE3GSA* (op at VP2MSA). Local power company doing repairs at the height the 10 meter pileup drove us wild. This is our first contest and had tremendous fun. Can't do the CW due to college exams . . . *VU2AH* (op at VU2IIT). Where was Africa? 10m was great . . . *WB6OOL/5W1AZ*. Catching the sporadic E on Friday night certainly helped . . . *WB2RLK/VE1*. Biggest thrill was having CR9AJ break JA pileup for my only zone 24. . . . *VE1MX*. Forgot to work Brazil on 10 and 15 meters . . . *PP1ZBM*. Question: If I train a parrot to call CQ, would that be multioperator? . . . *PY8ZLC*. Beat my own previous high score, so contest was a success . . . *CEØAE*. Glad to see 10 open after such a long time. Unfortunately, African and Pacific operation was very reduced . . . *CX3BH*. First contest, loved every minute of it . . . *KG4EP*. This is the second year in a row that I am struck by a storm—maybe next year . . . *KP4RF*. Enjoyed hearing the YB station call me, but I still guess the JA's are hiding out. Not like the hundreds I used to get from VS6DD . . . *N7DC/YV5*. The most difficult station to work was HH5HR because of the skip on 15 . . . *HI3XEA*. Best I've ever done with QRPP (5 watts input). Couldn't believe the pileup from Europe . . . *OA8V*. At least my wife didn't have a baby in the middle of this year's contest . . . *OA8CG*. It seems that the propagation is building up again . . . *UR2AR*. Very bad reception on 40 because of jamming and BC. But, contest itself was a lot of fun as always . . . *UB5WE*. Worked IG9SKO LP on 10 . . . *JR1IJV*. Too bad we are limited to 50 watts on 10 . . . *KA6JC*. I still cannot believe contacting DX stations in the heavy QRM on 7 MHz. . . . *JA1BNN*. Got confused with KA2DX many times . . . *KA6DX*. The absence of the Russian Helicopter was helpful . . . *G4CVZ* (Ed. *AMEN*). Excellent manners of the USA JA stations during pileups . . . *G3KKJ*. I like the station who said "You are 5915, but please repeat your call—you are very weak" . . . *G3FTQ*. Worked 5 continents in 39 minutes with only 50 watts output . . . *OE1SBA*. As usual, the best 48 hours of fun and thrill in all the year . . . *OK2RZ*. Good to see the expeditions on 21 MHz . . . *OK2SPS*. My tower is hand rotated. The strong winds caused some problems on Saturday . . . *OH6JW*. Conditions poor first day; better the second day . . . *I2CBM*. Incredible Contest! Never expected to find such pileups of W's on 21MHz . . . *I4USC*. After 8 hours the rig quit. With no spare, I returned to the city and just relaxed . . . *YU3EY*. New Call this year. Used to be YU2RBY. Hope I have the European record on 21 . . . *YU2HS*. Enjoyed the contest, but the propagation was very poor all during the contest . . . *I6NOA*. Would like to see more activity outside Europe and USA . . . *OK1DA*. Heard a lot of elusive multipliers on 40, but how hard it is to work them . . . *OE5CWL*. Thanks to VE3BMV for helping out Saturday night when we were almost burned out . . . *VE3KZ*. Tough to get the attention of the stateside hams and to go through the JA's . . . *CR9AJ/W6AQ*. Lots of fun running the contest, but what a drag writing the logs . . . *DM2DUK*. Enjoyed again the World Championships of Ham Radio—the CQ Contest . . . *ON6MP*.

USA QRM

Dynamite conditions, especially on 10 M . . . *K1IU*. First CQ WW for us . . . had a great time and learned a lot . . . *W2YV*. Not bad, working Antarctica on first attempt . . . *K2GXT*. It's great. Suggest you nave this contest twice a year . . . *N3AW*. Second time in contest and first as a multi-single. Lots of room for improvement, but will be back next year . . . *N3UN*. First contest . . . *WA3NAN*. We didn't do as well on 15m as we should have and it cost us. Condx were super for a super contest . . . *N4PN*. JT1AN answered a CQ . . . *K4VX*. Don't think the use of 2 meters should be considered as an additional operator. It is a normal part of my station & DXing habits . . . *N4HU*. Fooey on the 2 meter spotting net rule. The 2 meter info is nice, but it can't sleep for you, log, check dupes, etc. . . . *W4LVM*. To the EA8 station; WA4ENJ was not in Helsinki last year . . . *WA4ENJ*. Great to have 10m back . . . *K4JNM*. Our first real contest. Worked W. Samoa and South Pole on 40. Look out next time . . . *WD4BRE*. I wish DX stations would stop the long runs without identifying . . . *WA4JTC*. Got the new amp built half way through the test. Sure helped . . . *WB4FOT*. Best opening I've ever seen on 10 from Texas . . . *K5JA*. Built on 80m sloper at 1 AM Saturday . . . *K5FUV*. Bye bye 80, hello 10. Love those sunspots . . . *W6OKK*. Very good. Please send a bill for a subscription to *CQ*. . . . *WA6JUD*. Japan pouring in on 10 and 15, wish we were multi-multi . . .

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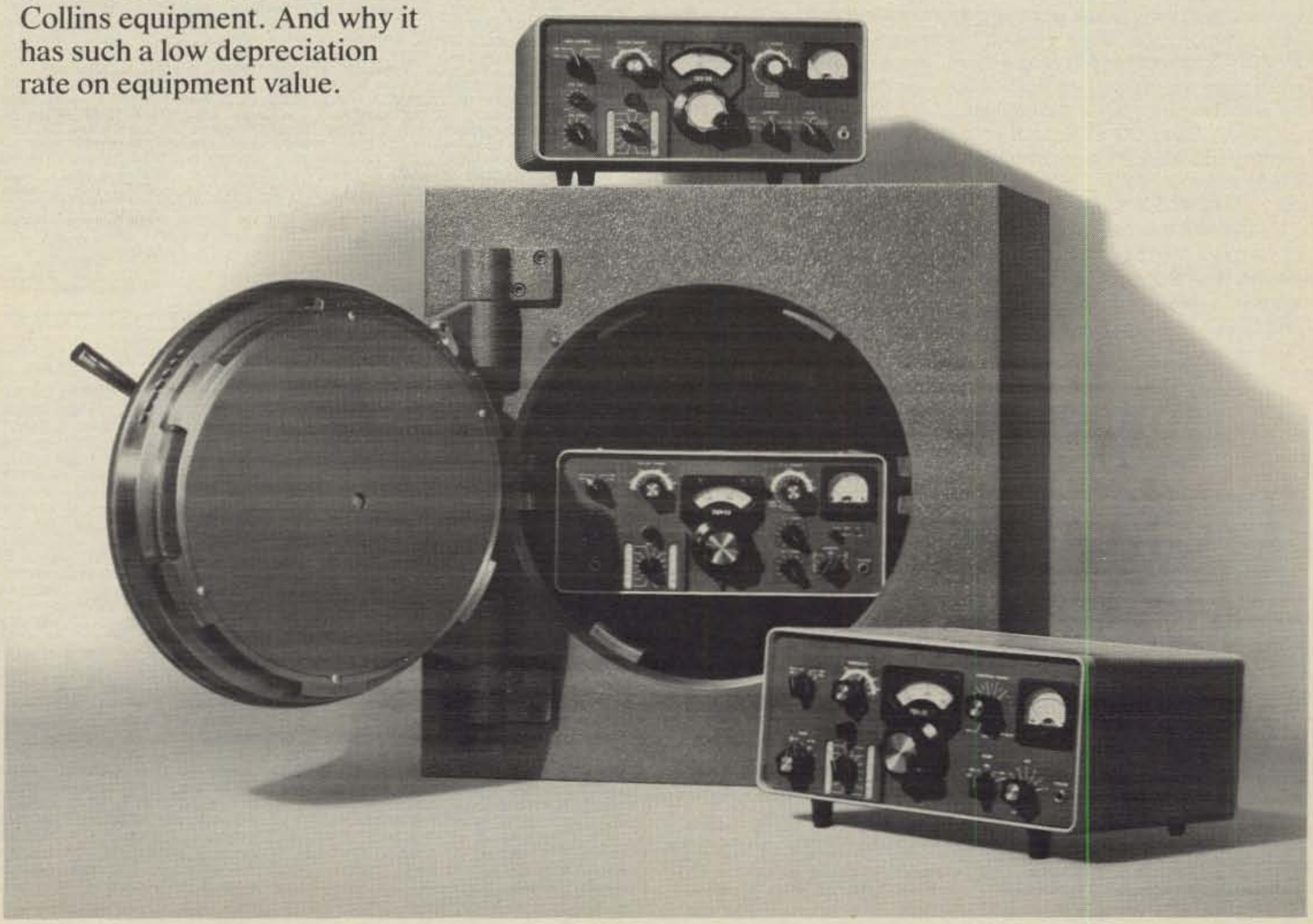


W6VLD. CB splatter was out of this world on 10 and 15 . . . *W6BIP.* Happy days are here again. Ten was open, but where was everyone on 160 . . . *K6YK.* Too many mistakes to win first multi-single, but look out, we'll be back . . . *N8JW.* Halloween party in the middle of the contest didn't help the score . . . *WB9TXO.* Nothing like getting wiped out by snow static during a JA run . . . *WØFG.* Virtually every piece of equipment blew up at least once, one antenna and feedline lost, even the vacuum cleaner quit . . . *WBØKWI.* First multiop effort. Do we have a lot to learn . . . *NØDX.* QRM terrific—in fact, unbearable. Wish we were back in the low part of cycle 20 . . . *N6AN.* I hate Dupes . . . *WA6DNM.* The relief when the band changed so the W6's didn't destroy the hearing . . . *W7MLJ.* New location, new call, new antennas—but the same lousy score . . . *K8MN.* Contests interfere with my sex life! My score should be better in the years ahead . . . *W8WPC.* What a mess for a "CW" man . . . *K9DX.* First phone contest ever—prior to contest had total for 3 QSO's on phone . . . *WØUZ.* "Tremendous . . . *N1GL.* 1st time I was able to run JA's . . . *K1KNQ.* Next time more organization and a lot more rest prior to 000Z . . . *K1NG.* Surprised to have JT1AN call me . . . *W1OO.* Poor PY3APH, called by N1AU and N2AU at the same time, utterly confused . . . *N1AU.* My TA33 got lost in shipping, so roughed it again with my dipole . . . *W1DYH. Never* again with 150 watts. I can't stand the frustrations. . . . *WB1AOS.* Called CQ on 14.33 by mistake and was answered by CR9AJ . . . *W1GSH.* Tree fell across power lines; no power—took sleep break . . . *WA1PSI.* Conditions worst ever for contest on 160 . . . *K1PBW.* Where were the Europeans on 75 meters? . . . *N2MR.* Where, oh where was Kermadec? . . . *W2LEJ.* Last time on was KA2NY in 60's—a lot different!! . . . *W2IMX.* 10m band was about twice as good as last year. Had 2 hrs of S9+10 noise from local construction first afternoon . . . *K9EGA/2.* Made the 48hrs with plenty to spare . . . *K2HFX.* Thrilled to have UK1PAA answer my CQ from Franz Joseph Land . . . *N3BB.* Was a little dismayed to hear so many calls similar to my new one . . . *K3ND.* Was delighted to hear 10m open to Europe and Africa . . . *WA3WRD.* No TVI until 30 minutes before end of the contest—at least no calls . . . *K3KA.* Nice to work 10 again . . . *W3UO.* Did alright for my funky long wire antenna system . . . *K3OX.* Put up a vertical wire for 160 supported by helium balloons but the neighborhood kids got them . . . *WA3RSK.* Beam went down 2 weeks ago in storm—just got it up Saturday afternoon . . . *WA3ROX.* Didn't think I could break through the pileups as good as I did . . . *WB3CHS.* In addition to being a 'ham', I'm a magician. Sure wish I could have worked some magic on 20m . . . *WA3AAJ.* CR9AJ called me with 3 minutes left in the contest . . . *N4NW.* 10 meters—WOW!! . . . *N4AA.* First CQ WW, total enjoyment . . . *N4SX.* First time in contest and enjoyed it . . . *W4DWY.* Great 10m openings—what a smorgasbord of DX!!. . . *WA4NTP.* Haven't heard 10 so good since the early 60's . . . *K8JRM/4.* Worked KL7RW on 10m to finish 5BWAS . . . *WA4JWT* turn beam . . . *W4WJJ.* Kites supporting 160' verticals came down 4AM Saturday. Finished contest witn inverted V up 30' . . . *N4UM.* Best propagation since 1969 contest . . . *K5DB.* Age 71, first contest . . . *W5DUI.* Borrowed everything for this contest except tower and coax . . . *WB5HIH.* Last contest was SVØWEE . . . *WB5WRY.*

STATION OPERATORS

Multi-Operator Single-Transmitter

CY1NN; VE1NN, VE1BGD, VE1BKA, VE1DI, VE1RU, VE1XG. **CY1UNB:** VE1BCZ, VE1BEC, VE1BHA, VE1QT, VE1BJC, AL, DWIGHT. **DF3QG,** DK8QA, **DKØKU;** Club. **DKØTU:** DL7QU, DF5GX, DK6QI, DL7ON, DL7SI, DL7XB. **DL1MD** & DL7AV, DK2KV. **DL8DC:** DL8CM, DL8FR, DL8HA, **DLØRCA:** DJ1GX, DJ7SO, DL4KE, DF3KJ. **DLØUE:** DF2OU, DF2OK, DJ4GO, DK4OV, DL3LU, DL8RL. **DLØWU:** DJ4AX, DJ8SW, DK4TP, DK5EZ, DL9DY, DK4EM, DK8EQ, DK6JZ. **DM2AYC** & DM2BBC, DM2BHC. **DM2DUK** & DM2AYK. **DM4ZA:** DM4VZA, DM4WZA. **FGØDWT/FS:** F6BLK, F6CUK. **FMØFC:** K4GKD, N4MM, N8II, FM7AV, K7ZZ. **G3XMI:** G8LJU, MKL, IOE, LXJ, KGG, LZH; G4DZC, CKT, AEQ; G3ZER, WIE, ZYW, XUX, **G3RCV:** G2MI; G3VOX, XMD, TAA; G4FSZ, FUG. **G3VPW** & G3UKS, G4ETK, G4AFJ. **G6UW:** G3ZAY, G3ZHK, G4BAH, G4FAM, BRS32525. **GJ4BJY/A:** G4BTY, G5OAA (K3RV). **HA2KRL:** Kubola Kum. **HA5KKC/2:** HA5MD, HA5MO, HA5LV, Zudor. **HA5KKO/2:** Kincses, Saradi, Ferkai. **HA4KYH:** Czanalog, HA4YQ, HA4YO. **HA5KFN/5:** HA5GF, HA5HY, Szellar, Ehmann. HA6KNI: Denes, Szabo, Tozek, Habony, Vergert. **HA7KLG:** Batho, Tuza, Tihanyi, Tajti. **HA9KOB:** HA9PV, HA9RB, HA9RU, HA9SB, Lajos. **HBØBHA:** DJ2EH, DJ4PX, DK7NM, DK9NV, DF9GR, DL8NE, DK6NN/HB9BHA. **HV3SJ** & W3US. **I1GUB** & I1ANF, I1DSG, I1GJC, I1PCT, I1RBP, I1DIE, I1UW, I1VVZ. **I1KN** & I1ANP, I1SBU, I1LBH, I1FNX, I1UTV, W1YVU, W1PDP, Lorenzelli, **IØGPP** & MWI, PNJ, XEF. **JA6YFT:** JH6LAF, JR6LBE, JH6NAC, JH6OKN, JH6RNJ. **JA7YCQ:** JI1FLB, JG1SLY, JA7RQK, JH8BZR, JA8NNT: **JA7YFB:** JA7LPX, JA7WBW, JH8DXM. **JAØYAK:** KENJI, JUNICHI, NAOYUKI, YASUYOSHI, MASATO. **K1IK** & W1IUU. **K1TU** & W1VQ, K1YL. **K1PR** & K1XM, WA1MAO, WA1QNF. **K1RU** & K1YKX. **K1RQ** & WB1AUL, WA1GQE. **K1ZX:** & N1EE, WB1CTQ, WA1ZZV. **KZBT** & K2DA, KZUR, K2YJ, N2IS. **K2GXT:** WA1QGC, WB2HGG, WB2KFU, WB2UID, WA3YBT, HI8RPB. **KZLE/1** & W2AO, W2AX. **K2UO** & N2GW. **K3RA** & WB3AVN, WA3VUQ. **K3RS** & N3TR. **K4JNM** & WØDAD. **K4VX** & K4YEP, KØCMF. **K5FUV** & WA5NXD, WA5SHV, WB5TXK, W5VGF. **K5JA** & K5RX, K5SR, K5XR, WB5SFX, N5AU. **K5NA** & K5WA. **K5TM** & K5WM, K5ZD, WB5NXH, WD5EHB. **K6LY:** SCHOOL. **K8HLJ** & WB8MBV. **K8XX** & K8DVV. **KC4AAA:** UA3DHO, K6DYD, WB6SMS. **KG6FAE:** KG6JIB, KG6JIR, KG6JJI, WA4MIB, WB8OUZ, WB9YDL, WAØJRZ. **KH6JMK** & KH6HIF, KH6ILR, KH6JEO, KH6JKP. **KL7IRT** & KL7CFX, KL7ENY, KL7IGN. **KZØDX:** KZ6JM, KZ5BA, KZ5BV, KZ5ED, KZ5FR, KZ5JA, KZ5TJ, KZ5UH, KZ5WH. **LA2D:** LA2WQ, LA3UU, LA3VU. **LA5X:** LA1EE, LA9DL, LA3RT, LA9ZO, LA3TK, LA1VM, LA7XK, LA6VH. **LX1ML/P** & LX1HP, LX1JM, LX2954. **N2HI** & WA2DQK. **N2MM** & N2ME, WB2OYH, W2XQ. **N3AW** & N3DA, K2HR. **N3MM** & WA3YUR. **N3RD** & W3XU. **N3UN** & N3II. **N4HU** & REPEATER. **N4PN** & K4BAI, N4RJ, NFSF, N4WW, WA2MBP. **N4YN** & WD4AQH. **N4YO** & WA4CYB. **N5DX** & K5GO, K8CC, WA8RRR. **N6KT** & WD6DBM, WD6CHF, WB6PYI. **N6MG** & WA6PGB, WR6ACZ. **N6SV** & N6RJ. **N8JW** & WD8CRY, K8NA. **N8RA** & K8NS, K8TTS, K8UQA. **NØDX** & WØHBH, KØODB, WØZHB. **NØXX** & WBØKWI, WAØYQD. **OF2AA:** OH2MD, Y, BAQ, BQZ, BHL, TW, BNP. **OF3AD:** OH3HS, HY, IB, KL, HZ; OH2BOI, BQB, GGZ/3. **OF4RH:** OH4RH, OH4OO. **OH1PS/2** & OH1PV, OH1QP. **OH2IO:** Multi-op. **OH3EW** & TQ; OH2DS, BAR, RI, BPZ. **OH8OS** & OH8UT, OH6RM. **OHØAC:** OH9BDP, OH2VB. **OK1KCI:** Club. OK1KIR: OK1DKS, OK1AWH. **OK1KPU:** OK1JDX, OK1MUF. **OK1KRY/P:** OK1AQO, OK1AQG, OK1DCM. **OK1KSL:** OK1FAK, OK1AHG, OK1FAF, OK1AQ. **OK1KSO:** Club. **OK1KUR:** OK1DDS, OK1AET, OK1DDT, OK3CMR. **OK1KYS:** Club. **OK1ONC:** OK1DFZ, OK1ARD. **OK3KAP:** Club. **OK3KJJ:** OK3CKY, OK318651. **OK3VSZ:** Club. **ON6MP** & ON6NL, PAØMPM. **PI1KMA:** Timmerman, Herber. **SK2KW:** SM2DMU, SM2DLZ, SM2EKM, SM2EPR, SM2HPF, SMØDGU, OH6DX/SM2. **SK3AH:** Multiop. **SK6HA:** SM6HIO, HLZ, 1BF; SM7FCG. **SKØCC:** SM5BXP, SMØEPU. **SM5AOE** & SM6BJI. **SP3PGX:** SP3HID & others. **SP5PWK:** SP5DZI, BT, BSV, ASF, DER, EBH. **SP6PZB:** SP6FIH, SP4FUY. VF3HYU/SU: Multiop. **UK1CAA:** UW1CX, UA1, CAI, CID, CAP. **UK2AAB:** V. Kosanev, A. Kosanev, Krushinskiy. **UK2AAG:** UC2AAK, LAR, Ø09105. **UK2BAG:** UP2DT, BAD, BAA, BAE, BZ. **UK2BAS:** UP2PAJ, PX, Ø38-609. **UK2BBK:** UP2MB, 2Ø38517, 2038727. **UK2FAD:** Club. **UK2GAX:** UQ2AB, 1F, GBR. **UK2GDZ:** UQ2-3727, 37115, GEA, GHA. **UK2GKW:** UQ2ON, OC, GBW, 371Ø35, GFM. **UK2OAA:** Olenin, Melnikov, Gordienko. **UK2PAO:** RAØADC, UP2BEJ, PAQ, Ø3844Ø, Ø38574. **UK2PAP:** UP2OX, PAX. **UK2PCR:** UP2BCR, BCT, BDF, PCI. **UK2RAQ:** Liivrand, Varjo, Soone. **UK2RBA:** UR2REN, QI, MG, REO, BDP, RGR. **UK3AAC:** RA3ACE, UA3AAH, AGX. **UK3AAO:** UA3-142Ø3, ADM, UA6-15Ø363. **UK3ABB:** UA3XAC, AFO, ABZ, UW3FI, UV3CC, UA3-17Ø88Ø, 17Ø834. **UK3DAH:** Urzhumcev, Ponomorev, Baronov. **UK3MAX:** UA3-1687, 16844, 168174. **UK3SAB:** UA3SAQ, Chirkov, Pozdnyakov, UA3SAH, Vetiutnev, Terehov. **UK3TBF:** Zintshenko, Sidorov, Letkon. **UK3XAA:** UA3-12721, XAG, XM, XCE, RA3XAS. **UK4LAC:** UA4LAR, 164212, 164213. **UK4WAR:** UA4-Ø953Ø4, Ø953Ø6, Ø953Ø7, Ø95315, Fomin, Islamov, Lapin, Ohatnikov, Shevtsov, Zapolskiy, Zagumennov. **UK4WAB:** Baronov, Krylov, Sakerin. **UK5EDB:** UB5-ØEØ1376, ØEØ1377, ØEØ1378. **UK5HAA:** Budanov, Kalapturovski, Rybchenko. **UK5IAN:** Kiblitsky, Melnichyk, Tolstoy, Medvedev. **UK5IAZ:** UB5-Ø732Ø9, Ø73342, Ø731151, Ø73474, Ø731619, Ø731123, Ø731874. **UK5IBB:** UB5IHO, Ø732Ø77, Ø73394, Ø73433, UB5IJK. **UK5JAO:** Grene, Volkov, Polyakov. **UK5LAA:** UB5LCV, LCX, UY5OO, UB5LI. **UK5LAS:** Popova, Gordienko, Kapustina (all YL's). **UK5MAF:** UY5LK, UB5MDC, UB5MAK, UB5MCI, UB5Ø5922. **UK5MAG:** UB5MAP, MDL, NGP. **UK5MBU:** UB5MFK, Ø59473, Ø59474. **UK5QAV:** Zlenko, Dedrsh, Umansky, Shakhmatov. **UK5QBE:** UB5QBG, Ø64900, QDI. **UK5VAA:** Zubko, Bondarenko, Lisovsky, Wagin. **UK5WAA:** UB5CN, WCJ, Ø6842Ø. **UK5ZAK:** UB5ZAW, ZBK, ZDK, ZDF, Ø69337, Ø69329. **UK6LAZ:** UA615Ø262, UB5-Ø73873, Ø7347Ø, UA6-15Ø792, 1Ø1152, UB5-Ø731Ø4, ØEØ9Ø1. **UK6VAF:** Maglakelidze, Osminkm, Kurginyan. **UK9ABA:** UA9BE, UW9AF, UW9BC, UA9BB, UA9ABA, UV9AX. **UK9HAC:** UA9HBH, UA9HCA, UA9-158249, 158310, **UK9HAP:** UA9HBA, 158366, 158269, 158356. **UK9JAA:** UA9-1633, 16210, 16217. **UK9GAA:** RA9GBE, UA9RR, UA9-13411. **UKØAAB:** UAØAEE, AFA, 103249, 103259; RAØAAN, ABJ. **UKØAAO:** Vasiliev, Ertskin, Kotelevsky, Mozaarov, Yanchuk. **UKØFAA:** UAØFBA, UAØFCK, UAØFDA, UAØFBW, UAØFAM, UWØFM. VE1BU/3 & K4JSI. VE3AKG & VE3BVD, VE3ENM. **VE4EW** & VE4AH, HARRIS. **VC9UM:** VE4VV, VE4UO. **VE6HN** & VEGEH, VE6GT, VE6CEQ, VE6LZ, VE6DE, VE6SB, ROY, JERRY. **VK6OR:** VK6XM, VK6ZGY, CLUB. **YP2MSA:** OE3GSA, OE7UU. **VU2IIT:** VU2AH, VU2KVI. **W1HCO** & WA1HXH, WA1POL. **W1ZA** & K1EA, K1IR, K1VR. **WB3DJN** & WB2HQJ. **W2UI** & N3KR. **W2YV** & K2BXG, WB2YQU, WA2ZPT. **W3HB** & W3NX, WA3WPY. **W3KA** & W3IUU. **WA3NAN:** WB3AON, WB3ANV, W3FUO, WB2VIV. **WD4BRE** & WA4KOV, WB4ZQV, BOB, SUMMITT, LARRY. **W4DR** & WA4BVY, N4ND, W4MYA, W4QCW. **WA4ENJ** & WB4LIB, WA4LTG, K4ZGB. **W4FDA** & WB4IAE, WB4NIG. **WB4FOT** & WA4LSD, WB4LSG, WA4TNV. **WA4JTC** & REPEATER. **W4LVM** & REPEATER. **WA4LZR:** N4RU, WB4VMH, K5XF, WB9OBA. **W4NL/3** & K3AO, K4FJ, N4TX, WA3NGS. **WA4PYF** & WD4FZL, WA4IYM, WA4SPY, WA4WFS. **W4QAW** & K3RT. **WB4SFM** & WD4FIG, WB4LED, WB4YFZ. **WA6AHF** & K6OP, K6UFT. **W6BIP** & WA6DJI, WA6PYN, K6SMH. **WA6JUD** & WA6DGX, W6OAT. **W6KG** & W6QL. **WA6IQM** & K6GV, WA6HAF. **W6OKK** & K6AYA, WB6DSV, WA6OEC. **WB6OPD:** WA6SOM, WD6AXU, W6TKR, WD6AOA, WA6VNS, KP4DIS, WB6SUM, WB6SUN, WA6HMZ, WA6SDH, WB2AUH. **W6VLD:** WA6DPQ, N6KN, WA6HJK, K6TXA, WA6EUM, W3CEQ. **W6YX:** N7MH, WA6ACE, REPEATER. **W6ZYC** & REPEATER. **W7ISX** & WB7CAO, WA7YCZ, VE7XQ, VE7AZG. **WB7OQW** & WB7P1J. **W7VRO** & W7DQM, W7EKM, WA7ZWG. **WD6JLM** & SON. **W8FF** & WB8CTA. **WD8LIU** & WB8ZJW. **W8TA** & K8IA, K8MD, K8ED, W8RC, K8TR, K8CD, I1MOL. **WB8VOT** & WA8HBR, WB8RTJ, WD8AQI. **WB8ZUW** & WB8UQL. **W9CAF** & WB9TOU, WB9VLV, WB9UXR, WB9ZBK, WD9DZV. **WB9TXO:** WA9SIW, N9BB, K9UQN, K9RMA, WB9KCQ, K9RN. **W9RX** & K9HDE, WB9IWN, K9MR, REPEATER. **W9YH:** K9GL, K9MK, K9PW, K9VV, WB9HRQ, WB9OEP, WB9VEJ, WD9AON, WD9DNK. **WDØAXT:** WDØCTV, WBØTKL, WBØJIV. **WAØDCB** & WBØNQO, **WØFG** & WBØLLR, WBØFOR, WBØNYY, WAØYFU, K7LR, WAØTTJ. **XE2MX** & N6CJ, N6ZZ. **YO5KAV:** YO5DH, YO5RE. **YU1ELM:** YU10FT, YU1OND, Petkovic, V. Krakic, Z. Krakic, Stolic. **YU2CDS:** YU2CT, YU2RNC, YUZRTM, YU2RMN, YU2RQX. **ZS6YS** & ZS6JM, ZS6BPL, ZS6BNX, ZS6BNZ. **3AØJF:** F6BN, F6DQG, F6DYK, F6ELT, F6FCV. **4L6M:** UK6APA, UA6APW, UA6APP, UA6DL, UA6ADC, UV6AF, UA6APU, **W5AZ** & WB6OOL, Marty. **6W8MM:** WB2CHO, KIXA.

STATION OPERATORS

Multi-Operator Multi-Transmitter

CE2AA: CE2BH, CE2BNT, CE2CC, CE2DW, CE2GK, CE2HN, CE2HW, CE2MH, CE2MP. **CY6JA:** VE6ASI, VE6JA, W7AEK/VEG. **DKØKX:** DF3QL, DF6QJ, DJ1FG, DK3BJ, DK4QT, DK7BN, DK8BH, DL8OH, DL8QE, DL9NC. **EA8CR** & EA8BW, EA8IT, EA8LO, EA8OZ, EA8-2560, OH2BAD, OH2BH, OH2MM, OH3XZ. **HB9H:** HB9LG, HB9NH, HB9ZE, HB9AGC, HB9AIB, HB9AJM, HB9ALM, HB9ALX, HB9AQS, HB9AUS, HB9BLQ. **HD1DX:** HC1AL, HC1EE, HC1GZ, HC1HV, HC1VS. **HH5HR:** K4CAH, W4OGO, W4ORT, W4PJG, W4ZR. WA4DRU, WA4SGF, WB4EYX, N4KE, N4UF, N5RR. **HI8RCD:** CLUB. **JA1YXP:** JF1VVR, JA4QNJ, JA4XPT, JH4KAH, JA5IEP, JH6JHB, JH7JPQ, JA8MRV, JA8XQI, JAØXUF. **JA2YCN:** JE2LBD, JR2HVG. **JA2YEF:** CLUB. **JA3YBF:** CLUB. **JA3YKC:** CLUB. **JA4YBU:** CLUB. **JA3YDH:** CLUB. **JA7YAA:** CLUB. **JA7YRR:** JA7CFB, JA7CLN, JA7CLX, JA7CXV, JA7JUD, JH7MEX. **JA8YAU:** JA8FPX, JA8KWG, JA8UXL. **JH1YDT:** JH1BBT and CLUB. **K1OX** & EA4LH, K1RX, K1UA, KH6DUT, N4ZC, W1BR, W1CWU, W1HD, W1FJ, W1RR, WA1TAI. **K2GM** & K1RLU, N1XX, W1PN, K2BQ, K2GL, K2RR, K2SS, K2TT, K2UU, WB2VYA, N2AA, Bob Walsh. **K3GM** & K3PPI. **K3II** & K3JLK. **K3WW** & K3VW, K3WJV, WA3LNM, WA3RID, WB3FIY. **K4CG:** K3WUW, W3IDT, WA3FUV, WA3SXH, WB4BQX, WB5CFA, WB5EEN. **K6SMF** & K6YRA, WA6LWF, WB6RZA. **K8LX** & K8GM, W8WA, W8SYR, N8EA, WA8RYE, WA8ZDT, WB8ALP. **K8OT** & WA8ECH, WB8BBO, WD8CEG. **KØRF** & KØGU, KØKE, WØUA, WØUN, WØSII, WBØIKN. **KM6FC** & KM6FD, WD6KLN, R. KELLEY. **LA9K:** LA2SQ, LA3KV, LA4MV, LA4WV, LA4ZV, LA5JS, LA8TF, LA6CN. **LU1BAR/W3** & LU2DX, W3ZZ, WB3BSV. **N3RB** & K2PS. **N6AV** & N6AW, N6DV, N6NU. **N6RO** & N6LC, N6TU, W1ARR, W6LH, WA6HJV, WA6VEF, WB6CBJ, WB6SHD, WB6UOC. **OH1AA:** CLUB. **OH2AW:** CLUB. **OK3KFO:** CLUB. **VP9DX:** CLUB. **W1ZM** & K1AR, K1ZM, K2DM, K2ZM, K3ZM, N4OC. **W2PV** & K1OME, K1MM, K2XA, K2TR, K2VV, N2RX, W2IB, W2VT, W3AZD. **W3FA** & N3GB, N3US, WA3KCY, WA3ZAS. **W3GM** & W3GL, WA3JYB, WA3WIM. **W3MA** & W3DHM. **W3MM** & W3BI, W3BGN, WA3VYD, N3LR. **W3YFV** & K3JHE. **W4BVV** & K3KU, K3NPV, K3ZNV, WA3AMH, WB4UKA. **W4WS** & W4FWG, W4ZCB, N4DO, N4TO. **W5BJA** & K5TJ, N5CR, N5TP, W5MYA. **W8NGO** & W8CLR, W8ONA, WD8AMW. **W9YT:** K9LBQ, K9MA, K9TR, W9MO, W9WI, WØXT, WB9DUN, WB9KMQ, WB9YEM. **YU1BCD:** CLUB. **YU1INO:** YU1OEU, YU1RS496, YU1RS2042, YU1RS254. **ZF2AP:** N4IZ, W4YKH, WD4AXM. **ZL1AA/K:** ZL1AJL, ZL1AMN, ZL1BKL, ZL1BKX. **4J9B:** UA9AN, UA9ACZ, UA9AEN, UA9AIA, UW9BY, RA9AIL.

Number groups after call letters denote following Band (A-all), Final Score, Number of QSOs, Zones and Countries. Certificate winners are listed in Bold Face.

PHONE RESULTS: SINGLE OPERATOR NORTH AMERICA

UNITED STATES

N1GL	**A**	**1,704,520**	**1394**	**118**	**312**
K1DG	"	**1,504,165**	**1510**	**97**	**268**
K1WB	"	**729,060**	**902**	**81**	**209**
K1XX	"	655,146	774	86	220
K1KNQ	"	514,794	647	87	207
W1UR	"	424,463	493	91	226
K1NG	"	352,157	499	78	185
W1DA	"	283,040	419	63	181
W1OO	"	256,998	440	62	141
W1MM	"	237,195	382	75	176
W1HYY	"	214,785	372	68	147
W1NG	"	203,232	369	72	147
K1HMO	"	180,122	296	68	158
K1MBQ	"	168,175	380	51	124
W1HX	"	163,548	271	72	164
WA1NRG	"	150,060	306	52	131
K1YHM	"	131,047	257	63	130
W1WY	"	119,148	246	56	128
W1SD	"	118,932	235	57	139
W1GG	"	115,992	267	64	115
N1AU	"	113,120	262	49	111
N1JW	"	106,326	232	63	135
WA1TAT	"	104,958	260	45	102
WB1AOS	"	78,526	198	48	74
W1GD	"	64,477	170	46	105
W1ZT	"	51,830	154	49	97
W1DYH	"	46,101	142	43	84
K1BV	"	32,208	134	26	62
WA1OLK	"	32,058	101	41	76
W1RQ	"	26,558	116	36	62
K1ZZ	"	25,576	109	36	53
W1XK	"	22,922	119	21	52
K1WJL	"	17,457	101	18	51
K1WJ	"	11,242	68	25	48
WA1ZEF	"	11,016	97	27	45
WB1DLA	"	9,600	76	20	40
K1LL	"	9,280	75	21	37
W1VV	"	8,820	56	26	37
WA4YUU1	"	8,250	73	17	33
W1XX	"	2,257	25	16	21
W1PLJ	"	1,003	20	7	10
W1BK	"	860	26	9	11
WA1HFN	**28**	**51,086**	**214**	**22**	**67**
K1LWI	"	39,852	189	20	62
WA1VQP	"	25,795	133	20	57
WB1DGG	"	23,184	120	20	52
W1BR	"	5,054	52	13	25
WB6KIL/1	"	1,827	27	9	20
K1RT	**21**	**382,398**	**990**	**27**	**111**
W1FXD	"	**328,107**	**801**	**31**	**110**
K1WX	"	319,480	798	30	110
W1YN	"	267,750	748	27	98
WA1EUO	"	250,107	801	26	93
WA1UZH	"	135,360	504	22	44
K1TN	"	111,456	405	21	75
W1ZIY	"	45,198	173	23	70
W1GSH	**14**	**172,074**	**526**	**28**	**91**
WA1PSI	"	18,000	154	14	34
W6ZBS/1	"	1,827	25	11	18
W1YG	**7**	**29,760**	**138**	**19**	**61**
WA1POJ	3.8	136	8	4	4
K1P8W	**1.8**	**1,792**	**31**	**12**	**16**
W1BB	"	**198**	**9**	**3**	**8**
K2BU	**A**	**1,573,352**	**1329**	**112**	**306**
N2LT	"	**1,355,289**	**1199**	**112**	**291**
N2SS	"	728,815	729	97	258
N2RM	"	614,075	811	77	198
K2UA	"	570,734	741	73	205
K2FL	"	531,416	551	102	260
N2MR	"	311,322	441	75	192
W2LU	"	279,946	430	84	194
WA2VYA	"	278,208	457	70	154
W3HKK/2	"	276,571	445	67	166
WA2HGM	"	214,730	389	61	136
W2KI	"	182,115	321	66	147
N2VW	"	180,115	325	71	150
WA2PCF	"	153,550	310	56	129
W2NS	"	134,880	302	50	110
WB2FIT	"	134,688	268	57	126
K2TD	"	131,704	255	63	139
W2GD	"	118,664	264	61	121
W2LEJ	"	110,053	253	56	111
W2CP	"	107,880	218	62	124
K2SD	"	104,248	227	51	115
W2SGK	"	84,128	188	58	118
N2GC	"	82,368	210	53	103
WB2LOF	"	46,636	142	49	82
WB2EOO	"	36,900	165	42	81
W2PFQ	"	34,200	129	25	70
WA2LJM	"	29,388	117	31	62
W2MNK	"	28,324	111	34	63
K2TV	"	26,820	105	34	60
K2PH	"	26,574	107	36	67
W2XN	"	21,804	95	31	61
W2FGY	"	20,865	85	39	68
W2RQ	"	13,916	76	24	47
W2ZLQ	"	8,712	58	30	42
W2FVS	"	7,900	70	17	33
K2VV	"	7,774	47	19	27
W2IMX	"	5,244	38	24	33
K2PF	"	3,772	37	20	26
K9EGA/2	**28**	**63,063**	**244**	**23**	**76**
W2RS	"	26,460	118	22	68
N2AU	"	26,136	147	19	53
WB2VWW	"	25,915	147	19	52
W2KDI	"	19,668	116	18	48
WA2YYT	"	17,822	116	20	47
WA2AUB	"	13,293	87	18	45
W2IML	"	9,075	69	17	38
WB2GFE	"	7,850	72	17	33
WA2MHL	"	7,038	65	17	34
WB2MAN	"	5,850	49	18	32
N2OO	"	2,100	27	11	19
K2HVN	"	1,960	28	12	16
WB2ZGI	**21**	**143,424**	**470**	**24**	**84**
WA2ZWH	"	37,152	181	19	53
WA2TJO	"	20,636	99	20	57
W2DW	"	1,404	21	12	15
K2HFX	**14**	**387,549**	**875**	**36**	**117**
K2BMI	"	222,552	608	33	99
WB2QYT	**7**	**21,736**	**116**	**20**	**56**
WB2VFT	"	10,488	83	17	40
WA2IFS	"	2,788	36	13	21
W2VP	**3.8**	**108,405**	**465**	**24**	**75**
W3WJD	**A**	**2,377,560**	**1713**	**128**	**357**
			(Opr. WA3LRO)		
W3RJ	"	**1,184,625**	**1122**	**97**	**278**
K3ZO	"	**1,079,305**	**1064**	**104**	**261**
N3BB	"	946,890	1033	91	243
K3WX	"	928,984	884	99	272
N3AD	"	906,240	851	106	278
N3ED	"	702,498	674	102	280
K3NZ	"	516,971	638	92	207
K3SW	"	427,680	624	72	171
			(Opr. K30X)		
K3UZY	"	364,179	550	60	173
K3ND	"	323,960	421	74	206
K3OO	"	305,732	476	80	164
WA3WRD	"	294,580	429	79	181
K3KA	"	283,175	438	69	172
W3GK	"	275,616	485	66	166
W3AP	"	275,184	404	81	192
W3KT	"	274,896	371	86	190
W3GRF	"	273,462	418	72	166
K3MWV	"	221,361	338	81	168
WA3NNA	"	211,920	331	75	165
W3GRS	"	204,072	295	82	182
W3MR	"	187,227	335	63	150
K2SCU/3	"	172,431	330	65	142
W3KHB	"	157,806	278	62	136
W3KV	"	155,373	283	61	140
W3AZ	"	153,846	299	53	136
W3BE	"	147,906	326	53	113
W3UO	"	135,780	286	61	125
K3WOK	"	135,270	294	46	121
K3MD	"	131,528	306	52	112
W3UJ	"	130,479	278	60	123
W3EVW	"	130,284	261	63	125
W3HYJ	"	107,342	220	62	129
K3GQJ	"	104,193	247	56	97
K3OX	"	98,392	212	71	125
W3HUM	"	60,544	183	44	84
W3JPT	"	59,764	180	46	88
WA3RSK	"	50,828	158	50	81
K3KNH	"	50,666	146	53	101
K3NL	"	40,800	144	31	69
WB3EAG	"	27,948	95	36	66
W3BGN	"	27,538	108	31	67
W3UET	"	20,672	109	18	50
W3ETB	"	19,995	87	34	59
W3BI	"	19,080	96	22	50
KØUCK/3	"	16,470	87	37	53
WA3ROX	"	14,822	76	31	50
W3CM	"	11,705	74	23	42
W3PN	"	11,210	70	21	38
W3GU	"	8,280	66	16	29
W3PC	"	6,960	52	20	40
WB3AHN	"	5,406	38	19	32
WA3ZKL/3	"	4,838	43	14	27
W3SUE	"	2,442	28	12	21
K3JHE	"	435	16	6	9
K2PLF/3	**28**	**39,674**	**196**	**22**	**61**
W3EB	"	22,572	137	21	45
W2SKE/3	"	22,470	133	20	50
WB3BKD	"	8,211	71	17	34
WB3DET	**21**	**304,640**	**799**	**31**	**105**
K3LWM	"	185,955	565	28	87
W3EWL	"	136,528	453	25	81
K3GYD	"	73,056	267	23	73
WA3RRS	"	46,870	197	20	66
W3JO	"	27,898	139	21	53
K3MA	"	10,556	75	14	38
K3JLT	**14**	**277,583**	**702**	**35**	**104**
W3GG	"	165,735	462	30	97
K3TUP	"	110,880	353	29	83
K3MBF	"	53,176	203	26	66
W3EAN	"	38,269	199	15	56
WB3CHS	"	28,801	134	27	56
WA3AAJ	"	18,849	149	19	42
K3UA	**3.8**	**7,105**	**103**	**12**	**23**
N4RV	**A**	**1,213,740**	**1086**	**110**	**286**
W9QQ/4	"	**1,022,788**	**1035**	**107**	**249**
W4HR	"	**725,355**	**671**	**110**	**295**
N4RA	"	500,439	586	95	226
N4NW	"	481,314	628	89	202
K4YT	"	367,030	490	89	200
W4DM	"	342,657	492	82	177
WB4ZNH	"	336,560	479	87	193
W4XR	"	313,464	400	94	202
K5KT/4	"	309,272	455	84	184
K4GFH	"	280,872	430	76	173
WA4GQJ	"	262,305	380	87	174
WA4PUJ	"	226,198	446	72	142
K4EZ	"	199,682	324	28	160
K4AF	"	188,727	367	72	137
			(Opr. WB3DNL)		
N4AA	"	179,894	297	75	146
WB4HNC	"	171,589	305	59	150
K4HAV	"	166,920	305	76	138
W2GHK/4	"	165,572	297	70	142
WB4EDD	"	154,294	279	70	136
K4THE	"	152,712	283	63	139
W4KFC	"	140,876	305	44	120
WA4NHP	"	140,427	275	57	132
N4MO	"	136,224	300	57	115
W4DZZ	"	117,831	239	60	121
K4KKJ	"	116,110	255	49	121
WA4PAB	"	97,495	243	54	101
W4BV	"	95,535	189	54	139
W4UYC	"	86,428	218	60	104
WD4BPP	"	86,180	228	47	92
W4HJ	"	80,634	189	51	100
N4IA	"	79,040	205	46	106
W4YE	"	78,048	197	40	104
K4LRJ	"	71,982	206	37	92
W4EZ	"	71,145	182	52	101
N4SX	"	69,745	172	49	96
W4RW	"	64,308	168	51	87
WB4LCZ	"	64,056	202	46	90
WA4UNZ	"	61,200	172	49	95
WA4IAR/QRPP	"	60,417	181	47	90
WB4BZR	"	58,926	187	36	86
K4PI	"	53,760	146	43	97
WØDAD/4	"	50,922	144	46	92
W4OUN	"	50,920	156	46	88
W4OWY	"	48,258	139	42	84
WA4GAB	"	41,987	133	44	77
W4HVU	"	40,506	134	45	84
W4MYA	"	39,198	154	30	64
W4SRH	"	37,675	105	47	90
N4XM	"	35,984	140	43	61
K4JTH	"	32,010	124	34	63
W4JVN	"	30,870	116	38	67
WB4RDV	"	29,916	110	39	69
K4EG	"	29,532	122	31	61
K4BAM	"	28,700	122	40	60
W4KMS	"	28,158	103	45	69
WA4NTP	"	27,621	125	40	59
K4UEE	"	23,086	96	37	60
WA4GLE	"	20,150	115	22	43
WA4SBT	"	17,177	75	32	57
N4YJ	"	15,600	88	25	50
K4KA	"	13,440	73	33	51
W4RAL	"	10,138	66	31	43
W4IQ	"	8,967	65	76	33
K4OD	"	3,818	37	21	25
W4EEO	"	2,343	25	9	24
W4QQN	**28**	**160,834**	**483**	**28**	**90**
W4MWT	"	**115,988**	**432**	**25**	**82**
WB4OXX	"	110,250	399	23	82
K4UTE	"	72,261	247	28	83
N4UM	"	51,377	235	21	62
W4YV	"	44,030	192	22	63
N4NX	"	43,616	181	23	71
WB4IUX	"	41,130	170	26	64
K4II	"	35,530	151	25	60
K8JRM/4	"	33,939	162	24	57
WA4JWT	"	32,800	159	21	61
W4KNW	"	24,180	114	24	54
WØYVA/4	"	20,700	120	19	50
WD4AAM	"	12,636	90	17	37
W4ZWZ	"	8,823	69	16	35
W4QO	"	8,109	55	17	34
W4PME	"	4,687	41	17	26
WB4GRK	"	117	8	5	4
K4RV	**21**	**370,464**	**966**	**32**	**104**
N4KG	"	273,650	736	28	102
G3WJN/4	"	139,029	404	27	94
WB4KZG	"	122,820	385	29	86
N4NW	"	73,304	307	23	65
K4FYM	"	54,472	229	24	64
W4LCL	"	43,243	190	22	61
WA4HNL	"	16,896	102	18	46
WB4PRU	"	15,444	119	19	35
W4MGX	"	14,136	93	16	41
K4HGG	"	8,798	60	13	40
K4VAA	"	7,106	66	12	26
WB4VQO	"	5,365	54	12	25
K4JPD	**14**	**247,559**	**668**	**35**	**104**
N4HB	"	101,640	331	27	83
WA4JDI	"	51,186	160	28	86
WA4DCP	**7**	**49,268**	**174**	**27**	**82**
N4BP	**3.8**	**9,308**	**84**	**15**	**37**
WA4YBV	"	3,510	56	11	19
WB4RUA	"	1,980	32	10	20
W3YY/4	"	840	30	4	10
N4EA	**1.8**	**2,233**	**42**	**12**	**17**
K56A	**A**	**1,291,264**	**1173**	**119**	**297**
K5OA	"	**794,964**	**816**	**107**	**265**
W5JW	"	614,714	792	101	192
K5DX	"	413,220	535	100	191
K5TSQ	"	344,418	472	89	185
W5OSJ	"	238,005	438	79	136
N5TX	"	219,730	387	80	135
K5UA	"	184,032	333	72	141
K5DB	"	168,468	337	68	134
WB5HGS	"	161,239	380	63	94
K5LP	"	155,904	291	75	128
K5WF	"	139,320	296	65	115
W5TSF	"	131,054	320	62	99
N5WW	"	130,310	282	59	107
W5FL	"	98,384	231	66	106
K5OR	"	95,424	161	60	153
K5KG	"	91,875	214	66	109
WB5QBV	"	90,300	265	44	85
K5GE	"	85,813	206	63	98
W5OB	"	76,692	190	62	104
N5DU	"	74,228	186	63	91
W5HEZ	"	70,950	188	50	100
WB5SFS	"	70,080	190	56	104
W5JC	"	67,832	177	50	89
W5ZPA	"	61,488	185	52	92
WA5NDV	"	48,162	146	52	86
W5LUU	"	45,980	152	55	66
W5SNU	"	38,796	133	43	79
W5JWM	"	31,900	125	39	61
WB5MXS	"	27,606	103	47	60
K5DEC	"	25,410	113	49	56
W5OSH	"	24,444	106	41	56
WA5IYX	"	22,050	114	37	53
W5DUI	"	19,780	89	38	54

1978 TOP SCORES

WORLD

Single-Op All Band

PJ9CG	6,059,580
KG6SW	5,114,512
9L1SL/A	3,695,580
HC1BU	3,199,386
VP2VDH	2,919,312
9Z4NP	2,379,861
W3WJD	2,377,560
KH6NO	2,140,432
DJ4PT	2,100,866
UB5WE	2,025,900

Single-Op Single Band

28 MHz

PY1MAG	657,756
IG9SKO	651,904
CX8AR	454,584
YV4BDB	422,400
ZE1BL	364,812
KG6JIA	330,780

21 MHz

YU3ZV	1,047,321
I4USC	867,482
I5NSR	850,836
YU2HS	843,594
EA8JJ	766,125
G3MXJ	672,520

14 MHz

YV2AMM	966,328
8PØA	963,263
ON4UN	891,780
CK1HH	746,760
YY4YC	743,552
PY4OD	694,590

7 MHz

KX6LA	405,678
DK3FB	145,665
VE2AQS/OA4	136,138
UP2NK	136,100
UA1DZ	112,615
JA2BAY	102,168

3.8 MHz

KP4RF	245,549
KH6XX	116,416
W2VP	108,405
KG6JIH	108,186
VE3PET	99,134
I3MAU	69,200

1.8 MHz

DJ8WLA	3,125
DJ6TK	2,562
N4EA	2,233
K6SE	2,088
VE3BBN	1,903
K1PBW	1,792

Multi-Op Single Xmtr

FMØFC	6,832,004
4L6M	5,993,520
5W1AZ	5,452,302
6W8MM	4,942,160
DLØWU	3,682,462
CY3KZ	3,433,560

Multi-Op Multi-Xmtr

EA8CR	21,351,898
HH5HR	9,979,355
CWØA	7,681,915
W2PV	7,302,350
DKØKX	6,696,680
VP9DX	6,604,551

USA

Single-Op All Band

W3WJD	2,377,560
N7DD	1,973,618
N1GL	1,704,520
K2BU	1,573,352
K1DG	1,504,165
W6XR	1,357,800
N2LT	1,355,289
W6RR	1,347,974
K7RI	1,332,555
K5GA	1,291,264

Single-Op Single Band

28 MHz

WB6PXP	238,056
W4QQN	160,834
W4MWT	115,988
K5UR	111,936
WB4OXX	110,250
K6XM	92,736

21 MHz

WA6EKL	457,532
K1RT	382,398
K4RV	370,464
WA6DNM	352,564
W1FXD	328,107
K1WX	319,480

14 MHz

K2HFX	387,549
K3JLT	277,583
K4JPD	247,559
W7ATF	246,962
K7OX	235,103
K9DX	228,927

7 MHz

W7KW	79,488
WA4DCP	49,268
W8LU	32,725
W1YG	29,760
WB2QYT	21,736
WØSD	19,658

3.8 MHz

W2VP	108,405
W8WW	34,119
K5LM	18,688
N7RK	17,748
K5NU	15,738
W9LF	15,620

1.8 MHz

N4EA	2,233
K6SE	2,088
K1PBW	1,792
W5USM	1,458
WAØTKJ	817
K8CFU	300

Multi-Op Single Xmtr

K5JA	2,643,580
N6SV	1,994,298
W1ZA	1,888,029
W4DR	1,642,194
K1PR	1,621,992
WØFG	1,566,416

Multi-Op Multi-Xmtr

W2PV	7,302,350
K1OX	4,982,796
K2GM	4,453,120
W1ZM	4,424,046
W4BVV	3,213,540
K3WW	3,051,640

TROPHY WINNERS AND DONORS

Single Operator, All Band

World

Station: KG6SW
(Opr. Charles H. Margelli, K7JA)
Donor: Bill Leonard, W2SKE

U.S.A.

Station: W3WJD
(Opr. Walter Rakitsky, WA3LRO)
Donor: Potomac Valley Radio Club

Canada

Lee Sawkins, CY7CC
Donor: Jack Baldwin, VE3BS

Europe

Klaus Kuhlemeier, DJ4PT
Donor: W4BVV Operators

Caribbean/Central America

Tom Skinner, KG4TS
Donor: Don Wallace, W6AM

Africa

Jose Teixeira, CT3BD
Donor: Gordon Marshall, W6RR

Asia

P. M. Goncharov, UF6VAG
Donor: Japan C.Q. Magazine

Oceana

Bill Meyers, KH6NO
Donor: Northern California DX Club

Single Operator, Single Band

World

Drago Turim Jr., YU3ZV
Donor: K2HLB Memorial (No. Jersey DX Assoc.)

World, 3.8 MHz

Pedro J. Piza, Jr., KP4RF
Donor: Fred Capossela, K6XX

U.S.A., 3.8 MHz

John C. Small, W2VP
Donor: Arnold Tomchin, W2HCW

Canada

Udo Franz, CY3FFA
Donor: Gene Krehbeil, VE7KB

Caribbean/Central America

William T. Kerber, KP4DSD
Donor: Pedro Piza, KP4RF

South America

Sergio Pontoni, YV2AMM
Donor: Brazil DXers

Oceana, 14 MHz

Norman R. Duxbury, YB0ACT
Donor: VK3JW Memorial (Pacific DX Net)

U.S.A.

Jim Stevenson, WA6EKL
Donor: Southern California DX Club

Multi-Operator, Single Transmitter

World

Station FM0FC
(Oprs. K4GKD, N4MM, N8II, FM7AV, K7ZZ)
Donor: John Knight, W6YY

Canada

Station CY3KZ
(Oprs. VE3KZ, VE3IXE, and VE3BMV)
Donor: Calgary A.R.A.

Multi-Operator, Multi-Transmitter

World

Station EA8CR
(Oprs. EA8CR, EA8BW, EA8OZ, EA8LO, OH3XZ, EA8PT, OH2BH, OH2MM and OH2BAD)
Donor: Radio Club of Venezuela

U.S.A.

Station W2PV
(Oprs. W2PV, K1OME, K1MM, K2XA, K2TR, K2VV, N2RX, W2IB, W2VT, W3AZD)
Donor: Dale Hoppe, K6UA

Contest DXpedition

World, Single Operator

Station VP2VDH
(Opr. Terry Baxter, N6CW)
Donor: Stu Meyers, W2GHK

World, Multi Operator

Station EA8CR
(Oprs. EA8CR, EA8BW, EA8OZ, EA8LO, OH3XZ, EA8PT, OH2BH, OH2MM, and OH2BAD)
Donor: Bill Schneider, K2TT

WA5YFQ	"	17,675	73	43	58
WA5IEV	"	13,224	73	29	47
N5JJ	"	10,934	64	28	43
WA5WEY	"	10,440	69	21	37
W5VD	"	9,514	66	27	40
WA5GZO	"	8,906	59	26	35
W5EDX	"	8,664	57	25	32
W5SOD	"	7,791	65	23	26
K5KR	"	7,006	50	23	39
W5EIJ	"	3,485	31	18	23
N5AF	"	660	15	10	12
WB5NAK	"	322	12	6	8
K5UR	**28**	**111,936**	**462**	**25**	**81**
WB5HIH	"	88,179	428	24	67
K5GL	"	72,720	286	25	65
K5MA	"	54,740	243	23	62
WD5CSK	"	39,590	244	23	51
K5NW	"	39,225	202	22	53
W5VGX	"	37,191	185	24	53
W5YZ	"	36,205	207	21	44
K5RF	"	30,514	166	23	50
N5XR	"	28,743	159	22	45
W5RRR	"	26,860	129	24	55
K5EWJ	"	10,140	77	18	34
WB5IFY	"	6,837	65	17	26
K5KLA	**21**	**137,052**	**451**	**24**	**84**
K5BZU	"	75,101	255	27	82
W5C8	"	38,761	171	27	60
K5PO	"	17,136	219	18	45
WB5UEL	"	14,620	80	22	46
WB5WRY	"	8,360	58	17	38
WD5BZI	"	3,936	60	16	25
W5FO	**14**	**177,781**	**508**	**33**	**106**
W5NO	"	34,272	157	27	57
WA5AFG	"	2,236	41	10	16
WB5TDO	7	3,240	44	14	25
K5LM	**3.8**	**18,688**	**127**	**19**	**45**
K5NU	"	15,738	108	18	43
W5USM	**1.8**	**1,458**	**27**	**11**	**16**
W6XR	**A**	**1,357,800**	**1687**	**98**	**194**
W6RR	"	**1,347,974**	**1373**	**116**	**245**
K9DQ/6	"	**1,160,793**	**1373**	**99**	**204**
N6AA	"	835,775	912	112	219
N6AR	"	818,400	876	113	228
K6PU	"	804,162	982	107	196
K6NA	"	691,878	1006	94	148
W6PU	"	650,925	1004	76	149
WB6NHF	"	484,029	891	70	127
W7CB/6	"	397,416	612	84	148
W6BH	"	342,866	499	81	170
W6FQF	"	272,896	602	59	105
K6AO	"	205,623	382	76	125
N6AN	"	201,204	471	67	95
K6DR	"	167,650	362	68	107
W6HXW	"	159,290	342	61	109
W6US	"	151,620	212	104	181
N6MB	"	137,880	286	65	115
WA6TKT	"	129,150	438	43	62
W6ZUM	"	112,633	280	72	91
K6XT	"	98,332	291	54	68
W6SWM	"	96,525	265	57	78
N6QQ	"	96,346	265	58	76
N6HE	"	93,195	232	66	105
N6NG	"	90,395	199	63	116
W6PQZ	"	88,320	249	58	80
W6CN	"	79,544	241	51	71
N6HM	"	76,527	306	41	58
W6TPH	"	75,924	207	59	89
W6IA	"	73,021	195	52	85
K6DC	"	72,447	209	43	80
W6YVK	"	71,936	214	56	72
N6MW	"	56,684	147	63	85
K6RK	"	51,170	162	47	72
K6SSJ	"	48,412	153	54	79
WA6SDH	"	47,785	210	38	57
WA6KTZ	"	45,695	172	42	53
W6CPL	"	45,260	120	55	91
N6OS	"	42,448	148	43	69
K6QX	"	35,712	138	36	57
WA6UFY	"	25,080	125	35	41
W6BZE	"	23,634	124	32	46
W6XN	"	23,154	94	44	58
N6IH	"	20,340	91	41	49
N6UW	"	19,173	99	33	44
WB6KOR	"	17,040	104	25	35
WB6ZHD	"	13,390	73	25	40
WB6BPA	"	9,834	65	28	38
W6QDE	"	9,308	65	24	28
N6IC	"	8,925	61	21	30
W6MZQ	"	8,602	73	18	28
WA6TLA	"	7,520	59	20	27
K6KUQ	"	4,410	36	19	30
W6NKR	"	4,343	37	19	24
K6SMH	"	3,526	37	20	21
W6SUJ	"	2,242	22	18	20
WA6QCZ	"	1,972	33	14	15
WB6PXP	**28**	**238,056**	**912**	**27**	**64**
K6XM	"	92,736	475	22	47
W6CNA	"	43,127	313	21	40
WA6EKL	**21**	**457,532**	**1477**	**27**	**80**
WA6DNM	"	352,569	1189	27	76
N6ND	"	311,400	1078	25	75
W6HX	"	241,374	840	26	72
W6AM	"	221,403	882	24	67
			(Opr. K6SVL)		
K6HNZ	"	116,058	587	23	46
N6VV	"	65,965	302	22	57
WA6TFS	"	29,900	206	20	30
WA6QDR	"	416	41	7	6
W6EUF	**14**	**103,615**	**325**	**31**	**84**
N6KA	"	81,477	306	30	69
W6OK	"	53,605	264	26	45
WB6EHT/6	"	26,936	136	24	50
K6SE	**1.8**	**2,088**	**91**	**12**	**17**
N7DD	**A**	**1,973,618**	**1795**	**126**	**260**
K7RI	"	**1,332,555**	**1772**	**97**	**162**
N7XX	"	**1,236,756**	**1558**	**98**	**178**
(Opr. WA1KKM/7)					
W7EJ	A	1,057,920	1309	94	196
W7NI	"	915,045	1218	93	172
W7GOV	"	572,769	981	83	124
			(Opr. W5XZ)		
W7BUN	"	402,426	887	52	106
W7OTO	"	280,756	694	59	89
W7ZR	"	248,094	519	62	117
W7MB	"	159,150	373	57	93
W7JYW	"	143,592	431	49	75
DL1UF/W7	"	138,919	332	71	102
K7UU	"	126,690	408	47	76
W7UZ	"	96,570	209	64	110
W7HXG	"	66,640	209	43	76
K7YDO	"	60,499	238	39	62
W7ZMD	"	59,976	187	62	85
K7NF	"	58,016	212	39	59
WA7URW	"	54,131	238	34	43
K7ZA	"	53,148	219	41	45
K7WA	"	22,880	118	37	43
W7BQG	"	21,120	119	29	35
W7WW	"	19,584	70	44	58
K7EQ	"	16,353	86	39	40
WB7BNP	"	14,852	70	41	53
W7JNC	"	12,672	73	22	42
WA7TTM	"	11,233	84	21	26
K7RS	"	10,927	86	23	26
W7JUO	"	9,882	61	26	35
WA7GZA	"	8,820	60	29	34
W7GUR	"	6,160	44	24	32
W7ZI	"	3,811	40	19	18
K7GR	"	2,146	28	14	15
W7AYY	**28**	**23,267**	**162**	**18**	**35**
W7LZF	"	22,656	129	18	46
K7MKS	"	20,000	156	20	30
K7IDX	"	17,802	143	18	28
N7DX	"	6,027	63	16	25
WA7SHW	"	1,566	23	13	14
WA7UWE	**21**	**296,700**	**1149**	**25**	**67**
K7NN	"	258,100	874	26	74
K7XX	"	63,560	332	22	48
W7YKN	21	32,190	205	22	36
W7ATF	**14**	**246,962**	**698**	**34**	**100**
			(Opr. N7RP)		
K7OX	"	235,103	690	35	86
K7TM	"	166,535	631	30	65
W7IL	"	155,325	583	29	66
WA7GVM	"	125,528	563	31	73
W7FP	"	119,000	421	33	67
W7MLJ	"	18,020	128	21	32
WB7QYG	"	408	81	9	8
W7KW	**7**	**79,488**	**397**	**25**	**47**
K7UR	"	13,356	81	24	39
N7RK	**3.8**	**17,748**	**126**	**19**	**39**
K8MR	**A**	**237,888**	**386**	**75**	**161**
K8MN	"	160,962	323	64	129
K8US	"	160,060	315	76	136
K8TMK	"	93,378	224	50	108
W8CBR	"	68,949	189	47	94
K8CVV	"	50,570	132	44	86
WD8BPH	"	43,632	160	35	66
WB8LFO	"	31,556	122	37	61
W8YGR	"	20,874	85	37	61
K8JK	"	19,184	84	30	58
W8HMB	"	15,392	82	26	48
W8HU	"	8,415	60	17	34
W8ILC	"	8,382	61	25	41
WD8DNZ	"	8,058	62	18	33
W8ICC	"	7,257	53	26	33
W8HQN	"	6,966	55	22	32
WB8TMR	"	6,820	46	27	35
K8KR	"	2,349	31	9	18
K8HF	"	1,566	23	15	14
W8IMZ	**28**	**44,184**	**220**	**23**	**61**
W8WPC	"	38,912	199	22	54
K8TL	"	11,556	84	17	37
K8YWG	"	9,898	96	17	32
K8BTH	"	7,268	80	17	29
K8CX	**21**	**161,490**	**531**	**23**	**82**
K8ZR	"	112,336	333	25	94
K8FO	"	77,330	306	24	71
W8JWN	21	61,560	244	21	69
WB8ZWW	"	16,531	99	17	44
WD8BFV	"	13,524	127	16	33
W8DWP	"	11,880	80	17	38
K8SMC	**14**	**170,506**	**495**	**35**	**98**
K8HJD	"	80,960	273	27	83
W8NWO	"	62,418	216	28	75
W8LU	**7**	**32,725**	**186**	**21**	**56**
K8CW	"	10,980	76	19	42
WA8LXJ	"	6,165	56	15	30
W8SQ	"	3,080	43	10	25
W8WW	**3.8**	**34,119**	**321**	**16**	**35**
W8TWA	"	13,113	141	18	29
WA8DXG	"	4,218	54	14	24
K8CFU	1.8	300	20	4	6
W9ZRX	**A**	**1,156,599**	**1058**	**114**	**279**
W9RE	"	**961,526**	**916**	**112**	**274**
WA9P8K	"	**881,225**	**975**	**100**	**249**
W9LT	"	421,850	560	98	197
N9NS	"	308,200	470	89	179
K9AJ	"	211,190	331	84	161
W9RY	"	154,026	298	63	136
WB9CEP	"	133,812	278	60	117
W9NA	"	120,726	272	54	117
K9IL	"	107,954	249	55	99
WB9CPQ	"	103,887	288	52	101
WB9EBP	"	102,984	246	58	110
N9RC	"	90,471	213	58	101
K9IW	"	89,440	202	58	114
WA9BHH	"	86,664	209	54	103
K9LWT	"	86,184	230	49	103
WB9IYO	"	78,246	186	56	106
W9OP	"	76,293	217	51	96
W9LQ	"	70,308	160	52	110
K9SD	"	70,030	170	53	96
WB9PUL	"	51,460	162	44	80
			(Opr. WB9SAD)		
W9NNE	"	41,072	121	49	87
W9AMM	"	39,882	149	30	72
K9BQL	"	28,231	106	38	71
W9NM	"	13,320	69	26	46
WB9UNX	"	12,222	70	24	39
W9TNZ	"	11,928	76	29	42
WD9APY	"	9,238	75	26	36
W9JZE	"	8,384	58	27	37
K9BK	"	4,428	49	21	33
WB9VLV	"	4,128	47	20	23
WB9NEH	"	3,444	32	18	24
WB9NUL	"	2,926	32	16	22
W9HZ	"	2,808	26	18	21
K9HMB	**28**	**68,904**	**289**	**23**	**76**
WB9ZKK	"	57,240	250	23	67
W9OBF	"	53,640	235	23	67
W9ZA	"	49,416	252	23	64
N9DP	"	40,744	186	24	64
WA9BOW	"	25,014	154	20	46
K9UWA	"	16,870	92	19	51
WB9CBY	"	14,628	86	23	46
K9KM	"	14,175	90	18	45
W9SU	**21**	**283,261**	**847**	**28**	**93**
K9JF	"	**245,826**	**691**	**28**	**98**
WB9HAD	"	231,960	677	29	91
K9ES	"	200,564	535	29	104
W9ZTD	"	117,070	386	28	87
W9JZK	"	107,590	393	24	82
W9RN	"	105,952	345	26	86
W9JDJ	"	81,700	312	22	73
W9GIL	"	80,376	244	22	80
K9AM	"	73,661	222	26	93
WB9EBO	"	7,650	56	19	31
K9DX	**14**	**228,927**	**601**	**32**	**105**
WA9JCO	"	162,047	456	31	100
N9MM	"	160,500	467	31	94
K9CLO	"	87,462	306	31	82
WB9LTY	"	74,470	254	31	79
K9GM	"	60,455	202	30	77
K9JDV	"	26,560	124	23	57
W9TA	"	16,058	101	20	42
WB9ZBE	"	7,314	49	16	37
WB9QPN	**7**	**19,320**	**114**	**21**	**48**
W9CL	"	17,219	104	20	47
WA9OZC	"	11,780	80	21	41
W9MVL	"	7,050	61	15	35
WB9TVN	"	3,404	42	14	23
W9LF	**3.8**	**15,620**	**146**	**19**	**36**
K9OTB	"	15,400	135	19	36
K9FN	"	6,601	80	14	27
W9BW	"	6,144	100	10	22
WB9RET	**A**	**328,987**	**512**	**95**	**174**
W9IUB	"	**205,965**	**406**	**70**	**137**
WA9AGN	"	180,600	329	72	143
W9VX	"	176,085	350	66	129
K9OAM	"	138,198	297	59	127
W9QWS	"	99,541	240	58	111
W9MHK	"	90,396	222	59	103
WB9EZQ	"	83,398	213	59	102
K9IR	"	76,296	222	48	84
K9VUW	"	49,911	387	50	77
W9HUP	"	44,928	203	38	58
K9EQY	"	42,336	166	33	63
WB9NOQ	"	38,664	174	42	66
W9UYL	"	35,028	152	44	82
W9JU	"	32,745	121	42	69
WB9IEL	"	31,512	123	36	65
W9YK	"	29,355	127	38	57
W9AIW	"	21,372	115	29	49
WB9ZVP	"	18,468	173	32	49
WB9UXI	"	16,198	77	39	50
W9PKO	"	16,082	78	39	47
W9RMA	"	14,091	79	32	45
W9YR	"	12,351	76	30	39
WB9MPH	"	12,191	73	31	42
W9DHN	"	11,712	69	30	34
WB9ISW	"	10,710	65	29	41
W9MJN	"	10,504	78	24	28
WB9ULO	"	9,106	62	25	33
W9UZ	"	6,902	53	24	34
WA9YPY	"	5,250	49	23	27
K9EGA	A	3,634	34	18	28
WB9LNF	"	3,256	33	12	25
K9BUR	"	1,500	19	13	17
WA9LYO	"	880	16	9	11
W9SR	**28**	**38,982**	**170**	**24**	**65**
WB9WNG	"	35,392	190	23	56
W9UO	"	27,406	149	20	51
WB9OTA	"	8,379	70	17	32
K9NN	"	1,428	25	10	11
WB9RRA	**21**	**141,616**	**473**	**24**	**82**
K9LUZ	"	94,500	340	25	80
WA9FSQ	"	62,134	252	26	68
W9SML	"	56,202	249	24	63
K9GT	"	46,013	189	23	66
WB9HAI	"	45,528	198	23	61
WA9YEF	"	1,740	21	11	19
W9FO	**14**	**83,916**	**299**	**29**	**79**
W9LGW	"	75,036	276	33	78
K9STF	"	34,200	177	22	54
W9RIC	"	6,360	52	20	33
W9SD	**7**	**19,656**	**103**	**25**	**53**
N9RF	"	11,375	67	22	43
K9AT	"	4,646	44	15	31
WA9TKJ	3.8	817	21	8	11

ALASKA

KL7IUN	**A**	**430,944**	**1314**	**54**	**80**
KL7AF	"	103, 306	480	44	50
KL7GRP	**21**	**150,370**	**1122**	**22**	**33**
KL7GN	"	26,520	576	10	10

BAHAMAS

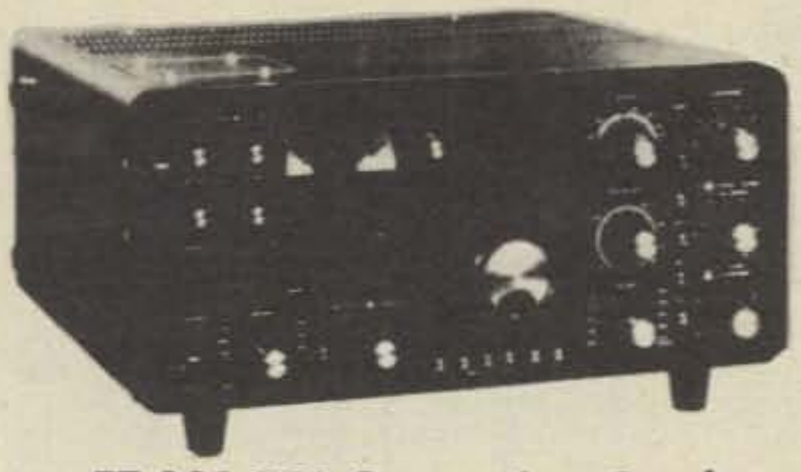
C6ABC	**A**	**325,748**	**1084**	**55**	**93**
					(Opr. K4IIF)

BARBADOS

8P9A	**14**	**963,263**	**2657**	**36**	**125**
					(Opr. 8P6AH)

BELIZE

VP1AJ	**A**	**949,914**	**2402**	**77**	**112**
					(Opr. N5UR)



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BRITISH VIRGIN IS					
VP2VDH	A	2,919,312	4530	82	209
				(Opr. N6CW)	
CANADA					
CK1HH	14	746,760	1891	32	115
CK1CM	"	109,800	422	25	65
VO2AB	14	295,290	1469	20	65
VE1AI	A	694, 792	1032	79	187
VE1AIH	"	546,345	760	76	209
CJ1EJ	"	34,650	222	22	48
CY1BDT	"	25,186	113	31	67
WB2RLK/VE1	28	236,946	1050	23	78
VE1BBO	"	276	25	3	3
VE1MX	14	147,618	450	31	87
K2SQM/VE1	"	5056	29	16	23
VE1EP	"	1150	20	6	17
VEAYU	A	376,740	760	65	145
VE2WA	"	4888	36	22	30
VE2DZO	3.8	6230	311	5	5
VE3CEF	A	418,176	768	68	148
VB3ICR	"	344,655	738	60	147
VE3DLR	"	210,715	291	58	127
VE3CMV	"	119,340	294	51	102
VE3GCE	"	69,355	180	49	94
VE3MV	"	65,178	252	27	75
VE3BTQ	"	59,180	196	41	69
VE3BR	"	45,493	180	25	72
VE3FEA	"	38,112	178	37	59
VE3NE	"	34,524	106	49	77
VE3YV	"	5537	48	15	34
VE3JAY	28	3888	43	12	24
VE3BBH	21	583,737	1716	28	105
CY3HGN	"	344,277	1109	27	96
VE3IKN	"	126,920	515	25	70
CY3FFA	14	471,270	1447	35	105
VE3NCT	"	466,072	1297	35	114
				(Opr. VE1AL)	
CY3HHS	"	124,149	594	25	62
VE3PET	3.8	99,134	638	23	50
				(Opr. VE3BWK)	
VE3ECP	"	40,515	562	14	23
VE3BBN	1.8	1903	86	6	5
VE4RRC	A	869,945	1388	78	179
				(Opr. VE4EA)	
VE4RP	"	207,834	731	56	78
VE4MP	"	63,894	180	52	86
VE4AE	"	18,648	119	33	39
VE4SK	"	6195	61	11	24
VE4XJ	14	112,632	398	29	85
VE5DX	A	1,396,122	2298	90	183
VE5AAO	28	44,572	498	17	27
CY6WQ	A	820,870	1357	76	154
VE6MP	"	584,268	1330	62	119
VE6AGV	"	240,856	782	45	74
K7LUH/CY6	"	155,106	577	52	74
VE6AHM	"	6594	90	24	18
VE6KW	14	186,780	704	29	81
VE6AQ	"	129,759	479	32	79
CY7CC	A	1,654,792	2727	91	171
VE7WJ	"	851,691	1700	82	137
				(Opr. WA7UQV)	
VE7CMD	"	126,900	532	44	64
VE7DXC	"	115,947	377	47	70
				(Opr. VE7WJ)	
VE7CMC	"	105,792	506	37	50
VE7AQR	"	67,260	394	22	37
VE7BSM	"	4982	46	23	24
VE7AEA	28	8760	98	17	23
VE7IQ	21	12,544	183	13	15
CJ7BC	14	617,442	2132	30	92
VE7AQF	"	220,304	932	30	68
VE7AV	"	119,232	494	28	64
VE7AZC	"	37,080	215	20	40
				(Opr. VE7DLM)	
VE8AS	14	10,605	119	11	24
CAYMAN IS.					
ZF1SV	A	1,413,030	2893	71	151
ZF2BB	1.8	108	18	2	1
DOMINICAN REPUBLIC					
HI8MOG	A	371,925	1199	46	99
HI8RRD	"	171,336	699	41	80
HI3XEA	21	66,799	447	23	44
HI8BMC	14	112	5	4	4
HI8EPS	7	49,822	445	19	41
HI8JAG	1.8	182	14	3	4
GREENLAND					
OX3RA	A	40,768	185	37	61
OX3AB	"	22,695	120	31	54
WB7AQP/OX	14	7.125	119	12	13
GUANTANAMO BAY					
KG4TS	A	1,201,060	2464	70	160
KG4EP	28	46,760	381	18	38
GUATEMALA					
TG8NE	A	139,920	536	46	74
MEXICO					
4A1HR	A	828,223	1946	67	120
XE1VV	"	802,400	1721	76	124
XE1XF	"	135,641	998	24	35
6D1LCH	28	100,205	1004	19	30
XE1LLS	21	142,260	979	19	41
PUERTO RICO					
KP4WI	A	501,510	998	74	155
KP4FGH	"	405,309	1098	50	117
KP4EGO	"	249,966	699	51	111
KP4DSD	28	324,967	2189	19	52
KP4DKX	"	188,404	927	24	52
KP4AM	"	64,050	874	11	24
KP4RF	3.8	245,549	986	25	88
STE PIERRE ET MIQUELON					
FP8DX	A	1,153,166	1639	85	202
TURKS AND CAICOS					
VP5MB	A	176,517	870	33	61
ASIA					
CYPRUS					
5B4HF	A	789,446	1248	50	167
INDIA					
VU2DK	A	1,230,570	1381	88	251
VU2ACD	14	95,979	350	32	75
VU2GO	"	15,912	104	24	48
IRAN					
EP2SV	A	1,291,677	1575	91	232
EP2NC	14	36,244	243	11	41
EP2DT	3.8	3,328	43	10	22
ISRAEL					
424KX	28	63,516	280	23	56
4ZIØTA	14	11,890	99	12	29
JAPAN					
JA1BK	A	893,325	1125	98	179
KA2DX	"	589,356	974	81	133
JE1SSE	"	420,413	725	73	129
KA6DX	"	261,785	481	80	125
JA6CNL	"	249,893	437	75	125
JH1ESR/2	"	172,516	361	69	103
JA6WSB	"	160,059	354	61	98
JA8SW	"	155,144	330	68	104
JJ1MZH	"	101,270	381	35	60
JA6JRI	"	86,784	274	45	68
JAØVHI	"	72,423	225	55	61
JA7KCD	"	70,584	250	44	58
JR3XEX	"	65,940	227	48	57
JA8KNE	"	56,910	193	39	66
JA5CEK/6	"	56,264	208	45	59
JA1SGU	"	50,808	198	38	49
JA1IZ	"	46,686	170	35	58
JA1BNN	"	33,027	123	49	52
JA7BAL	"	31,486	126	35	56
JAØFMB	"	27,888	114	36	48
JA9JBK	"	27,132	125	35	41
JA7BSK	"	24,840	381	13	10
JR2JZR	"	21,320	125	30	35
JA4ZQA	"	15,288	80	40	44
JE1YTE	"	14,326	95	29	29
JA9CWJ	"	10,230	69	27	28
JA1PUK	"	9,158	81	20	18
JR1LEV	"	8,232	69	22	27
JA8FBM	"	6,440	41	20	21
JA8BWE	"	6,176	66	14	18
JH6KXG	"	5,768	38	24	32
JH4JLT/2	"	4,292	41	18	19
JA7JNF/1	"	1,792	26	14	14
JA6JVR	"	1,748	28	10	10
JA2BGX	"	1,595	21	14	15
JAØXWE	"	1,449	23	10	11
JH1OEL	"	1,200	25	11	9
JA3ELU	"	976	21	8	8
JA4POX	"	496	11	8	8
JA1BNW	"	400	9	7	9
JH4FIU	"	45	3	2	3
JH1AJT	28	117,844	612	26	42
JA2DYI	"	107,712	546	26	42
JR1IJV	"	102,960	552	25	40
JA3PJL	"	93,784	435	29	47
JA2JSF	"	92,288	551	24	40
KA6JC	"	47,372	335	21	31
JA1DQT	"	42,300	256	23	37
JA7MVX	"	38,760	263	21	30
JH6RIM	"	37,510	215	26	36
JA1MYW	"	36,848	227	22	34
JA3XRC	"	33,814	212	23	35
JH1ARC	"	25,992	163	23	34
JI1HHX	"	21,050	145	20	30
JF1SCB	"	19,236	161	18	24
JH2WIC	"	13,280	114	18	22
JR6EXN	"	12,956	119	17	24
JF3GKE	"	10,058	83	19	28
JA7CUK	"	6,400	69	14	18
JA1CFJ	"	5,597	69	13	16
JJ1RDX	"	5,292	66	12	16
JHØEQN	"	4,830	59	12	18
JF3KNQ	"	4,228	52	12	16
JH7BRG	"	2,784	40	11	13
JF3NTS	"	2,261	44	9	10
JR7AEB	"	1,870	30	11	11
JA3NPL	"	1,800	26	11	14
JH6WHN	"	1,764	31	10	11
JH3UBF	"	1,725	39	8	7
JH2BUF	"	1,160	22	10	10
JA1ABU	"	1,050	35	5	5
JAØFB	"	126	7	2	4
JG1WRN	"	24	2	2	2
JA6LLO	21	373,752	1101	32	84
JH1DEV	"	255,496	822	33	76
JH1XYB	"	247,401	853	31	68
JR1MTQ	"	151,300	593	27	62
JH2MYN	"	132,270	563	28	58
JA7QVI	"	125,120	620	22	46
KA6KN	"	108,944	471	28	60
JA7HMZ	"	97,016	492	26	41
JA1FIJ	"	71,368	282	30	58
JA1SHC	"	71,040	386	24	40
JA1GSK	"	49,000	252	26	44
JH4IFF	"	48,645	249	24	45
JI1CKQ	"	46,748	279	22	36
JE1AYU	"	44,004	266	25	32
JF1SEK	"	41,211	250	22	35
JE3TYR	"	37,098	234	19	35
JR3CVO	"	22,724	168	21	25
JAØWUU	"	22,344	182	18	24
JA7JND	"	21,715	176	18	25
JA1OHZ	"	20,205	156	18	27
JH2HFD	"	19,769	130	22	31
JA1UNT	"	18,772	177	18	19
JAØVBJ	"	17,546	195	14	17
JA4XKL	"	15,700	112	22	28
JA1EM	"	14,898	131	18	21
JH7MTK	"	12,012	104	17	25
JA5VNI	"	11,972	105	17	24
JR3CVJ	"	11,466	94	18	24
JA5XFS	"	8,892	83	18	21
JH7CUU	"	7,801	93	13	16
JA5VOB	"	5,520	66	16	14
JR3LFP	"	5,125	71	12	13
JA9SOT	"	4,408	53	13	16
JI1VTD	"	3,820	66	10	10
JA7MYL	"	3,192	80	9	5
JA1KAW	"	2,464	55	9	7
JH7IMX	"	2,214	30	14	13
JI1DVM	"	540	18	5	5
JF3HZW	"	468	12	8	5
JE3JDJ	"	432	15	5	7
JH4CDN	"	378	21	3	3
JE3FSD	"	162	6	4	5
JE3SDM	"	140	11	2	3
JA9RCX	"	56	4	4	4
JR1OYL	"	36	3	2	2
JAØTVA/1	"	12	2	1	1
JA8BMK	14	299,956	849	35	89
KA6RR	"	211,275	586	35	100
JA8AXV	"	209,616	552	34	98
KA6KJ	"	196,352	561	34	94
JA1SKE	"	125,745	442	30	71
JA1RDW	"	114,639	380	32	71
JA4ZU	"	100,500	356	32	68
JG1PGJ	"	98,190	386	30	60
JA1ISA	"	67,620	254	30	62
JH3XCU	"	65,455	247	28	67
JAØSC	"	55,693	242	29	54
JH4AAG	"	50,904	223	29	55
JA4CZM	"	45,524	216	26	50
JA1PEJ	"	37,367	178	27	52
JA9FOR	"	35,624	170	27	46
JA1OHD	"	33,777	149	28	53
JA9SV	"	32,802	163	27	44
JA6CM	"	30,426	163	28	38
JA1BUI	"	26,488	173	23	33
JA4VMU	"	21,240	128	27	33
JA2OJ	"	14,649	88	22	35
JA1AAT	"	11,385	79	20	35
JA1MZM/7	"	9,684	91	16	20
JA5FDG	"	4,720	50	18	22
JA6GFJ	"	4,400	38	15	25
JA3BIP	"	3,572	36	10	28
JH6WRW	"	3,500	47	15	20
JA3MFE	"	3,280	33	18	23
JA6YY	"	2,852	35	15	16
JE1BQE	"	2,726	36	13	16
JA2XGZ	"	2,700	39	15	15
JAØGZ	"	1,950	29	11	15
JAØCRK	"	1,302	27	11	10
JA6BD	"	1,224	19	11	13
JA5AF	"	693	16	10	11
JA2HUN/1	"	220	12	6	5
JA4AQR	"	135	7	5	4
JR2BDF	"	105	8	3	4
JA1RDP	"	54	3	3	3
JA2BAY	7	102,168	404	27	61
JH2TYH	"	2,108	41	11	9
JE1PFD	"	351	11	6	7
JE2LMG	"	272	10	8	8
JA1KXT	"	42	4	4	3
JA6BSM	3.8	13,568	256	19	34
JR1BRV	"	6,902	203	14	20
JH1APZ	"	2,860	110	12	14
JAØDAF	"	2,024	88	12	11
JA4BKL	"	1,872	78	11	13
JA1XF[illegible]	"	1,180	59	9	11
JH1WLA	"	448	28	6	10
Korea					
HL9KL	14	81,954	545	30	57
HM1EA	"	25,308	198	25	32
Macao					
CR9AJ	A	493,122	1447	68	131
				(Opr. W6AQ)	
Malaysia					
9M2DQ	A	200,992	616	58	118
9M2MW	"	19,312	154	28	40
Mongolia					
JT1AN	A	22,875	277	24	37
JT1BK	14	14,948	340	16	21
ASIATIC USSR					
ARMENIA					
UG6GAF	21	129,806	611	22	60
UG6LQ	14	87,616	428	17	57
ASIATIC RUSSIA					
UA900	A	533,788	1031	66	162
UA9TS	"	224,480	492	52	132
RA9CAS	28	9,976	101	16	27
RA9CIU	"	9,576	99	17	25
RA9ODC	"	6,640	92	17	23
UA9AED	"	3,100	51	10	15
RA9CFI	"	2,968	53	12	16
UA9FCI	"	416	17	7	9
RA9FMC	"	228	13	6	6
UA9MQ	21	6,912	155	9	23
UA9ODK	14	170,104	793	27	61
UV9WF	"	72,400	332	23	57
UA9AAP	3.8	15,990	144	9	32
UAØPJ	A	54,340	381	27	49
UAØQBB/M	"	12,768	266	17	25
UAØLFK	28	23,766	290	19	32
UAØLBU	"	11,590	131	16	32
UAØCCW	"	4,995	72	10	17
UAØSGJ	"	1,992	68	11	13
UAØUBG	"	1,891	99	6	7
UAØCBW	21	47,554	535	21	38
UWØIX	14	256,347	1144	28	63
UAØSAU	"	188,976	825	27	66
UAØABC	"	137,655	519	30	75
UAØBAC	"	133,912	642	23	53
UAØSB	"	126,126	626	27	64
UVØEX	"	60,947	638	25	34
UWØLF	"	9,555	174	18	21
AZERBAIJAN					
UD6DER	A	3,500	34	14	21
GEORGIA					
UF6VAG	A	1,457,636	1638	78	229
UF6DZ	14	58,926	313	19	50
UF6OAC	3.8	21,465	177	8	37
KAZAKH					
UL7OAO	A	744,464	1011	80	209
UL7CT	"	145,792	422	35	99
UL7PCK	28	30,814	271	19	43
RL7PCB	"	25,875	227	17	52
UL7GBP	"	9,633	179	17	22
UL7PBY	"	8,280	112	17	28
UL7EAF	"	5,134	82	14	20
UL7TAC	"	2,064	53	10	14
UL7TA	"	121	7	5	6
UL7QH	21	159,732	737	27	75
UL7YR	"	64,092	283	26	58
UL7EAJ	14	383,001	1160	35	94
UL7WI	"	242,634	982	32	77
UL7IBC	3.8	36,608	255	10	42
KIRGHIZ					
UM8MBW	A	173,375	652	38	87
UM8NNN	"	147,684	484	40	84
TADZHIK					
UJ8JCL	A	792	13	11	13
UJ8JCQ	28	20,577	224	21	36
TURKOMAN					
RH8EAA	28	29,648	204	22	46
UZBEK					
UI8IAR	28	3,885	39	13	24
EUROPE					
AALAND IS					
OHØNE	A	26936	169	25	49
OHØNJ	"	476	11	7	10
AUSTRIA					
OE5CWL	A	432055	1022	49	172
OE1SBA	"	7070	48	27	43
OE1ZGA	21	251724	760	30	102
OE1LPW	14	14616	109	17	55
BALEARIC ISLANDS					
EA6BD	A	5,452	94	13	34
BELGIUM					
ON4XG	A	172,056	427	56	158
ON5HU	"	156,310	580	39	106
ON5KH	"	114,075	430	42	127
ON6GB	"	83,590	423	32	98
ON6AH	"	76,791	293	44	99
ON6QS	"	54,496	354	27	77
ON4UN	14	891,780	1931	39	139
BULGARIA					
LZ2JA	A	276834	796	59	163
CORSICA					
FC9UC	14	689,128	2407	38	126
CZECHOSLOVAKIA					
OK2RZ	A	1414100	1634	96	299
OK2BLG	"	325619	701	53	199
OK1IQ	"	167370	520	52	158
OK1KZ	"	158,860	622	42	146
QK1DA	"	158650	501	48	142
OK2JK	"	152280	528	41	121
OK3KWK	"	73406	389	37	90
OK1DDS	"	61256	292	36	116
OK2PEQ	"	60000	296	29	96
OK1EP	"	35,424	171	35	109
OK1AGI	"	30015	220	32	83
OK1OXP	"	27454	260	19	55
OK3YCA	"	21252	203	18	74
OK2BEF	"	16280	170	18	56
OK2BJU	"	11288	107	23	60
OK1DKS	"	7296	77	18	46
OK1VE	"	6634	62	20	42
OK2PBG	"	5040	73	44	16
OK2BBJ	"	1320	24	9	13
OK2LN	"	360	11	6	14
OK2SPS	28	5103	111	11	27
OK1DVM	"	2739	76	7	26
OK1DH	"	416	16	5	11
OK1AVU/P	21	512787	1506	34	89
OK3TAB	"	110983	473	28	61
OK1IMP	"	109275	567	24	51
OK2QX	"	79876	391	21	55
OK3EA	"	55842	250	26	56
OK1ASQ	"	38284	227	18	50
OK1PCL	"	6314	64	12	29
OK2BPK	"	792	24	9	13
OK1FV	14	163959	607	30	93
OK1AJN	"	8639	125	11	42
OK1JST	"	7644	118	9	49
OK1DMM	"	5040	60	14	26
OK1FT	"	4914	78	12	30
OK3CFS	"	4687	75	12	31
OK3KMW	"	380	19	5	15
OK3TOA	7	9030	207	6	37
OK3CFA	"	8148	187	7	35
OK1AGN/P	3.8	29484	413	12	51
OK2HI	"	11520	247	8	39
OK3YCL	"	11092	225	8	39
OK1AFB	"	9984	259	7	32
OK2SEO	"	8,901	208	8	35
OK3WM	"	4950	66	13	37
OK1EV	"	4950	198	4	21
OK2SSS	"	4305	116	8	27
OK1AIJ	"	1596	77	4	17
OK1MIZ	"	510	32	4	13
DENMARK					
OZ5EV	A	479,736	1047	57	158
OZ5ZY	"	162,771	492	50	111
OZ5QU	"	41,422	194	37	112
OZ5BS	"	21,867	112	36	75
OZ1ZE/P	"	18,124	102	28	64
OZ1BAN	"	14,504	121	22	52
OZ4HW	"	14,144	92	31	73
OZ1AVV	"	3,926	40	10	16
OZ3KE	"	544	12	9	8
OZ2BM	21	21,952	167	20	36
OZ9FM	14	378	15	5	13
OZ6PI	"	234	14	4	2
ENGLAND					
G4CLK	A	192,400	481	55	145
G4CVZ	"	179,564	654	37	117
G3FTQ	"	89,262	522	35	136
G3JKY	"	21,746	155	24	59
G3XFW	"	4,180	41	16	22
G3MXJ	21	672,520	1807	33	103
G4EHF	"	180,948	672	27	75
G3FXB	14	668,506	1670	37	120
G3ZQW	"	535,432	1503	37	99
G3KKJ	"	147,056	725	25	76
G3VOF	"	82,080	512	26	69
G2AJB	"	11,340	146	13	41
G3KTR	7	8550	150	10	40
G4BDL	"	5809	134	8	29
G4BXT	3.8	28,073	360	13	54
G3XWZ/A	1.8	1449	68	3	18
G3YMC	"	1260	62	3	17
FAROE ISLANDS					
OY1A	A	29,832	292	21	67
FINLAND					
OH6JW	A	1357398	1620	104	274
OH1XX	"	867519	1200	104	265
OH1MA	"	212640	491	75	165
OH6KN	"	186720	458	50	110
OH6UM	"	163485	489	43	92
OF3AA	"	127626	343	53	125
OH3TY	"	116683	317	54	157
OF7SX	"	83328	376	38	90
OH2KP	"	72981	274	40	119
OF7NW	"	52734	273	36	105
OF1LF	"	32349	165	32	91
OH1SA	"	30195	183	23	71
OH5LU	"	29085	192	29	76
OH2VZ	"	12975	93	23	52
OH9PH	A	11590	95	23	38
OH7TD	"	7884	76	19	54
OH8OB	"	8400	84	18	42
OH6PI	"	8321	79	18	35
OH9TD	"	3650	46	16	34
OH5BM	"	3030	41	13	17
OH3FT	"	2484	29	15	21
OH1UR	"	484	18	7	15
OH5NW	28	42476	382	22	60
OF3TA	"	5110	133	8	27
OH1VA	"	4788	110	10	28
OH2XA	"	1595	46	7	22
OH2BAH	"	984	26	6	18
OH1KF	21	116280	478	28	74
OH2BMP	"	81858	400	23	88
OF4SL	"	70955	252	29	86
OH1HB	"	67725	275	26	79
OH5XL	"	49734	288	21	60
OH2PQ	"	44540	271	23	62
OF3MF	"	10258	93	13	33
OH5PA	"	8642	61	18	40
OF3NJ	"	5280	57	12	28
OH6UJ	"	612	12	6	11
OH1TD	"	323	12	6	18
OH1JW	"	148	13	7	8
OF7PI	14	539250	1782	32	93
OF7SQ	"	11616	144	11	43
OH2JQ	"	11169	144	11	43
OH6VV	"	3900	50	14	36
OF1MQ	"	2886	50	9	28
OH8RQ	"	2695	42	10	25
QH2BCD	"	2610	39	13	16
OH3CJ	"	1400	48	8	17
OH8SR	7	99000	486	31	69
OH2BO	1.8	1520	88	4	15
OHØRJ	"	126	29	2	3
FRANCE					
F6DIM	A	1,300,070	1886	70	220
F6EXQ	"	202,014	570	49	132
F8WE	"	191,340	615	46	134
F6DDP	"	128,700	413	52	128
F6CAX	"	108,540	514	29	105
F5IN	"	94,316	336	40	106
F6DZU	"	78,360	399	33	87
F6DLM	"	72,393	224	47	130
F8BVB	"	71,953	352	33	100
F5HZ	"	43,608	202	21	58
F6DEW	"	40,086	167	36	72
F8TM	"	34,500	177	34	58
F6BFH	"	24,190	160	26	56
F6BJA	"	22,386	98	37	44
F5RD	"	17,172	196	17	64
F6DRP	"	16,450	131	21	49
F6BFH/M	"	7,884	72	17	37
F6CYV	28	3,332	48	13	20
F2SI	21	613,050	1721	34	100
F6KED	14	148,465	669	29	86
F6ARC	7	21,899	195	17	44
GERMANY (FRG)					
DJ4PT	A	2,100,886	2177	111	308
DK8FZ	"	1,635,375	1982	88	287
DJ6QL	"	1,467,393	2002	88	229
DA1UM	"	1,307,446	1529	88	241
DL8UI	"	1,204,518	1515	92	265
DK5AIA	"	612,680	1082	74	194
DK8NG	"	432,864	692	82	242
DJ4P1	"	422,466	586	92	254
DK3GI	"	336,936	536	78	225
DL8FL	"	276,125	816	38	79
DL7RT	"	274,476	581	73	194
DL8YR	"	244,212	551	68	214
DF2RQ	"	227,040	570	59	161
DJ9MH	"	147,395	478	58	147
DJ7XB	"	133,216	320	57	124
DF2RG	"	121,792	386	44	129
DJ2UU	"	102,220	344	50	140

DJ3ST	"	78,300	250	46	134
DJ0UP	"	71,820	219	55	134
DF3TJ	"	71,371	355	37	112
DA1BD	"	55,860	218	45	95
DF2KD	"	54,036	251	32	82
DK8AX	"	49,980	263	36	104
DL1YA	"	44,660	188	38	107
DF4KA	"	30,821	162	34	85
DK5KJ	"	21,600	138	30	78
DK8KC	"	20,700	141	28	64
DA1EG	"	15,800	113	24	55
DF1FH	"	8,757	78	21	42
DK9IP	"	3,192	27	18	24
DK3SN	**28**	**26,320**	**154**	**16**	**54**
DL1KS	"	1,764	46	7	21
DK0ZZ	**21**	**457,800**	**1577**	**25**	**80**
			(Opr. DK5WMA)		
DL0BQ	"	304,902	1014	28	89
			(Opr. DK3ZC)		
DK1QH	"	250,512	905	26	76
DJ0XT	"	**61,100**	**260**	**28**	**66**
DL9XN	"	**57,950**	**272**	**25**	**70**
DL1RB	"	**20,945**	**183**	**18**	**41**
DK4HD	"	**1,848**	**28**	**118**	**17**
DK1FW	**14**	**589,245**	**1386**	**38**	**125**
DK8FS	"	**137,391**	**504**	**29**	**94**
DJ3BZ	"	**2,511**	**47**	**8**	**19**
DK3FB	**7**	**145,665**	**785**	**31**	**104**
DK5WQ	"	2,016	72	4	24
DK5WL	**3.8**	**58,539**	**619**	**16**	**63**
DJ2YP	"	24,070	357	11	47
DA1GF	"	14,586	318	9	42
DA1QO	"	10,812	201	7	44
DJ8WLA	**1.8**	**3,125**	**143**	**4**	**19**
DJ6TK	"	2,562	126	3	18
DJ6RX	"	1,035	73	3	12
DJ2YE	"	559	48	2	11
GERMANY (GDR)					
DM4RDA	**A**	**361,680**	**887**	**98**	**163**
DM2BJJ	"	265,644	669	59	165
DM4WFF/P	"	98,136	374	34	107
DM2ARA	"	90,272	319	41	83
DM5YVL	"	70,532	308	40	114
DM4BK	"	55,640	297	28	102
DM2CBB	"	53,500	276	32	75
DM3VAA	"	48,258	310	29	97
DM3EA	"	39,688	158	42	79
DM3BF	"	23,858	273	15	64
DM2COJ	"	18,655	170	18	73
DM3WMJ	"	16,633	80	37	62
DM3BE	"	16,350	124	24	51
DM2FQN	"	10,458	81	20	43
DM3CF	"	5,300	67	15	38
DM3UNL	"	4,418	78	18	29
DM3TYF	"	4,350	76	12	38
DM2FBN	"	3,434	47	13	21
DM5IG	"	1,890	39	11	34
DM4YUL	"	1,107	44	6	21
DM4SDA	"	154	6	5	6
DM4OLG	**28**	**11,712**	**138**	**15**	**46**
DM2CDL	**21**	**186,964**	**748**	**25**	**73**
DM3EL	**14**	**22,265**	**227**	**18**	**55**
DM2FEN	"	7,774	110	10	36
DM2FLN	"	5,699	100	8	33
DM2BDN	"	1,827	39	10	19
DM3YA/DM2CFA					
	"	972	26	8	19
DM3KK	7	5,700	148	7	31
DM2BPB	"	3,420	120	4	26
DM3WDJ	"	1,450	58	3	22
DM2AOM/A					
	"	1,058	41	5	18
DM2DLE	"	35	6	2	5
DM4WPF	**3.8**	**22,176**	**379**	**11**	**45**
DM3VMJ	"	17,490	320	10	43
DM3ZEN	"	12,384	245	8	40
DM3ZBJ	"	10,371	265	6	33
DM3VGC	"	10,305	254	6	39
DM3XPE	"	10,019	255	7	37
DM3SGC	"	6,942	178	6	33
DM4NDJ/P					
	"	2871	89	5	28
DM2CDH	"	2,652	80	5	29
DM5TNH	"	2,075	83	4	21
DM2AUJ	"	1,980	64	6	24
DM4WKF	"	714	34	5	16
DM2FKL	"	540	33	4	14
DM6AF/5WGL					
	"	49	11	2	5
DM2CFA	"	35	8	2	5
GREECE					
SV0WA	**21**	**50,850**	**372**	**20**	**55**
SV1GA	**14**	**266,752**	**1308**	**31**	**100**
HUNGARY					
HA0DU/9					
	A	**374,187**	**914**	**61**	**92**
HA0KLU	"	164,000	594	47	158
HA1ZD	"	34,230	226	27	78
HA0HW	"	8,000	98	20	44
HA6NP	28	4,000	83	10	30
HA5KDQ	**7**	**82,834**	**629**	**22**	**61**
HA5MX	"	340	19	5	12
HA4KYB	**3.5**	**37,620**	**586**	**11**	**49**
HA0KLE	"	23,760	400	13	42
ITALY					
I1NUC	**A**	**1,587,820**	**1521**	**101**	**302**
I1BAF	"	1,332,740	1553	93	277
I6NOA	"	629,525	1049	86	239
I3VJW	"	122,688	377	52	92
I2MQF	"	115,415	386	56	149
I1ZYR	"	37,948	40	20	86
I2LVN	"	5,616	242	20	32
I2CBM	**28**	**132,510**	**546**	**23**	**82**
I4DLS	"	122,930	566	24	71
I2LPA	"	76,329	325	23	76
I4USC	**21**	**867,482**	**2077**	**38**	**116**
I5NSR	"	**850,836**	**2143**	**37**	**110**
			(Opr. I4VEQ)		
I0GFP	"	137,376	558	29	79
I8ZLW	"	33,705	324	15	48
I1GPK	**14**	**600,425**	**7364**	**38**	**137**
I3HSN	"	**263,652**	**1094**	**31**	**96**
I4AFQ	"	119,556	531	24	84
I3ASK	"	20,940	285	13	47
IK5FCK	**7**	**81,774**	**651**	**23**	**76**
IK6FLD	"	73,960	650	21	65
I3BBZ	"	39,455	587	14	51
I3MAU	**35**	**69,200**	**637**	**15**	**65**
I4UVA	"	3,488	106	6	26
LUXEMBOURG					
LX1GG	**A**	**87,750**	**441**	**31**	**- 94**
MALTA					
9H1CH	**28**	**98,007**	**504**	**22**	**69**
NETHERLANDS					
PA0TAU	**A**	**78,008**	**176**	**66**	**130**
PA0CYW	"	76,032	230	59	117
PA0CLC	"	65,830	245	36	109
PA0IJM	"	44,730	250	26	100
PA0TO	"	25,330	143	30	73
PA0KHS	"	9,486	112	20	42
PA0WRS	"	5,510	74	17	41
PA0KDM	"	3,969	79	11	38
PA0BAB	"	3,952	37	17	21
PA0RRS	21	3,834	52	11	16
PA0HWM	**14**	**67,680**	**326**	**26**	**70**
PI1PT	"	21,888	217	19	57
NORWAY					
LA1NG	**A**	**598,886**	**1203**	**61**	**190**
LA6EV	"	13,552	112	26	62
LA5IH	"	8360	71	21	55
LA6XI	"	624	20	10	14
LA2DR	**21**	**20,880**	**100**	**22**	**68**
LA2ZN	**14**	**43,928**	**365**	**21**	**55**
LA4EU	"	238	17	3	11
POLAND					
SP5ALP	**A**	**126,074**	**557**	**45**	**124**
SP9BLF	"	**115,440**	**456**	**40**	**116**
SP9KDC	"	68,310	366	35	103
SP6DYD	"	38,622	216	33	90
SP9BDQ	"	38,592	201	35	99
SP7ETG	"	29,892	284	20	74
SP9CTW	"	26,691	102	36	87
SP6ECA	"	22,125	168	23	52
SP6DMT	"	19,364	147	27	67
SP1OT	"	17,711	148	24	65
SP6AYP	"	17,325	159	21	78
SP7CDG	"	16,536	122	34	72
SP2GNB	"	8,664	135	12	45
SP3CDQ	"	8,184	90	20	46
SP6HRK	"	7,616	100	19	45
SP3ADZ	"	7,020	65	13	41
SP7BFC	"	2,964	27	14	25
SP5BSG	"	2,925	54	13	32
SP6DB	"	1,224	24	12	22
SP9JBE	"	357	19	6	11
SP9AI	**28**	**26,418**	**273**	**21**	**53**
SP3GEM	"	24,696	294	24	60
SP9ADU	"	2,448	62	8	26
SP6AEG	"	1,600	33	10	22
SP5SIP	"	612	29	6	12
SP9BPE	**21**	**22,650**	**192**	**15**	**35**
SP8IMA	"	18,618	167	14	44
SP4DIM	"	10,727	109	12	35
SP1FPG/1	"	3,224	54	11	20
SP2FAP	**14**	**52,008**	**355**	**25**	**63**
SP8HXN	"	37,752	355	18	60
SP5IVC	"	23,052	207	18	50
SP6IXF	"	19,840	187	14	50
SP3BHI	"	12,600	132	15	35
SP7EXN	"	9,982	159	11	35
SP9AVZ	"	6,747	135	8	31
SP5ANQ	"	4,185	47	13	32
SP9ZD	"	4,136	65	13	31
SP8BJT	"	3,317	79	8	24
SP6GVU	"	2,356	60	7	24
SP5DUR	"	2,232	53	9	22
SP7ASZ	"	1,550	22	10	15
SP3AUZ	"	1,472	32	8	24
SP5CNF	"	1,025	23	6	19
SP9PT	"	180	8	5	4
SP3SZ	"	143	11	4	7
SP3DOI	**7**	**96,096**	**463**	**26**	**78**
SP5BAK	"	23,912	397	10	46
SP9GVT	"	8,346	207	7	32
SP9EMI	"	1,228	57	4	19
SP9EWM	"	1,125	44	6	19
SP8RJ	"	792	46	4	14
SP8YA/9	**3.5**	**29,705**	**373**	**15**	**50**
SP2DNI	"	6,440	160	7	28
SP7EBM	"	6,384	160	7	31
SP6IHE	"	3,894	126	6	27
SP9HWT	"	3,220	87	6	29
SP7IEZ/3	"	1,586	63	3	23
SP4HAT	"	990	33	3	12
SP6UK	"	180	14	3	11
PORTUGAL					
CT1QZ	**A**	**456,820**	**976**	**50**	**132**
CT1OY	"	204,468	594	35	97
CT1TM	"	81,432	290	39	78
CT50UA	"	69,509	413	21	50
CT1LV	"	58,968	253	33	51
CT1IR	"	7,896	122	18	29
CT7AL	**21**	**109,120**	**855**	**13**	**42**
CT1DF	14	12,192	152	11	21
CT4GO	**3.8**	**28,101**	**269**	**13**	**44**
ROMANIA					
YO3AC	**A**	**265,468**	**698**	**68**	**198**
YO6AWR	"	193,630	619	47	123
YO9VI	"	137,992	531	45	143
YO6KBM	"	59,280	380	34	96
YO5AT	"	10,366	118	21	52
YO7APM	"	9,804	112	23	53
YO8KGP	"	9,315	125	20	49
YO6AJI	"	8,349	93	25	43
YO8KGW	"	2,040	58	12	22
YO8KGE	"	1,280	39	11	21
YO8BDQ	"	1,050	45	8	17
YO3JW	28	2,769	27	16	23
YO4AYE	**14**	**21,248**	**237**	**13**	**51**
YO3JU	"	180	7	5	7
YO6VZ	**3.8**	**5,848**	**170**	**6**	**28**
YO8BDA	"	4,608	109	7	29
YO6LV	"	520	16	6	14
SARDINIA					
IS0MVE	**A**	**293,880**	**931**	**46**	**140**
IS0PJP	**14**	**84,096**	**537**	**24**	**72**
SCOTLAND					
GM3BCL	**A**	**64,629**	**274**	**37**	**92**
GM3SSB	"	25,740	131	29	81
GM4CHX	21	4,004	77	9	17
GM3XNJ	**14**	**29,990**	**217**	**16**	**58**
SICILY					
IG9SKO	**28**	**651,904**	**1718**	**29**	**99**
IT9KZW	11	220,700	1106	24	76
IK9LMK	**21**	**130,900**	**786**	**28**	**82**
IT9MPR	**14**	**151,340**	**609**	**30**	**85**
SPAIN					
EA1PT	**A**	**1,163,480**	**1515**	**84**	**256**
EA7GF	"	389,803	761	69	182
EA3OJ	"	146,484	513	27	90
EA3NA	"	131,569	336	62	137
EA3AOO	"	21,900	168	23	52
EA2LY	28	4,686	62	22	40
EA2IA	**14**	**60,435**	**400**	**21**	**58**
EA3VM	**3.8**	**7,850**	**122**	**12**	**38**
SWEDEN					
SM3BIZ	**A**	**277,065**	**650**	**61**	**74**
SM5CSS	"	68,585	293	39	106
SM7BYP	"	61,887	199	47	100
SK4EA	"	41,944	222	27	71
SM7AIO	"	12,600	116	20	55
SM6BXV	"	8,190	55	25	45
SM0BDS	"	3,627	55	15	24
SM7AAQ	"	1,824	42	5	14
SM4AZD	"	805	22	9	14
SM5ERK	28	5,070	111	11	28
SM7GFE	"	4,403	76	11	26
SM0HO	"	2,090	55	13	25
SM5DUS	"	756	27	6	12
SM7ABL	21	21,603	135	19	38
SM5CAK	"	14,280	240	5	15
SM5RE	"	4,585	75	11	24
SM0KV/0	"	336	14	5	9
SM5AD	**14**	**370,778**	**1190**	**33**	**101**
SM4BNZ	"	294,998	1074	30	91
SM3DSP	"	156,472	661	29	80
SM2HZQ	"	241,114	379	17	44
SM0AJU	**7**	**30,033**	**313**	**18**	**53**
SWITZERLAND					
HB9LP	**A**	**337,212**	**2204**	**41**	**112**
HB9BGI	"	82,075	270	51	124
HB9DX	21	22,236	87	27	82
HB9BAM	**14**	**309,684**	**1229**	**36**	**54**
HB9UD	"	1,950	50	7	19
WALES					
GW3GHC	**28**	**32,706**	**327**	**18**	**51**
GW3SLA	**14**	**50,102**	**364**	**19**	**63**
GW3MPB	"	21,024	175	15	57
YUGOSLAVIA					
YU1NZW	**A**	**70,125**	**274**	**45**	**142**
YU3EY	"	65,096	276	45	113
YU3TEW	"	47,424	220	37	115
YU3TPM	**28**	**110,094**	**491**	**26**	**92**
YU1EXY	"	104,766	541	29	85
YU2CAW	"	37,290	266	23	66
YU3TXT	"	30,876	243	22	61
YU2CBK	"	27,145	147	24	65
YU2CBV	"	22,575	148	23	52
YU4VBR	"	3,738	66	14	28
YU1NZR	"	414	.1	8	10
YU3ZV	**21**	**1,047,321**	**2483**	**36**	**113**
YU2HS	"	**843,594**	**2290**	**33**	**105**
YU1OBA	"	196,030	716	28	87
YU2CER	"	26,544	197	19	29
YU4FRS	**7**	**54,614**	**478**	**19**	**64**
EUROPEAN USSR					
BYELO RUSSIA					
UC2IJ	21	14,465	165	13	42
UC2AFA	**14**	**296,604**	**1268**	**34**	**92**
UC2WBT	3.8	3,857	114	6	23
ESTUNIA					
UR2RJ	**A**	**507,064**	**1128**	**66**	**197**
UR2IP	"	5,778	63	17	37
UR2JL	**28**	**11,750**	**198**	**14**	**36**
UR2TAX	"	10,865	153	14	39
UR2RAM	"	2,440	78	7	23
UR2TAB	"	1,824	71	6	18
UR2AR	**21**	**223,375**	**313**	**30**	**95**
UR2FQ	**14**	**358,878**	**1282**	**34**	**95**
UR2QA	"	60,630	388	30	64
UK2RAT	"	16,438	214	14	40
UR2RCU	"	1,590	19	13	17
UR2FU	**7**	**24,695**	**385**	**12**	**43**
UK2RAX	"	2,160	74	5	22
UR2RCN	**3.5**	**20,852**	**362**	**9**	**43**
UR2CW	"	714	32	5	16
EUROPEAN RUSSIA					
UA3DFK	**A**	**500,055**	**1022**	**68**	**197**
UA3TN	"	75,508	245	48	124
UA3DDF	"	63,767	366	34	87
UA4FAG	"	60,000	271	40	90
US6AJG	"	59,214	258	30	103
UA4DK	"	21,240	144	15	57
UA6LED	**28**	**51,142**	**318**	**25**	**66**
UA6WAI	"	40,257	257	23	40
RA4HDE	"	16,600	144	19	31
UW6FC	"	13,279	130	17	32
RA3ALQ	"	13,150	139	15	35
UV3CE	"	11,336	155	16	36
UA3YBO	"	6,930	104	13	29
UA4WPF	"	3,690	71	12	18
RA3AKX	"	2,744	40	10	18
UW6DR	**21**	**190,185**	**906**	**25**	**68**
UW3FW	"	136,895	603	24	71
UW3HV	"	119,794	591	24	65
UW3EQ	"	54,126	314	25	68
UA3AEW	"	22,542	183	16	35
UA6LBQ	**14**	**258,125**	**1117**	**35**	**90**
UA6HZ	"	222,456	1003	34	90
UW1AE	"	199,892	855	32	89
UA3XAX	"	126,936	614	22	60
UA1AAP	"	67,080	473	21	65
UA4CZ	"	26,767	234	19	52
UA4FAR	"	16,925	219	15	42
UA4CO	"	9,348	99	11	46
UA3WZ	"	5,920	102	8	32
UV3CS	"	495	15	3	11
UA1DZ	**7**	**112,615**	**668**	**30**	**71**
UW3RR	"	10,516	206	9	32
UA4ACD	"	2,516	52	8	26
UA4PW	**3.8**	**19,688**	**251**	**11**	**35**
UA6LLT	"	11,033	177	8	39
UA3EAL	"	9,633	200	8	31
UA4FAO	"	9,102	165	8	33
UA1AGL	"	1,083	50	5	14
KALININGRAD					
UA2WJ	**A**	**204,798**	**534**	**51**	**163**
UA2EC	"	81,345	257	50	115
UA2FBZ	**14**	**38,115**	**308**	**21**	**56**
LATVIA					
UQ2GDQ	**A**	**538,460**	**1143**	**67**	**193**
UQ2DV	"	33,988	195	34	82
UQ2GA	28	9,792	160	16	35
UQ2GW	"	1,708	43	8	20
UQ2HO	21	9,964	103	15	38
UQ2GFN	**3.8**	**15,708**	**313**	**7**	**37**
LITHUANIA					
UP2NV	**A**	**764,784**	**1317**	**75**	**207**
UP2CY	"	735,585	1336	77	208
UP2SA	"	659,256	1031	89	223
UP2OU	"	233,208	632	58	179
UP2BAR	"	125,296	364	49	142
UP2BBF	"	45,160	288	29	100
UP2BAW	"	14,382	108	32	70
UP2BCG	28	2,204	60	8	21
UP2BAT	**21**	**31,725**	**220**	**18**	**57**
UP2AV	"	4,305	78	11	24
UP2OM	**14**	**70,191**	**400**	**28**	**70**
UP2PT	"	26,466	242	19	47
UP2NK	**7**	**136,100**	**849**	**25**	**75**
UP2ND	"	11,603	257	8	33
UP2PBW	**3.8**	**14,040**	**334**	**9**	**39**
UP2BDH	"	53	234	6	21
MOLDAVIA					
UO5ODX	**A**	**112,470**	**490**	**39**	**124**
UO5AP	"	36,875	272	3	94
UO5BZ	21	14,310	135	15	39
UO5OAK	**14**	**26,733**	**227**	**18**	**49**
UO5GR	3.5	15	85	7	28
UKRAINE					
UB5WE	**A**	**2,025,900**	**2071**	**110**	**340**
UB5EC	"	1,535,866	2077	87	247
UY5EG	"	702,270	1190	75	195
UT5VU	"	175,932	534	44	108
UB5MEB	"	56,055	353	29	82
UB5MFY	"	53,448	275	36	95
UB5CE	"	48,384	328	32	76
UB5MAB	"	26,370	155	25	65
UB5MBN	"	11,115	143	13	44
UB5MAV	"	11,060	106	19	51
RB4IOV	**28**	**42,585**	**274**	**25**	**60**
RB5ITS	"	42,225	322	24	59
UB5VAZ	"	31,672	301	20	54
UB5GBD	"	30,448	219	24	64
UB5VCD	"	19,698	211	16	51
UB5LAN	"	16,364	178	16	41
RB5MJG	"	13,053	143	17	40
UB5ICP	"	7,950	78	18	35
UB5VCK	"	7,866	57	19	38
RB5EIZ	"	4930	110	8	26
UY5OO	**14**	**49,761**	**234**	**28**	**69**
UB5ABK	"	33,288	310	22	51
UB5ABJ	"	1,950	41	7	23
UB5OD	"	1,008	21	10	18
UB5MDD	7	40	139	9	27
UB5VBY	**38**	**15,840**	**282**	**8**	**40**
UB5XBU	"	14,976	256	9	43
UB5WAO	"	12,450	244	9	41
OCEANA					
AUSTRALIA					
VK1FT	**A**	**211,574**	**665**	**46**	**72**
VK1GM	**14**	**30,675**	**148**	**27**	**48**
VK2XT	**A**	**482,724**	**854**	**66**	**132**
VK2BJL	"	221,704	525	47	101
VK2BAM	"	15,744	88	26	38
VK2NCU	28	6,612	80	15	14
VK3ANA	A	39,798	222	28	39
VK3BBS	"	4,935	41	21	26
VK3SM	**21**	**47,744**	**264**	**28**	**36**
VK3XB	3.8	4,560	92	9	10
VK4VU	**A**	**552,050**	**1051**	**71**	**110**
VK5MF	**A**	**215,384**	**682**	**47**	**63**
VK5SW	"	131,652	671	29	40
VK5RX	"	107,000	228	47	78
VK5OR	"	13,878	95	24	30
VK5LU	"	1,862	48	6	8
VK5AB	14	10,885	69	24	41
VK5IT	"	1,472	20	14	18
VK6NE	28	7,076	84	15	14
VK7NFR	A	36	3	3	3
VK8NDK	**A**	**314,253**	**1200**	**39**	**64**
GUAM					
KG6JIA	**28**	**330,780**	**1509**	**30**	**44**
KG6JHW	**21**	**60,028**	**476**	**20**	**23**
KG6JIH	**3.8**	**108,186**	**530**	**28**	**45**
Hawaii					
KH6NO	**A**	**2,140,432**	**3600**	**77**	**126**
KH6IJ	"	1,973,950	3447	81	113
KH6DL	"	1,547,854	2573	85	124
KH6JBU	"	244,268	1041	40	39
KH6HGP	"	171,054	524	53	64
KH6IJA	**28**	**149,736**	**1008**	**19**	**32**
WB4OGP/KH6					
	"	73,200	619	18	22
KH6GMP	**21**	**360,880**	**1911**	**25**	**40**
KH46BZF	"	312,246	1847	21	36
KH6DD	**14**	**427,710**	**1371**	**33**	**73**
W6PSQ/KH6					
	"	23,112	151	19	35
KH6XX	**3.8**	**116,416**	**606**	**28**	**40**
KH6CHC	**1.8**	**1,404**	**36**	**7**	**6**
Indonesia					
YB2SV	**A**	**543,536**	**903**	**74**	**137**
YB2QV	"	15,813	101	26	37
YB0ACH	"	4,640	41	18	22
YB0ACP	**28**	**149,786**	**603**	**30**	**61**
YB2CR	21	9,000	104	9	21
YB0ACT	**14**	**620,646**	**1502**	**36**	**110**
Marshall Isl					
KX6LA	**7**	**405,678**	**1523**	**28**	**63**
New Zealand					
ZL1BOK	**A**	**1,421,856**	**1682**	**96**	**192**
ZL1BIL	"	1,152,877	1289	109	202
ZL1BOD	"	730,712	1061	94	147
ZL1AGO	"	246,960	1715	61	83
ZL2AH	"	188,576	382	52	90
ZL4IJ	"	73,843	343	36	41
ZL1TB	"	11,600	81	30	28
ZL2ACP	**14**	**252,054**	**651**	**34**	**100**
AFRICA					
CANARY ISLANDS					
EA8JJ	**21**	**766,125**	**1900**	**31**	**104**
EA8URE	**14**	**45,648**	**215**	**16**	**56**
MADEIRA ISLANDS					
CT3BD	**A**	**706,928**	**1301**	**56**	**120**
Rhodesia					
ZE3JO	A	30,030	182	9	46
ZE1BL	**28**	**364,812**	**1428**	**23**	**63**
Sierra Leone					
9L1SL/A	**A**	**3,695,580**	**2968**	**107**	**312**
SOUTH AFRICA					
ZS6WW	**A**	**661,448**	**1249**	**55**	**123**
Ogasawara Island					
JD1AIZ	A	273	7	6	7
Phillipines					
K9PNT/DU2					
	A	**162,864**	**637**	**41**	**46**
Saipan					
KG6SW	**A**	**5,114,512**	**4735**	**123**	**244**
Solomon Isl					
VR4DX	**A**	**938,616**	**1305**	**102**	**157**
SOUTH AMERICA					
ARGENTINA					
LU5EPI	**21**	**111,754**	**531**	**24**	**48**
LU4MBI	"	39,990	180	22	40
LU8FEU	**14**	**403,524**	**1047**	**32**	**100**
LU9BAL	"	342,927	995	33	84
LU1HE	"	102,690	394	28	62
BOLIVIA					
CP1AT	**A**	**147,109**	**394**	**60**	**97**
BRAZIL					
PY3APH	**A**	**1,239,833**	**1620**	**79**	**180**
PP1ZBM	"	961,306	1948	53	113
PY2BW	"	733,700	1020	83	170
PY2XB	"	276,924	693	54	87
PY7AZQ	"	235,248	474	54	120
PT2TF	"	161,590	498	43	100
PY8ZLC	"	73,568	335	30	46
PT2LS	"	63,544	259	39	55
WIOR/PY2					
	"	20,436	104	33	45
PT2HQ	"	14,580	69	31	50
PT2CD	"	7124	61	23	29
PY2FFA	"	5735	80	15	16
PY2ED	"	1798	18	15	16
			(Opr. PY1ZAE)		
PY1MAG	**28**	**657,756**	**1687**	**29**	**103**
PY2ZEM	"	168,441	635	26	65
PY1CHP	"	12,450	168	12	13
PY1DHN	**21**	**134,152**	**568**	**23**	**59**
PY4KL	"	79,024	315	26	62
PY2AN	"	16,441	149	16	25
PY1ZDK	"	1104	92	3	1
PY4OD	**14**	**694,590**	**1897**	**34**	**103**
PY4BW	"	525,560	1315	34	106
PY1ZBJ	"	154,000	391	30	70
PY1BKA	"	23,541	152	21	36
PY7DA	"	450	10	9	9
PY2ELZ	**7**	**31,616**	**180**	**21**	**43**
PY7BXC	"	7182	90	11	16
PY2FUP	"	4945	44	16	27
PY1WDO	3.8	462	12	10	11
CHILE					
N4VV/CE3					
	A	**1,318,524**	**1959**	**82**	**146**
CE3FH	"	20,235	104	32	39
CE5CN	**28**	**114,304**	**623**	**21**	**43**
COLUMBIA					
HK3DDD	7	80	4	4	4
EASTER ISLAND					
CE0AE	**28**	**203,889**	**965**	**22**	**51**
ECUADOR					
HC1BU	**A**	**3,199,386**	**3503**	**96**	**213**
HC1BI	**28**	**104,720**	**470**	**25**	**52**
NETHERLANDS ANTILLES					
PJ9CG	**A**	**6,059,580**	**4477**	**121**	**339**
PJ2FR	"	2,014,800	2285	85	215
PERU					
OA8V	**28**	**208,980**	**828**	**23**	**63**
OA8CG	**21**	**101,616**	**403**	**23**	**64**
VE2AQS/OA4					
	7	**136,138**	**574**	**25**	**61**
SURINAM					
JA1PIG/PZ					
	A	**51,543**	**233**	**33**	**50**
TRINIDAD					
9Z4NP	**A**	**2,379,861**	**2728**	**95**	**202**
9Y4LA	"	89,355	305	37	68
URUGUAY					
CX3BH	**A**	**939,689**	**1382**	**75**	**158**
CX8AR	**28**	**454,584**	**1630**	**24**	**70**
CX2CL	"	329,400	1246	25	65

(Continued on page 96)

There is very often the danger of theft or injury in connection with amateur radio. Too few amateurs have adequate insurance coverage for the unforeseen. Author Charles Burke has some very valuable information and advice about protection.

Insurance and Your Radio

BY CHARLES BURKE*, WA2SLK

The subject of insurance coverage is seldom considered until a need arises. This tends to be the case when equipment has been stolen or damaged, and a call is then made to one's insurance company. At this point it is not the time to begin examining one's coverage to see what it will or will not do for you; regrettably, this is usually the case. Insurance is a complex subject that is difficult for the average person to completely comprehend. The actual policies are written using terminology and phrases which can be very difficult to understand. The general practice is simply to ask the agent to provide coverage for which you pay a premium. Too often the actual coverage for which you have been paying is never discussed in detail. Life goes on, and you find that it is a nice feeling to know that everything is now safe and secure. It must be safe and secure . . . look at all those paid-up premiums you have now begun to collect.

It is this feeling that so many of us have until some tragedy strikes and we find it necessary to call the insurance company for help. Now we get down to brass tacks. At this point the insured party is suddenly made painfully aware of the exclusions and limitations of his policy. There are documented cases where everything is lost and the insurance pays nothing, simply because the theft or damage that was incurred had certain characteristics which placed it under one of the exclusions. At this point those same paid-up premium receipts look more and more like a rip-off. You are now mad, without a radio, and have only a bunch of receipts to play with. This is a fact of life . . . one which we should all be very much aware of.

Anyone who buys something without asking to look at it is asking for problems. There is also another side to this coin. There have recently been a number of insurance policies being offered just to cover all those unforeseen things that can happen to your radio equipment. The price looks great, and the policy is clearly explained, so why not pick it up? There is a very good reason why you might want to think twice before you buy it. It is simply a matter of possibly buying what you already may own!

It is very possible that you may already have as much coverage as these new special policies can offer, for it is included in your homeowner's and/or automobile policy. Looking over the policies, you may not see the words "radio," "transmitter," "receiver," etc., but they can be discussed in other more general terms, such as "possessions."

While attempting to gather general data for this article, it became evident that there are no simply, cut-and-dry answers to the subject of insurance and how it applies to your radio equipment. To begin with, laws vary markedly from state to state. This fact in itself means that while coverage may be available from a company in New York, it might not be available from the same company in Georgia. Along with this, there is a wide gap between the coverage being offered from company to company. Some offer what you would call complete coverage while other companies exclude them completely.

The most critical point of all is the difference in interpretation of the policy. Since words sometimes have a way of meaning different things to different people, there are many instances in which situations arise that result in disputes between the company and the policy holder. Unfortunately, these situations can and do arise, so we can't dismiss this point.

What it boils down to is this: never assume that you have adequate insurance coverage on your radio. You have a sizeable investment in all those wires and resistors, so take a good, hard look at your policy with your agent and make sure you know exactly where you stand. You can't beat investing a few minutes with your agent when you realize just how much you stand to lose if the coverage isn't there.

However, to simply sit down and ask the agent if your set is covered is by no means the best way to go about gathering the information you need to know. You should be prepared to ask specific questions. That way, the chance of having a dispute arise between you and the insurance company is reduced. So that you can do this with a minimum of effort, a series of questions was presented to a number of agents who represent several insurance firms. The questions and the general answers are listed below. It is believed they will help you understand the insurance problem as it applies to protecting your radio equipment. Look them over carefully and then call your agent.

Q. Can an insurance company change its coverage as it applies to your radio equipment at any time?

A. Yes. If insurance companies receive ever-increasing and expensive claims, they can alter their policies. However, the change will not affect you until your policy comes up for renewal. In general, there are two changeover dates: a date after which all new policies will include the revision, and a date which will cover renewal of policies. This change of coverage has taken place on a dramatic scale just within the past few years in regard to CB radios mounted in cars. Most companies now exclude them unless you pick up additional coverage just for them. Prior to this change, coverage was

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included in your policies at no additional charge.
Q. What part of the policy covers theft of the radio?
A. If the mobile radio is in a car and is stolen, the comprehensive portion of the policy will cover it. If the radio is in a home, the homeowner's policy will cover it. A radio in a boat will be covered with the boat policy under what is sometimes called hull insurance. If it is in a house trailer, the trailer insurance takes care of it. This is assuming, of course, the the insurance policy does not exclude coverage of the radio.

Q. If you fail to register the radio station with the FCC, will this have any effect upon your coverage?
A. No. You are, however, in violation of a federal law.
Q. Should the theft of a radio be reported to the police?
A. Yes. Many companies will not accept a claim unless there is evidence of an actual theft. This generates a sticky problem for the guy who reports his set stolen just to "collect" so that he can buy another unit. Reporting a theft to the police which really did not take place is against the law, and the police will prosecute those caught doing it.
Q. If insurance companies decide to change their coverage on radios, what can they do?
A. There are three things an insurance company can do. First, they can simply raise their rates to bring in the additional income to cover the claims. Second, they can drop coverage on them, but when this is done, they will often offer an extra cost "rider" that reinstates coverage. Third, the company can exclude the radio altogether. In short, you have no coverage and can't get it from that particular company.
Q. Should you notify your insurance company if you install a radio in your car or home?
A. Yes, but only to the extent that you want to know where you stand concerning coverage. As noted before, don't wait until something happens before finding out whether or not you are insured. Call your agent before you install a unit and take whatever steps are necessary to be properly protected.
Q. Do companies take a different view on mobile radios that are on removable brackets?
A. Yes. This is one of the areas that can really get you into a sticky situation. Some companies will claim that the radio is "fixed" in the car; hence, it is a part of the car. As a part of the car, theft of the unit would fall under the comprehensive portion of your policy. On the other hand, some companies will claim that the set is not an attached fixture and will exclude coverage. It should be mentioned that if it is not covered by the auto policy, it probably will be covered under your homeowner's policy, since this usually can be applied to personal items that are stolen from your car.

Q. Is there a difference if the radio is covered under your homeowner's policy rather than your auto policy?
A. Yes. For the most part, the auto policy will give you complete coverage while the homeowner's policy will have a "deductible" clause. This means that you will pay a portion of the replacement value according to the formula set forth in the policy. Here is an example of this situation: A person buys two identical radios. He installs one in the car and puts the second on the back seat. He stops to buy a paper and returns to find his car broken into and both radios gone. Now, since one radio was attached to the car as a permanent fixture, it would probably be covered by the comprehensive portion of the auto policy. It means that he got back almost every cent of the unit's cost. The radio on the back seat is another story. Since it was not installed, and thus not a part of the car, it would be covered by his homeowner's policy. The catch here is that most homeowner's policies have a deductible clause. This means that he would have to supply the first $50 of the replacement cost; the insurance company would make up the difference. Deductible clauses vary and range from $25 to more than $100. Let's say your set cost $100 and the theft was covered by a homeowner's policy which had a $100 deducitble clause. You would get nothing back at all!

Q. What would happen if someone were injured by a car antenna while you were driving?
A. It would really depend upon the type of overall insurance policy you have. In states with no-fault, the injured party could turn to his own auto insurance firm, even if he were not in a car. However, if he were not a driver himself and thus did not have auto insurance coverage, he must turn to the driver's company for compensation. In a state without no-fault insurance, a person injured by a whip antenna would have to seek settlement from the car owner's insurance company.
Q. If the same antenna injured someone due to improper installation, would this affect your coverage?
A. It should not since your policy is intended to protect you regardless of the reason.
Q. What about an antenna at your shack that falls and causes damage to a neighbor's home?
A. This is covered by a homeowner's policy.
Q. If someone helping you install a base antenna on your roof or in the yard got injured, would your insurance cover this?
A. Yes and no. If the helper were doing it as an act of friendship, then it would probably be covered under the homeowner's policy. However, if you paid him to help you, it would be a different story altogether. Since you "employed" him, you would only be covered if you had insurance such as workmen's compensation. The act of paying a friend to help can mean the difference between having coverage or possible financial ruin if he should sue.
Q. If in the act of stealing a mobile radio from your car, the thief damages the automobile (broken windows or locks). Is this covered and how?
A. Damage to the car incurred during a break-in should be covered completely by the comprehensive portion of the auto policy.
Q. If someone were to break into your home and steal your radio equipment and also do damage, what coverage would take care of this?
A. This should be covered by the homeowner's policy, but here again you might find that the deductible clause cuts down on the amount the insurance firm will pay.
Q. If you have a set stolen from your car that was considered to be permanently installed, would the insurance cover the cost of installation on the new one?
A. Yes, that is if your insurance covered the radio to begin with.
Q. Does installing a unit on your own affect the coverage?
A. No, it should not.
Q. If the radio cost you $450.00 and is stolen 12 months later, would you get the full $450.00?
A. No. The insurance companies deduct for depreciation on the unit. A general figure for this runs about 1 per cent per month. This figure will vary, but it gives you a rough idea of where you stand. Some companies will also figure in the "replacement" value. This means they try to estimate how much it will cost to replace a unit that was 12 months old. This then means the actual amount you receive would reflect both the depreciation incurred over the period as well as the estimated replacement figure.

Q. What about the damage to a unit in an auto that results from something other than theft, such as a flood or fire?
A. Damage to a set from either flood or fire would be covered under the comprehensive portion of the policy.
Q. What about damage to a base radio from fire or the home being flooded?
A. This would probably be covered by the homeowner's policy, but once again we find the deductible clause present. However, this should be put into its proper perspective. If your house and the entire contents were to burn down, the deductible, if it were, for example $50, would apply to everything, but only once. That is, if the total property lost amounted to $40,000, you would have $39,950 to start working with.

Q. If you completely disregard our advice and buy a stolen radio, which, in turn, is stolen from you, what effect would this have on you?

A. First, you would be an accessory to the crime for possessing the radio. This is true even if you are not aware that the radio is stolen! Once this fact becomes known, you will not be covered by any insurance and you will be liable for prosecution as well. (In addition, it is hoped that you have your teeth kicked in by every guy who has his rates jacked up because of jerks who do take stolen sets!)

Q. If a radio is installed in a boat that it being trailered, and the entire rig is destroyed, what type of coverage would take care of this situation?

A. Boat insurance, since the radio was in the boat. This applies to everything in the boat, regardless of whether or not the boat is in the water.

Q. What coverage would apply to a radio that is moved from a car to a boat to a base station? With the detachable brackets it is very possible to have one radio which can serve in several positions.

A. This is a tricky question and situation because it would depend upon the position the insurance company takes concerning the removable bracket technique. As noted before, if the company feels it constitutes a permanent form of installation in the auto, since a portion of it is never removed, theft from a car would possibly be covered under the comprehensive portion of the policy, while in a boat or home, the radio would be covered by the boat or homeowner's policy, respectively. If, on the other hand, the insurance company considered the radio as not being a permanent part of the car, it would then fall under the homeowner's policy, if you had one, or the boat policy, while it was located there. It should be mentioned that homeowner's policies are available for people who live in apartments, trailers, teepees, etc., too. You don't have to own a home to have this form of coverage.

Q. Would putting registration marking, such as your social security or driver's license number, on the radio equipment affect your coverage?

A. Yes, but only indirectly. If enough people took the time and effort to engrave identification information on the radios, the number of thefts might decrease. This has been the case with thefts in general in areas where a concerted effort has been made to mark personal items. Along with this marking, it must be made very clear to any potential thief that the items are marked. In several instances, insurance companies have supplied an engraver tool so that identification marks could be put on valuables. They have also supplied, free of charge, "stickers" which boldly state that the contents of the house are engraved. It was found that homes so marked were avoided by thieves since items that could easily be traced were hard to unload.

Q. If the car door or house door is left unlocked and the radio is stolen, will this affect the insurance coverage?

A. It can have a devastating effect. Many insurance companies demand proof that the car or house was broken into. This proof is usually in signs of forced entry. If there are no clear signs of forced entry, the insurance company may not be obligated to pay.

Q. What is the best thing to do to find out just where you stand in relationship with your radio equipment and the insurance coverage you have?

A. All of the insurance agents questioned stated the same thing, that you should sit down with your agent and have him answer as many specific questions as you can ask. Have the agent show you in your policy just how and where you are covered. If there is a gray area in which some doubt exists, have him contact his claims office to get an opinion. If possible, have them put the opinion in writing. Then put it in a safe place and hope you never will need to use it or any other part of your insurance coverage.

Printed circuit boards very often require unusually sized cabinets. Bob Thompson shows how to build your own custom enclosures for those p.c.b. projects.

Building Enclosures for Small Units

BY BOB THOMPSON*, W7KDM

As a builder of electronic devices of various sizes and shapes over the last twenty odd years, I have continually been confronted with the problem of enclosures for these devices. In the early days, matters were simpler than today: one merely laid out all of the large items that were to be mounted and purchased a chassis with the appropriate area. Even at that, one usually ended up with more or less chassis space than was needed, more often than not. With the advent of printed circuit board (p.c.b.) construction, the problem took on greater dimensions. Usually the p.c.b. was designed to accomodate all components by minimizing board area and maximizing component density without undue crowding and consistent with good design practices. When it was desired to enclose a p.c.b. to provide electrical isolation, mechanical rigidity, component protection or other reasons, the builder usually found a dearth of commercially manufactured chassis boxes or enclosures of the dimensions desired. If the length and width were acceptable then the height was wrong. If the height was right, no box had suitable length and width dimensions.

Another problem is that few local stores carry an in-depth stock of boxes so that mail-order, with its inherent time delays, had to be utilized. Attempts at making small metal enclosures out of sheet metal in the shop proved disappointing and time consuming, Some boxes for u.h.f. devices were constructed by soldering pieces of p.c.b. together on all sides. They were r.f.-tight but adjustment or replacement of components was a major operation requiring the unsoldering of one or both covers.

A method slowly evolved which utilized the best features of both the metal enclosures and the p.c.b. boxes. The result is a unit that 1) custom-fits the p.c.b. with no wasted space; 2) combines its strength with that of the p.c.b.; 3) can be potted if desired and 4) lends itself well to r.f. shielding techniques. In discussing the process it became apparent that others have had disappointments in fabricating p.c.b. enclosures. The purpose of this article is to describe one method which has yielded good results.

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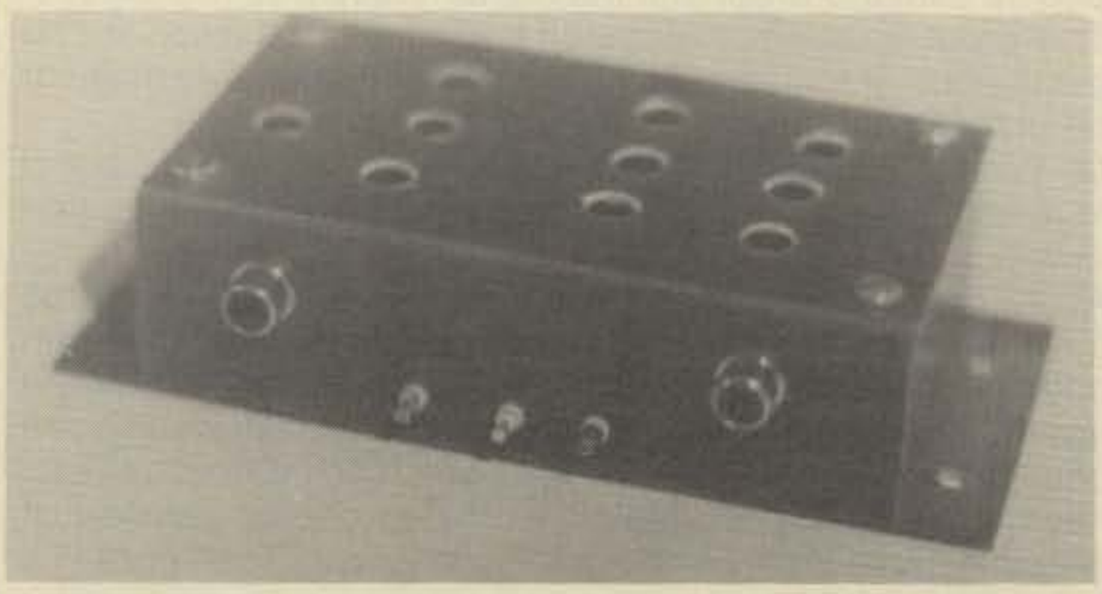

A typical home-made box. The holes in the top cover are for adjustment of internal components.

Fabrication

Certain requirements must be introduced at the printed circuit board design stage to enable this method to provide good results. After becoming familiar with the method, the builder can make changes and shortcuts but at least one box should be made as described first.

Ideally, the p.c.b. to be enclosed should have no ground conductor (unetched copper) around its entire perimeter. This copper should be at least one-eighth to one-quarter inch wide. We will see the reason for this later. The other requirement is that the edges of the p.c.b. be filed flat. If you are using a commercially manufactured p.c.b., chances are it was cut to size on a shear or guillotine machine. These, and most other cutting methods including hacksaw and bandsaw cutting will leave the edges of the board fairly rough. (see fig. 1a). If another piece of copper-clad material is placed against this edge in a perpendicular relationship, there will usually be a gap between the two foil surfaces as illustrated in fig. 1b. In such cases solder will usually not bridge the two foil surfaces at the juncture if the gap is more than one-thirty second of an inch or so. The problem is easily solved by filing the edges flat and true as in fig. 1c. This simple procedure might be troublesome if the p.c.b. already has all components mounted. It can still be done but requires extra care to prevent damage to the components. If you are starting from scratch and designing your own board, the best time to do this is right after the p.c.b. has been etched and plated. Simply place the board in a vise and apply a flat sided file to the edges in long sweeping strokes. Check all edges frequently during the filing process with a straightedge to preclude filing a depression or hump into the edges.

This a good place to mention that only fiberglass p.c.b. material should be used. It is usually green in color. Phoenolic-based material, usually brown in color, should not be used. The primary reason is that the copper tends to lift from the base material under heating more readily than is the case with the fiberglass-based material. A second, but no less important, reason is that the phoenolic material is brittle

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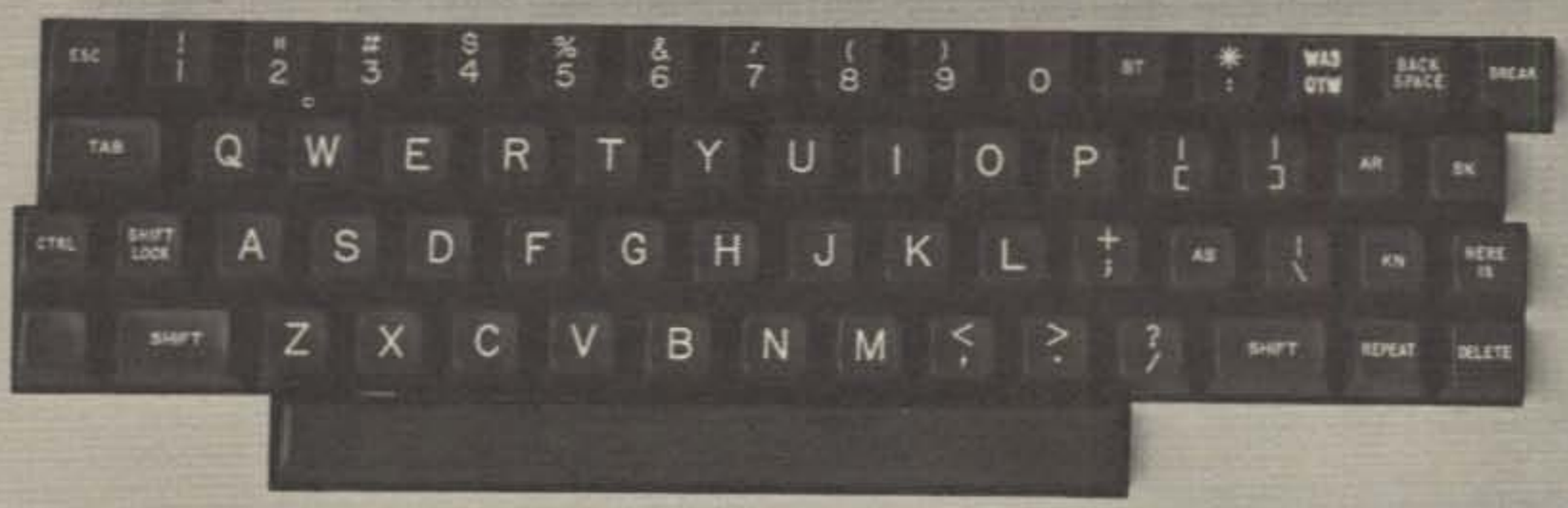

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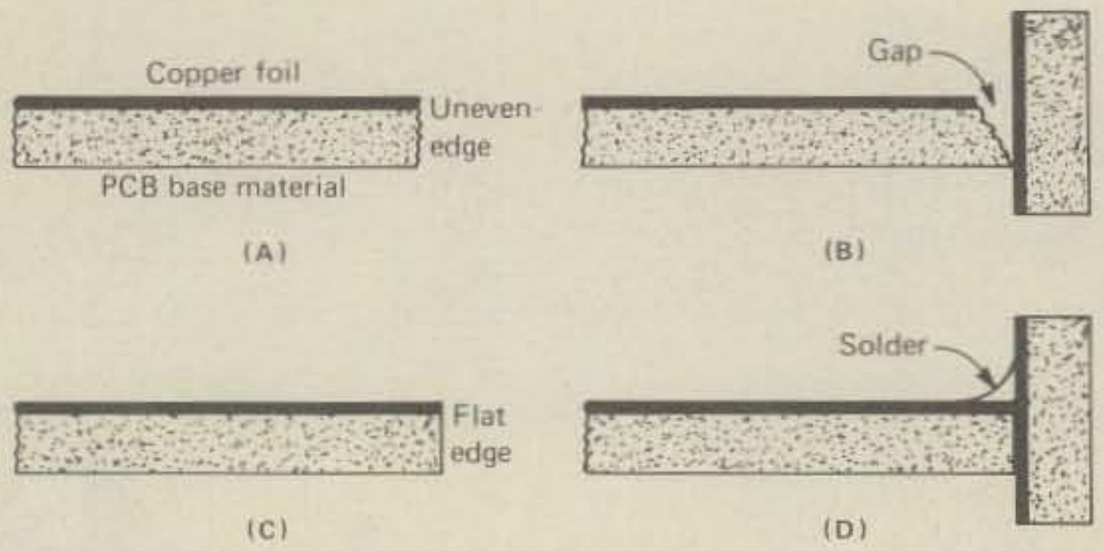
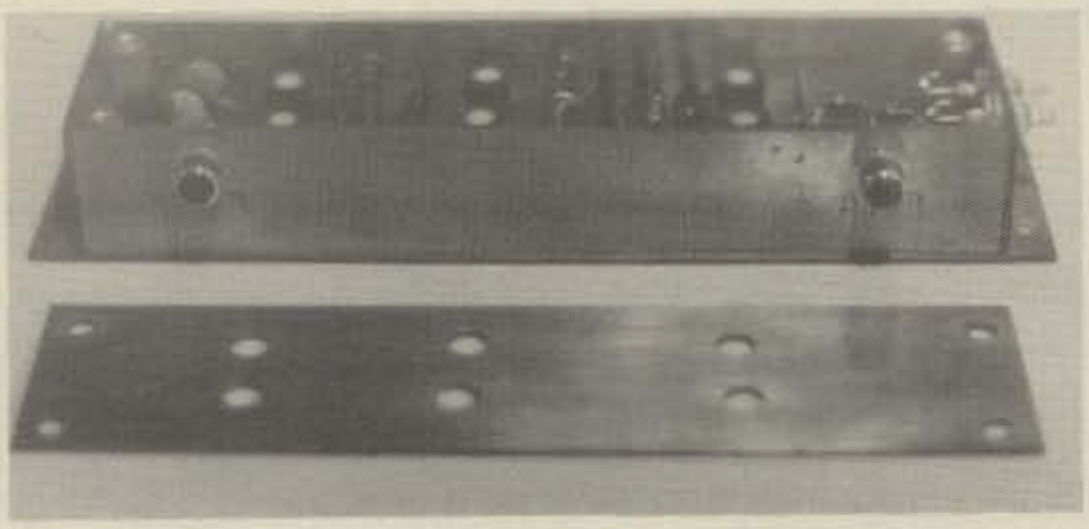


Fig. 1 – Joining printed circuit board stock. See text for a complete description of how this is done.

and tends to break when flexed or jarred.

The next step is to acquire some threaded metal bushings. They are sold in various lengths. I have found the one-half inch length to be adequate for most work. They should be tapped all the way through to accept a machine screw and be one-fourth inch in diameter. Anything close will probably be adequate.

The p.c.b. now must be drilled at each corner to accept a machine screw the size of which fits the bushing. Be sure to drill the hole far enough away from the edges of the p.c.b. so the bushing will not project beyond them. If in doubt, run a screw through the board and into a bushing to be sure. The bushings will be mounted above and below the p.c.b. as



An enclosure with its cover.

shown in figs. 2a and 2b. To accomplish this, pieces of threaded stock should be cut in lengths of about one-half inch. Best results are had using a small bolt cutter, but it also can be done with a hacksaw providing care is taken not to damage the threads.

Either method will usually leave a small burr which is most easily removed with a grinding wheel or hand file. Make four pieces. Screw one piece one-fourth inch into each bushing. Push the exposed screw portion through a mounting hole in the p.c.b. and screw another bushing on the other end. (See fig. 2b). Check to insure that the screw is centered between the two bushings. P.c.b. material thicker than about one-sixteenth inch will require cutting the screw longer than one-half inch to insure adequate projection into the bushings,

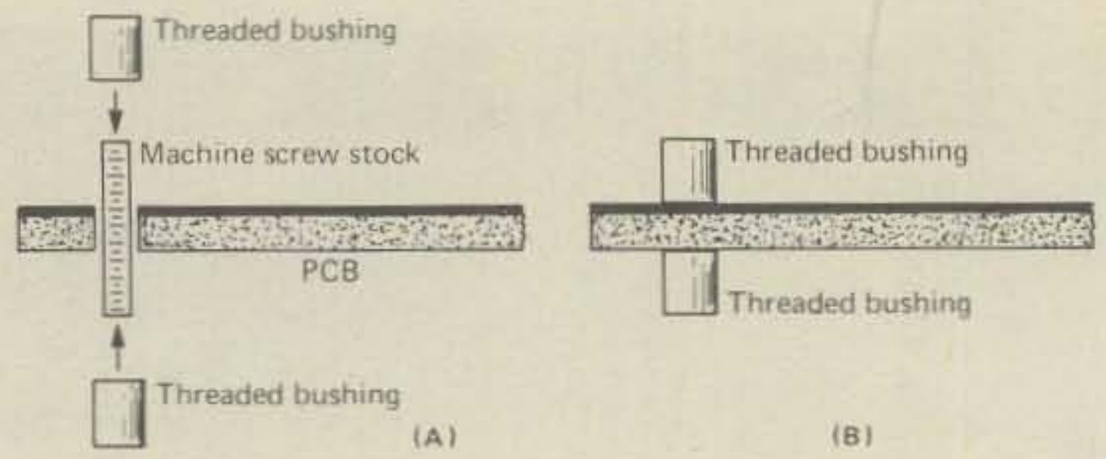


Fig. 2 – Using a machine screw and threaded bushings to mount a printed circuit board.

which should be about half of the bushing length.

The board should now have mounting bushings at each corner as in fig. 3. Do not worry if the height of the bushings on top are less than the heights of some of the components on the board—more on that later.

The side walls of the enclosure are the next step. Measure the length (L) of the p.c.b. as in fig. 3. The height (H) should include clearance for the tallest components. Don't forget to allow for such things as coil slug withdrawal. Do the same for the ends. If your source piece of p.c.b. material is long enough, an easy way to procede is to cut a long strip from it having a width slightly greater than H. The strip can be cut into lengths slightly longer than L1 and L2. The slight extra length is to allow for filing the edges to true them up as we did with the unit p.c.b. itself.

A simple way to get all edges equal, true and parallel is to place two similar side pieces in a vise at once and file the exposed edges until they are true. After filing one edge, and before releasing the vise, securely grasp the two boards where they protrude above the vise jaws. Invert and tighten the vise again with the other two edges up. It is important that the two pieces do not move in relation to each other. Repeat for all edges.

Now we come to a part which has been a source of much consternation: how to hold the four sidewall pieces and the p.c.b. in proper orientation to each other and also apply solder. It would seem to require the services of a talented octopus! Although there are probably many ways to skin this cat, one method has evolved which provides good results. Even with this method, some practice and manual dexterity is needed. First, secure two or three rubber bands large enough to go around the perimeter of the box when stretched. Next, place the four wall pieces in their respective positions around the p.c.b. Be sure the copper-clad sides are on the inside, and are clean. Now comes the tricky part: position two or three rubber bands around the outside of the whole thing. Don't worry if the pieces move a little while you are doing this. Now align all pieces to the proper positions. All this should be done on a flat surface. We are now ready to begin the soldering process.

The whole secret here is to use an iron that is high enough in wattage and has a tip small enough to get into some tight places. Remember, the p.c.b. has components on it. I use a *Wen* Model 199 soldering gun which is about 100 watts.

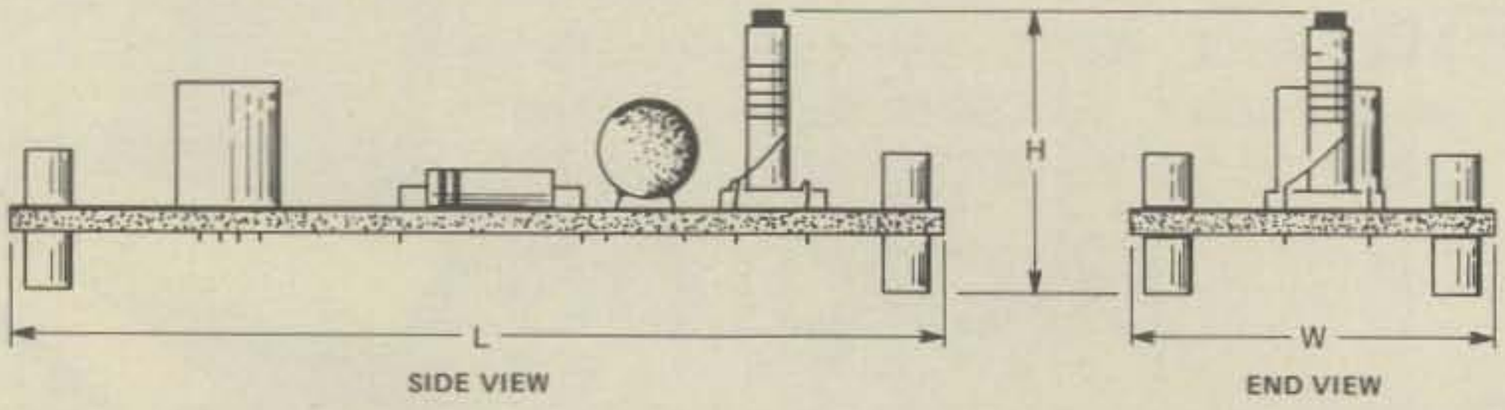


Fig. 3 – The size of an enclosure is a function of the dimensions of the printed circuit board with the components mounted on it. This figure shows how to make the measurements.

Soldering

After checking for parallelism and trueness of the sides, take a length of solder—*Ersin* Multi-Core number 16SWG 60/40 is used here—and lay about one-half inch of it in the joint of the corner to be soldered, near the top. I usually hold the solder with one hand and the gun with the other; the rubber bands should hold the box together at this point. Apply the well-heated gun or iron to the solder. All we want to do at this point is to make one small solder bridge across the two perpendicular walls. Do not solder the entire seam now. Repeat for the remaining top three corners.

Carefully turn the whole thing upside down on the bench. The pressure from the rubber bands should keep the p.c.b. from moving. Repeat the soldering process for the bottom four corners. Since there is only a spot of solder on the top corners, the sidewalls can be moved slightly if necessary for alignment prior to soldering. To secure the p.c.b. to the sidewalls we use the same procedure. Be sure the p.c.b. and its mounting bushings as well as the sidewalls are all flat against the workbench. The walls should be tight enough against the p.c.b. to keep it from slipping.

If not, you might have to grasp the unit by the sidewalls and apply finger pressure to insure alignment. It sounds more difficult than it actually is. Put a spot of solder between the p.c.b. and each sidewall. Recheck alignment of all pieces. If satisfied, apply solder along the entire length of all seams. The soldered seam should end up smooth and clean. If your iron starts sticking to the solder as you draw it down the seam, you are moving too fast or you iron has too low a wattage. Try to move the iron as quickly as possible consistent with a good joint. If you linger too long the copper foil can start to lift from the board.

Cover Pieces

For a bottom cover, cut a piece of p.c.b. material the same exterior width as the box but make the length about one inch longer than the box length. This will cause the bottom cover to project about one-half inch beyond the ends of the box to allow for mounting the unit box to a chassis. Cut p.c.b. material the same dimensions as the box for the top cover. Cut a piece of clear plastic or acetate sheet the same size. I use plastic from document protectors, available at any office supply store. Lay the plastic over the top of the box in the same position the cover will take. While looking straight down, place a dot on the plastic with a felt tip marking pen directly over the center hole in each of the four bushings on the p.c.b. We have now located the mounting holes for the cover. It can also be done by measurements but this method is quicker and provides acceptable results.

Position the plastic template on the cover piece and press a center-punch or awl through the plastic at the four dots. Drill four holes in the cover piece at the four depressions. Place the cover on the box and drop machine screws of adequate length down through the holes and into the bushings below. The top cover is now secure. Repeat for the bottom cover but countersink the holes and use flathead machine screws so that the bottom cover will lay flat against a chassis. If desired, the bottom cover can be eliminated. Use the plastic template to drill four mounting holes in the main chassis. Run screws through the chassis up into the mounting bushings at the bottom of the unit.

Input and output plugs, connectors and feedthroughs can now be installed as desired in the sidewalls of the unit. Use minimum pressure on the drill bit so that when it comes through the sidewall it doesn't go into the components on the p.c.b. It is advisable, whenever drilling p.c.b. material, to use a small drill bit first and then enlarge the hole to the desired size with a larger bit. This helps keep the drill from "walking" and ensures accurately-placed holes. Our custom unit enclosure is now completed.

For amateurs who have little room to spare for an antenna, the configuration described in this article may be an answer.

The W2ONV Delta/Slope Antenna

BY BILL SALERNO*, W2ONV

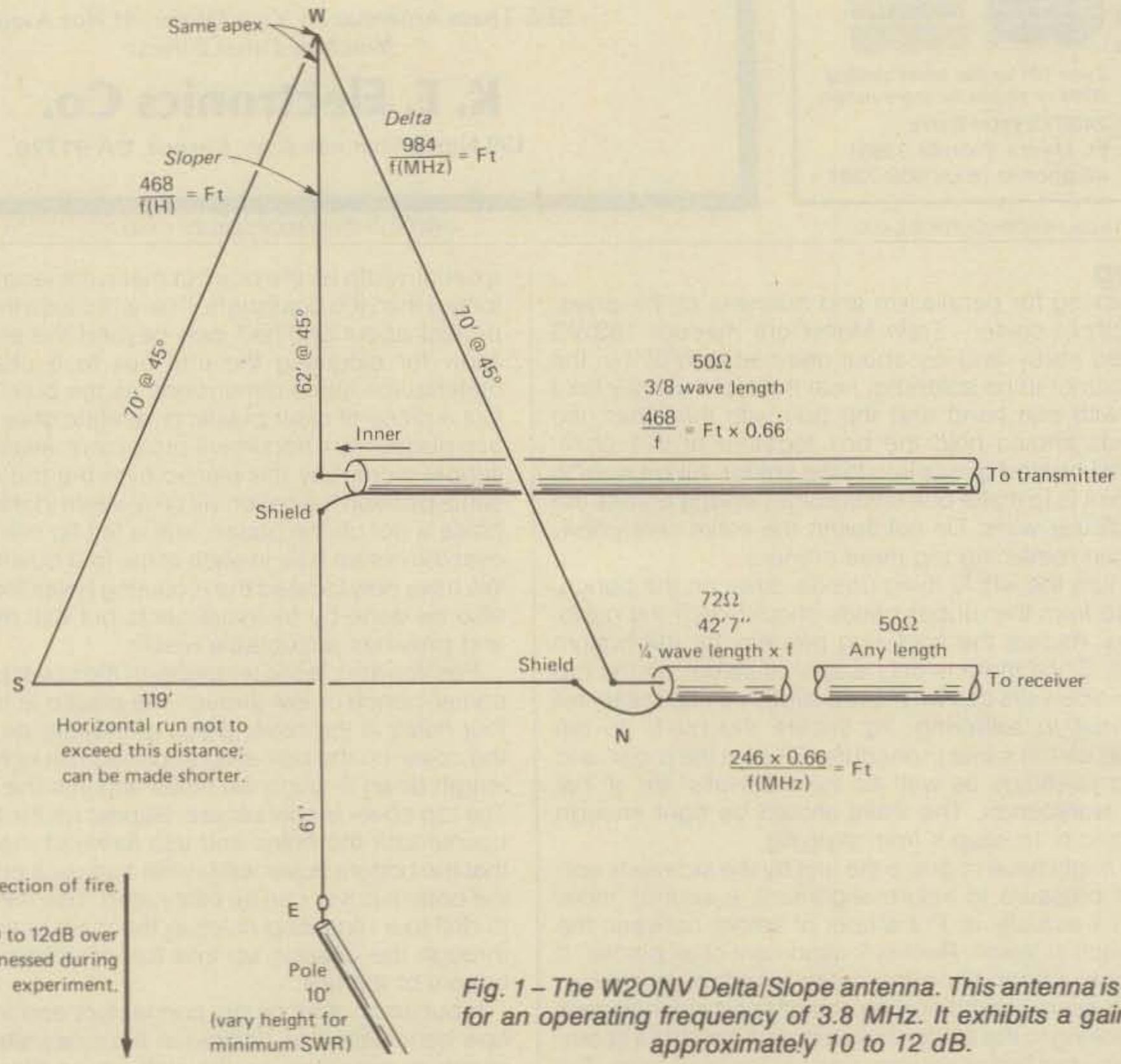


Fig. 1 – The W2ONV Delta/Slope antenna. This antenna is cut for an operating frequency of 3.8 MHz. It exhibits a gain of approximately 10 to 12 dB.

After two years of head scratching and tremendous moments of frustration and with the love and desire of low frequency operation, I have finally come up with what I believe to be an extremely viable 80 meter directional array for the amateur with limited real estate.

Like any new adventure into antenna experimentation, formulas never held quite true, especially in the case of low frequencies where ground effects are so prevalent. Therefore, the only credence relating to formula adhering would be in the case of the *Delta* and the matching transformer coming off the *Delta*. All other lengths in the instance of the sloper were trimmed for maximum forward gain.

The intention of the experiments conducted were to arrive at a point where the *Delta* would be able to receive signals greater than would be received by the sloper, thereby indicating that in effect a two-element beam at this point would be fully realized. I am happy to say that the herein described has accomplished just this. In addition, I discovered that benefits derived could be had by utilizing the sloper as a receiving antenna for the direction that it was firing into. This now afforded me an additional 20 to 30 dB of attenuation from unwanted signals coming from a direction other than the northeast.

In order to accomplish this feat one must be cautioned and alerted that the sloper, being in the field of the *Delta*, which in this instance is the firing antenna, contains an extreme amount of r.f. current. Therefore, one should exercise all caution to **remove the sloper from the receiver during the transmitting period.** This can be accomplished by the use of a keyed relay in the instance of transmitting, which would automatically open the sloper receiver connection. It was further discovered that additional benefits could be had if one were to install a three-way switch whereby you could now use the *Delta* or the sloper as a receiving antenna. The choice is to be the operator's for there are moments when using the sloper would be made difficult due to the attenuation afforded by the sloper antenna, A switch enabling the operator to switch from the sloper to the *Delta* would soon realize tremendous receiving abilities in almost an omnidirectional field when utilizing a *Delta* loop for receiving.

While I feel that perhaps an additional fraction of a dB or two may be gained from additional experimentation, I have resigned myself to fully accept what I have here stated as absolute and about as near to optimum that one can achieve; for after all, when one can come within a few dB of a four element array at 120 feet, I believe this is proof enough of the proficiency and abilities of the herein described "science fiction wonder." While the Delta/Slope may not be the ultimate, we must also bear in mind the word "feasibility" and certainly when dealing with the lower frequencies this ugly word rears its head, for real estate now becomes a primary concern and in most instances continues to present a problem to the individual operator for erecting a good viable low frequency antenna. Therefore, while the Delta/Slope may appear simple in design, this operator can assure you that you will be more than surprised with its performance; also, to realize that without the ability to put something at 120 feet and to turn it, this certainly then is a wonderful compromise. I hope you will have the success and enjoyment that has been mine with this arrangement.

*Director, UPI Communications Systems
481 Getty Avenue, Paterson NJ 07503

Author W8FX discusses the subject of dummy loads, and suggests some simple, low-cost loads which you can build for tuning and adjusting your low or medium-power transmitter for optimum performance.

Dummy-Up for DX

BY KARL T. THURBER*, W8FX/4

Have you ever wondered if your transmitter was *really* performing up to its advertised ratings? Was it putting out what it should, or something less? These concerns needn't go unanswered. If you use a good dummy load in conjuction with an r.f. wattmeter or ameter, you can be *sure* your transmitter is pumping out r.f. as it should.

First, let's talk about just what a **dummy load** is. It is, simply, a device that substitutes for an actual antenna. It has the power-handling capability to absorb the full output of the transmitter or transceiver under test. A properly constructed dummy load has the same resistance or impedance as the antenna it temporarily replaces, so that the transmitter can be tuned up and adjustments made as though on-the-air. The dummy load, of course, should be a "silent partner"—it should not radiate a signal, but instead "simulate" the effect of the antenna.

The dummy load is so important to "sharp operating practice" that it's fair to say that you shouldn't put a signal on the air unless you possess one. When you first acquire your equipment, you should load it into a dummy load to familiarize yourself with your rig's operation, and to establish a sort of *standard of performance* for your gear, making note of transmitter dial settings and meter readings for future reference. Bear in mind that when servicing your gear, you will need to use a dummy load, for two reasons: first, so as not to unnecessarily clog the airwaves with test transmissions; and second, because practically all servicing procedures require that the equipment be connected to a dummy load to insure proper operation under test.

What constitutes a good dummy load? First and foremost, it should present a steady, purely resistive load to the transmitter, usually 50 or 75 ohms, at all power levels over the entire frequency range of the transmitter with which it will be used. It should be shielded to prevent unnecessary radiation and possibly even TVI (television interference)—unshielded dummy loads often radiate surprisingly well! It should also be capable of handling the full power output of your equipment without overheating, and it should be connected to your rig by a *short* length of coaxial cable—preferably through a coax switch so that it can be switched in and out for tune-up and testing.

There are several types of commercial dummy loads that you can buy, or you can easily make one yourself if you care to. Most of the commercial units consist of either a heavy-duty, air-cooled resistor capable of absorbing your transmitter's output, or a hefty resistor encased in a "paint can" full of non-conducting, high-temperature transformer oil (for heat dissipation). Some dummy loads also have a built-in d.c. *sampling circuit* so that you can get an indication of relative power output by connecting a d.c. voltmeter to it. A number of manufacturers offer r.f. power meters that terminate in a dummy load; they're handy instruments indeed. Heath, Bird,

*233 Newcastle Lane, Montgomery AL 36117

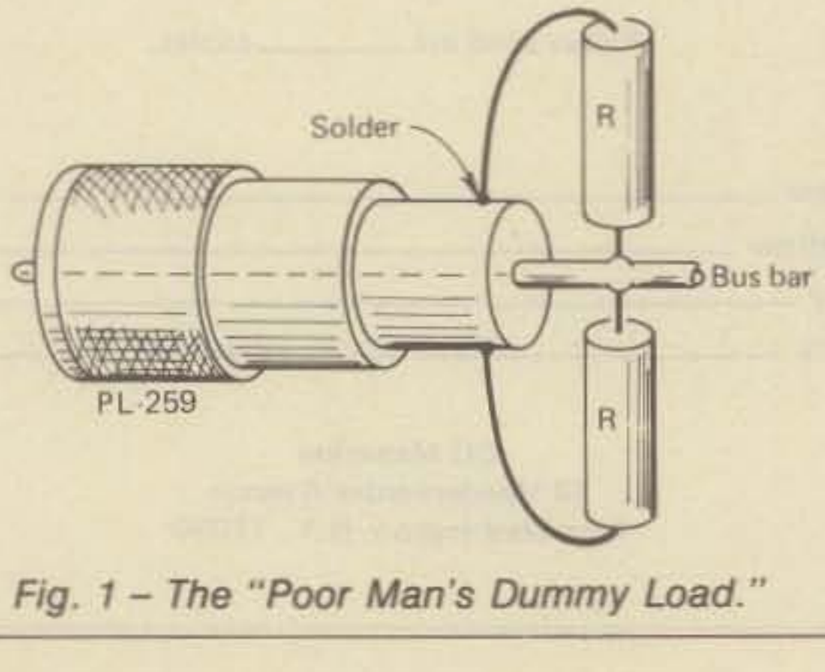


Fig. 1 – The "Poor Man's Dummy Load."

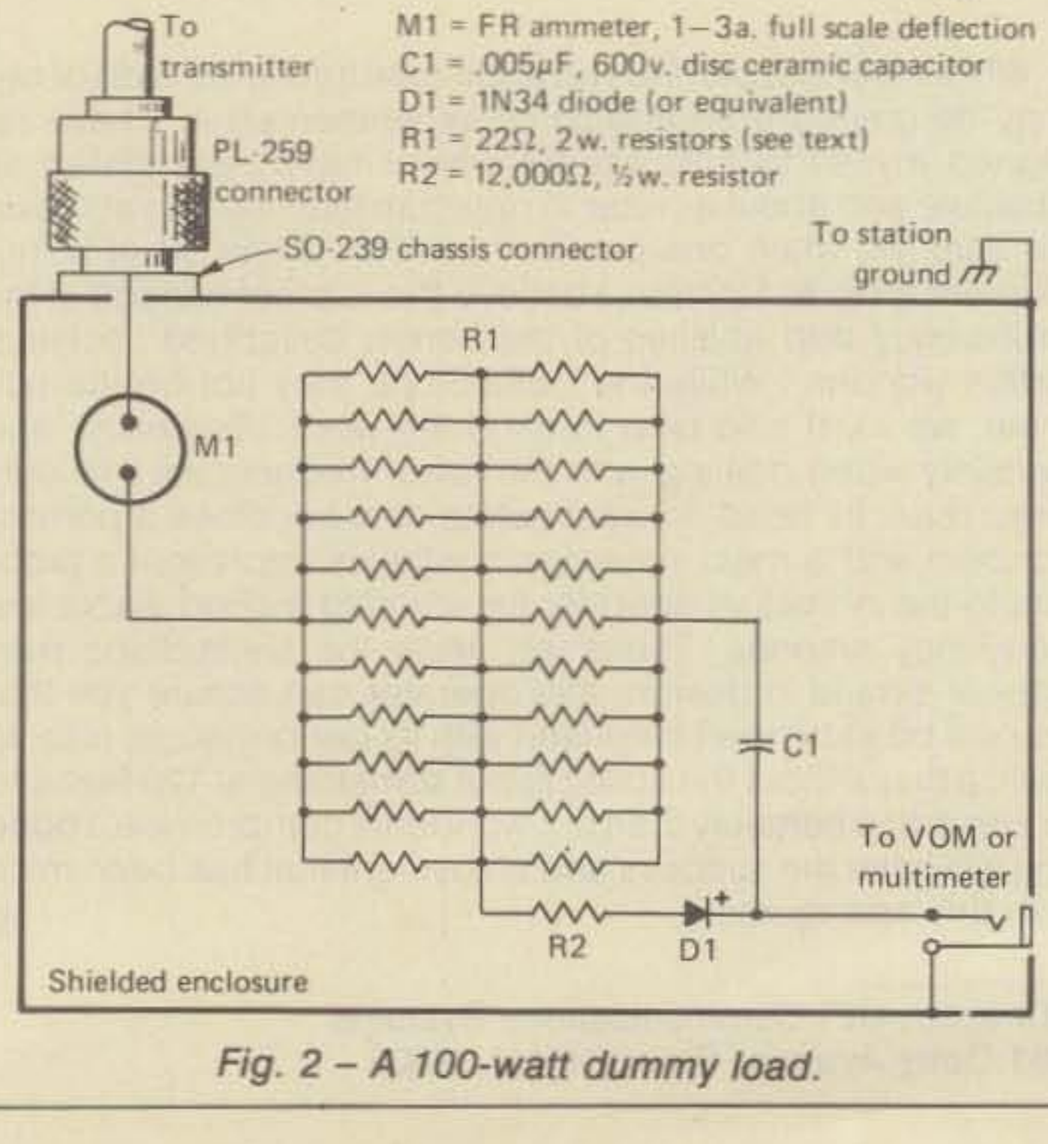
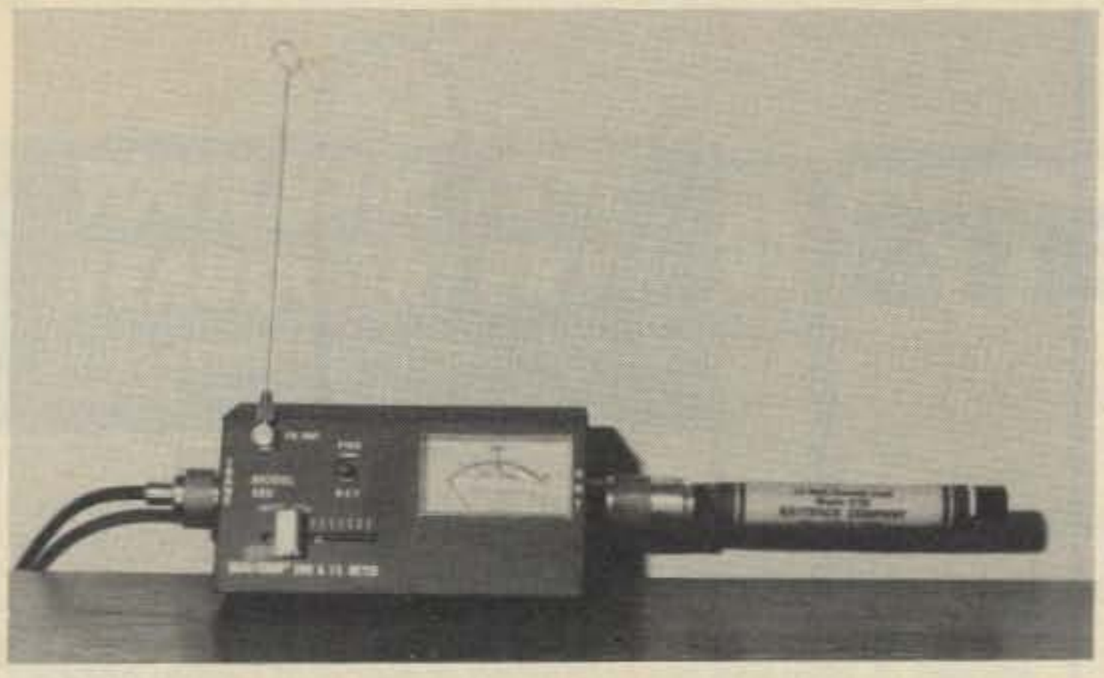


Fig. 2 – A 100-watt dummy load.



CB s.w.r. bridge and field-strength meter shown here works well up to at least 2 meters in both applications. The Raytrack 10-watt dummy load was designed for 27 MHz CB and commercial use, but the author has found it useful as a 2-meter dummy load. It fills the gap between the small 5-watt CB-type dummy loads and the heavy-duty, high power loads designed for h.f. transceiver loading; I use it with a Yaesu FT-221R 2-meter transceiver, which has a power output of about 12-14 watts.

Dentron, and Barker & Williamson all make a variety of highly useful and worthwhile units which you may want to consider for purchase. You'll find that the dummy load is one piece of equipment that will not soon become obsolete, provided you acquire one that has adequate power-handling capacity for future growth of your station.

But what about using the common *household lamp* as a "cheap and dirty" dummy load? The fact is that the ordinary light-bulb isn't a bad absorber of r.f. energy. There is no reason why you can't use the bulbs as "passable" dummy loads at least at moderate power levels, up to and including 10 meters. Of course, the common light bulb has so many disadvantages as a dummy load that the "pro" wouldn't *dream* of pumping the output of his expensive transceiver into it, but for casual check-out of the Novice-class c.w. transceiver, it's hard to beat for convenience, simplicity, and especially, *expense* (or the lack thereof).

Don't, however, try using the bulbs at very high power levels, or at v.h.f. They just won't give a good account of themselves, and may even cause your equipment to be damaged. You should recognize that as they heat up, they change impedance wildly (well out of the matching range of most pi-network output circuits). They also radiate excessively (particularly at the higher frequencies), and they can even change impedance while you're modulating your

Home-made low-power v.h.f. dummy load is shown mounted to the side of Sigma RF-2000 s.w.r. bridge/wattmeter. The dummy load shown in the photo differs slightly from that of fig. 1. In this one, it is actually mounted on an RCA-type phone plug which in turn slips into an RCA-to-coax-connector adapter. Thus, the little dummy load can be used both with transceivers having RCA or standard coax fittings.

The dummy load is one of the indispensable pieces of r.f. test equipment in your shack; it allows you to make equipment adjustments without generating unnecessary interference. The Heath "Cantenna" shown here will handle a full kW of r.f. up to 400 MHz with a low s.w.r.. It can be used at your operating position and switched into the r.f. line when you want to check your signal or tune up. It can also be used on your workbench for transmitter or transceiver alignment and maintenance–or it can be carried to the field for portable work. The power-absorbing resistor inside the can is oil-cooled, so you must purchase your own oil locally. (Photo courtesy Heath Company).

transmitter, making the load seen by your rig highly erratic. However, they *do* have the advantage that you can "guesstimate" your transmitter's output by *visually* comparing the bulb's brilliance with that of an identical one connected to the a.c. line. If you want to experiment with a light bulb load, go ahead; don't let this discussion put you down. For starters, try a bulb rated at about 70 to 85% of your transmitter's rated *input* power.

One caution you should observe: Be sure to *shield* your bulb if you go this route. If you don't, don't be surprised if others hear your test transmissions! Many hams, to their utter amazement, have "worked" hundreds of miles—unintentionally—on their "breadboard" light-bulb loads.

Let's assume, though, that you've decided to purchase one of the commercial dummy loads of the kind we mentioned. What's inside of them? Let's pry the lid off of the Heath *Cantenna* and see for ourselves.

At the heart of the Heath unit is a husky, 50-ohm film-type resistor which is directly connected to the transmitter output. By itself, the resistor could not handle anything approaching the 1000-watt "rating" of the *Cantenna*. But the bucket of transformer oil surrounding it allows much of the heat generated by the resistor to be transferred to the oil, thereby dissipating a great deal of heat. The resistor is actually mounted inside a metal sleeve or tube which extends from the can's lid; this arrangement helps to stabilize the impedance at the high frequencies, and it also helps to form a sort of thermal siphon for the oil. The effect is to pull cool oil from the bottom of the can up into the tube, and at the same time to discharge heated oil coming out of the top. This creates a circulation pattern for the oil to allow the load resistor to operate fairly cool.

periods. It can also handle 100-watt transmitters for periods long enough to make necessary adjustments and take power output readings. Its impedance is about 50 ohms, which is just right to match the output impedance of almost all pi-network transmitters; they are normally designed to work into load impedances ranging from about 30 to 100 ohms.

Construction is simple. The whole affair can be mounted in a small aluminum box, roughly 5×3×2 inches. No special construction techniques are required—just mount a standard SO-239 chassis-type coaxial connector to the minibox and neatly group the twenty-two (22), 270-ohm resistors around it in two bands of 11 resistors each. The two bands are connected in *series-parallel* as shown in the diagram, to result in an "equivalent resistance" of approximately 50 ohms (49, to be exact!) This can be done in any number of ways, and so, no special *physical arrangement* of the resistors need be followed—just make sure that they are mounted neatly, that their bodies don't touch one another (for heat dissipation), and that all connecting leads are as short as possible, in order to minimize lead inductance which could upset performance on the higher bands. Of course, all the resistors should be of the same value. I recommend drilling a number of ventilating holes (at least ten on each side of the cabinet) to allow the heat generated by by the resistors to dissipate. The unit is connected to the transmitter by a short length of 50 to 53-ohm coax, such as RG-58/U.

If you've standardized on 72 or 75-ohm coax in your station (such as might be the case if you're using dipole-type antennas, which have characteristic impedances in this range), use 22, *390-ohm resistors* instead of the 270-ohm ones. This will give you a good "simulation" of your dipole antenna and a good match to RG-59/U coax. Of course, if you're handy in the math department, you can make up an almost unlimited variety of load resistor networks to handle a wide range of load impedances and power levels. For a good discussion of how to do this, read Bill Wildenhein's article, "Dummy Loads You Can Build," which appeared in the October, 1977 issue of *Ham Radio Horizons*. You can also get a "feel" for how resistor networks function (in regards to the effects of series and parallel-connected resistors on overall circuit resistance and power-handling capability) by cracking the pages of a good basic electronic-theory text, or the *Radio Amateur's Handbook*. (It's simple!)

Also, since you'll need a good-sized handful of resistors, bear in mind that high-wattage resistors cost from 25 to 40 cents a piece if purchase *singly* from franchised-type radio outlets or mail-order outlets. So look for them at hamfests or swapfests, or look for them in quantity buys (10 or more) from the many small solid-state parts supply houses that regularly advertise in the amateur radio magazines. You should be able to get them for 5 to 20 cents apiece if you shop wisely. (Resistors having a tolerance rating of 10% or even 20% are perfectly good for our purposes here).

Another point: While the r.f. ammeter shown in the diagram isn't absolutely necessary and may be eliminated if you prefer, it's handy because it allows you to *measure* your transmitter's output using a simple Ohm's Law calculation: Power, in watts, is equal to current, in amperes, squared, and multiplied by resistance, in ohms. This is more easily written as an equation: P (power) = I^2R.

For example, say you build and use the 50-ohm load described in fig. 2. If you read a current of 1 ampere flowing through your ammeter, plugging into the formula shows your output *power* to be 50 watts. This would be about right for a 75 or 80-watt transmitter. The size or rating of the r.f. ammeter you use isn't critical; I'd suggest using whatever you can find at your local surplus emporium. In general, though, a 1-ampere meter should be o.k. for up to 75-watt (input) transmitters, while a 2 or 3-amp meter will handle more power than the dummy load we've built here can take. And, if you don't want to invest in an r.f. ammeter, there is also a provision in the load shown here for connecting a d.c. milliamter (such as in your multimeter or v.o.m.) to the output jack for *relative* power output monitoring.

For maximum versatility, you'll probably want to use the dummy load in conjuction with an s.w.r. bridge/power meter that gives an indication of forward and reverse power. Since most power meters are designed to work into a known, predetermined load impedance, using the dummy loads described here will enable you to get a very accurate picture of your transmitter's output power. You can check on the accuracy of your dummy load by switching to the *reflected power* function on your power meter or s.w.r. bridge. It will normally read below abot 1.2 to 1 with any of the loads described here. (If you keep the resistor leads short, you should have no trouble in using the home-built 50-watt load on 15 and 10 meters; but the impedance of the load will probably start to rise quite a bit as you go *higher* in frequency, and it may or may not perform well on 6 and 2 meters, where it is no longer acting as a purely *resistive* load.)

Of course, after completing testing and tune-up with the dummy load, it's important to insure that maximum power is being transferred to the *antenna*—it's the r.f. that jumps off your antenna that *counts*. This means that you must have a good impedance match between your transmitter and the transmission line, and between the transmission line and the antenna. A grid-dip meter or antenna noise bridge will help you to obtain a good match to the antenna, and an s.w.r. bridge left in the transmission line will allow you to keep a "running check" on your overall s.w.r. for maximum power transfer and resultant "DX potential."

Don't be a "dummy" when it comes to on-the-air testing and adjusting of your transmitter or transceiver. Use a dummy load, and make maximum use of its capabilities—"Dummy-Up for DX!"

This lightweight, air-cooled Barker and Williamson dummy load/wattmeter will handle power output levels to 250 watts. It presents the transmitter with an s.w.r. of less than 1.3 to 1 up to 230 MHz, and it can be used as high as 300 MHz. Note the four selectable wattmeter ranges–10, 50, 125, and 250 watts. The low-range selection makes it useful in checking QRP

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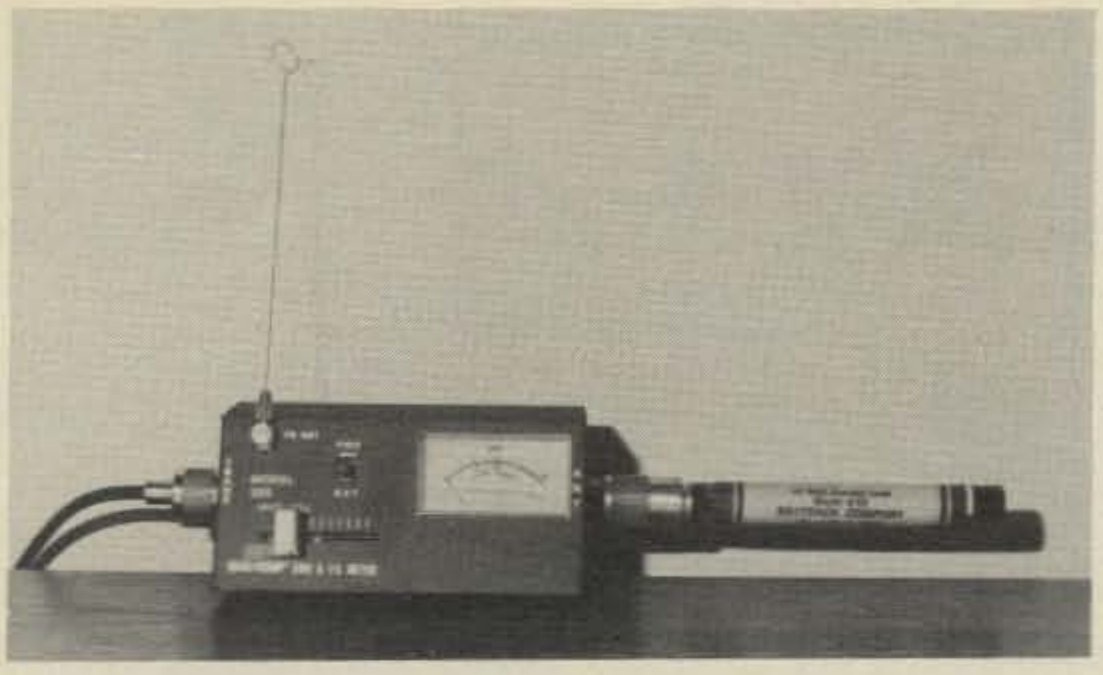
1. Moody, Willard R., WA3NFU. "Getting the Most from Your Transmitter." *Popular Electronics*. August 1973.



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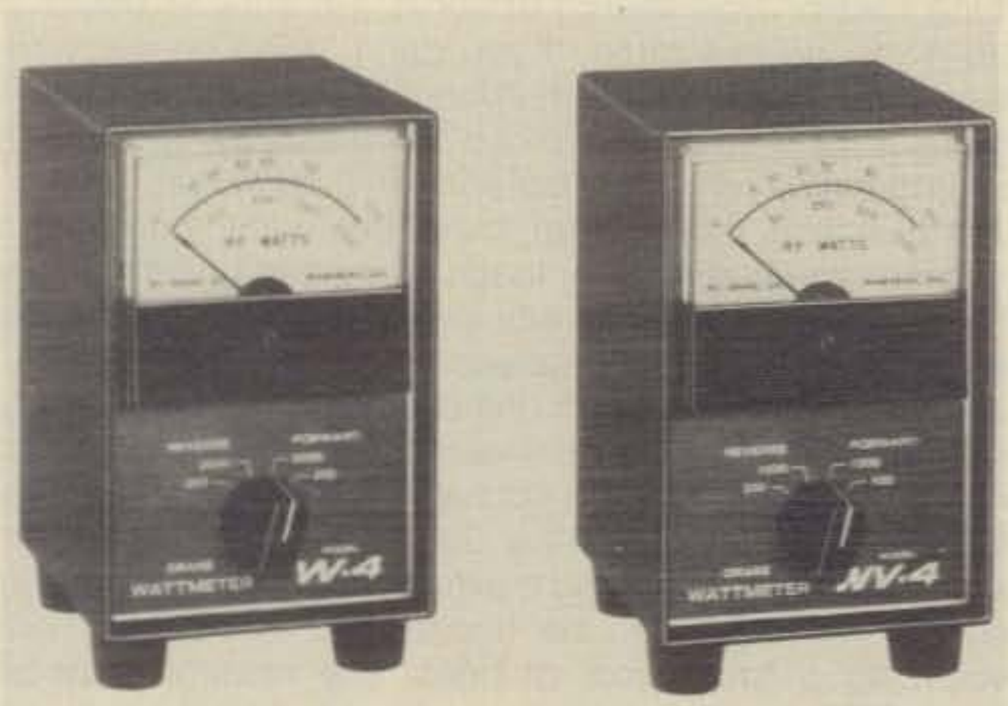
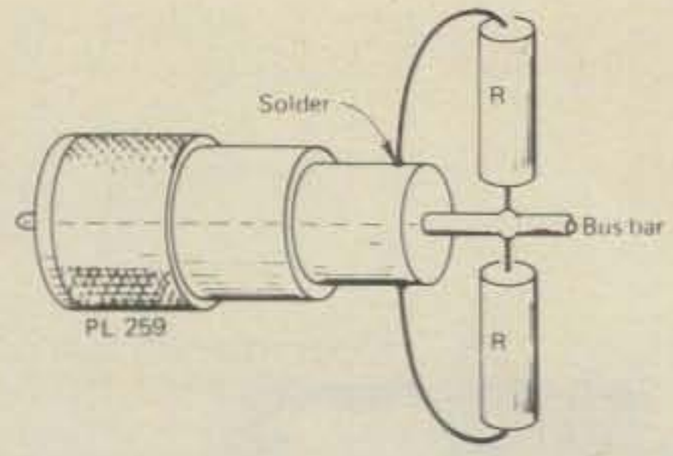
Heath HM-2103 (now discontinued) combines the functions of the dummy load and the r.f. wattmeter. This air-cooled load handles power levels to 1000 watts, and allows r.f. wattmeter readings of transmitter power output on either a 200- or a 1000-watt scale, depending on the range selected. At the heart of the unit is a 50-ohm heavy-duty, non-inductive carbon load resistor. The unit is protected against overloading or overheating by means of a thermal switch.

As you can see in the photo, the *Cantenna* has a small box at the top, which houses the coaxial cable connector that is used to connect it to transmitter. The box also serves as a housing for a simple voltage monitoring circuit that allows you to monitor relative transmitter output by connecting a d.c. meter to the terminals provided. By connecting your multimeter or v.t.v.m. to this tap-off, you can use it to tune your transmitter for maximum output.

Another construction approach is taken in the Heath HM-2103 Wattmeter, which is no longer offered by Heath although it is readily available on the use equipment market. Like the *Cantenna*, it will handle 1000 watts of r.f. power, but it is usable only to 30 MHz. Unlike the former, however, it has a built-in, accurate wattmeter for reading actual transmitter power output while working into the load. This feature is very



The Drake wattmeters shown here measure actual r.f. power output as well as reflected power. They can also be used to indicate radiated *power (forward power minus reflected power) by means of a special nomogram provided with the units. The Model W-4 at left handles 2 kW to 54 MHz, while the WV-4 is rated at 1 kW to 200 MHz. (Photo courtesy R. L. Drake Co.)*



For QRP transmitters and v.h.f. transceivers, a dummy load can be made for a dollar or two using nothing more than two carbon resistors and a PL-259 connector, as shown. It is made by soldering a piece of heavy copper wire or bus bar to the center post of a coax connector and installing two resistors between the bus bar and the connector's shell. For 70 to 75-ohm match, use two 150-ohm, 2-watt resistors in parallel; if what you prefer is a 50-ohm load, use two 100-ohm resistors. Be sure to use carbon and not wire-wound resistors—the latter will not work properly.

For tune-up, you can use your rig's internal metering, or you can use the r.f. probe of a v.t.v.m. clipped across the dummy load, tuning your gear for maximum meter deflection.

If you keep leads short, the dummy load shown here will work properly up to 2 meters, and will easily handle the output of the 10-watt class of v.h.f. transceivers if used intermittently.

You can also make a medium-power dummy load for an h.f. transmitter using various combinations of resistors connected in series-parallel arrangements. One such load is shown in fig. 2.

The 50-ohm dummy load shown here can be used with transmitters of up to about 100 watts input, to at least 30 MHz. An r.f. ammeter is connected in the line to allow you to calculate your transmitter's power *output* using the Ohm's Law relationship, $P = I^2R$.

The combined resistance of the twenty-two (22), 270-ohm resistors works out to be 49 ohms, which makes a good impedance match for the "nominal" 50-52 ohm output of most modern transmitters. Since resistors combined in series are additive, while resistors in parallel are divisive, you can easily make up other values for your load if you wish. For example, you can adapt this load for 70-75 ohm use by instead using 22, 390-ohm resistors. Many other combinations can be worked out for other load values and for handling either higher or lower power levels.

No special procedures are necessary for construction, other than keeping leads short and doing a good soldering job. An r.f. ammeter having a full-scale deflection of 1 to 3 amperes should fill the bill—and it can be eliminated if you have your own s.w.r./power meter or don't care to make current or power measurements. Or, you can connect up your multi-meter of v.o.m. to the output jack to measure *relative* power output.

The unit can be mounted in any convenient-size ventilated metal enclosure and connected to the transmitter through a short length of coaxial cable. After you finish construction, be sure to check the resistance of the completed dummy load for shorts (as read on an ohmmeter connected between the center pin on the input connector and the enclosure), *before* applying power. It should read about 50 ohms, or around 71 ohms if you designed the load for that impedance.

useful in checking transmitter efficiency (output versus input power), and in monitoring for any deterioration or loss of power in the final power amplifier tubes in your equipment (they can become *soft* or weak after a year of more's operation, particularly if they are operated close to their rated limits).

The HM-2103 uses an air-cooled, 50-ohm non-inductive solid carbon resistor as the load. There's quite a bit inside this unit—it's a lot more complex than the *Cantenna*. It has a pickup coil which samples a small portion of the r.f. applied to the load; this produces a voltage that is rectified and fed through a circuit to what is actually an r.f. voltmeter, but which is calibrated in *watts*. Thus, you can directly read transmitter output without having to perform any calculations. A thermal switch inside the case senses when the load is being overdriven (such as could happen if you were to run a full kw into the unit for an extended period of time); this circuit lights a high-temperature lamp which warns you of temperatures that might damage the load resistor. There is also a "press-to-test" type circuit which is built-in that allows you to check to insure that the warning light is working.

What about *rolling your own* dummy load? Frankly, if you're running high power, it's a sound idea to purchase one of the commercial units, such as the *Cantenna* ($14.95) that we described, or the Dentron *Big Dummy* ($29.50). Both of these are full-power, wide-range loads, meaning that they can handle any legal amateur power levels up to several hundred MHz. You can hardly duplicate them yourself at their price levels. However, if you're running *lower* power levels, say, up to about 100 watts or thereabouts, it makes sense to construct your own, since doing so entails a very simple project which can be accomplished for but a few dollars. Let's talk about two simple loads which you can construct for your shack.

For working with very low power levels, such as the output of 2 and 5-watt mobile or hand-held v.h.f. transceivers, you can either use a CB type load (they tend to work respectably well, even at 2 meters) or you can make your own simply by mounting a 2-watt, 50-ohm carbon resistor inside the shell of a PL-259 coaxial cable connector. One lead of the resistor is connected to the PL-259's center pin and the other lead is connected to the metal shell. Of course, if your transceiver uses a different type connector, such as a BNC or Type F, you can still use the same principle but with a slightly different physical configuration. Just be sure to use a *carbon* resistor; wirewound types will behave strangely, particuarly at v.h.f.

A second type of simple dummy load which you can build is shown in fig. 1. It should be useful in testing and adjusting the "typical" 10-watt class of v.h.f. transceiver. It is made up of two 100-ohm or 150-ohm, 2-watt resistors, depending on the load impedance you desire (50 or 75 ohms). I suggest mounting them, as shown in the illustration, to a PL-259 connector, regardless of the type of connector used on your rig—you can make or purchase an adapter connector to mate the PL-259 to other types of connectors which you may encounter on different makes and types of transceivers, such as BNC, Type F, RCA phono jacks, and Motorola automobile-radio type fittings.

Probably the biggest need for a suitable dummy load is for use with the 25 to 100-watt Novice transmitter These power levels lie in the "never-never land" between CB-type load capacities, and the full-power commercial-type loads. Usually, the Novice is confronted with the choice of either immediately investing in a full-power load at a time when his finances may not be in the best shape (after having just acquired his transceiver and accessories), or getting by on the not-so-satisfactory light-bulb load.

The dummy load shown in fig. 2 should fill this gap very nicely; it is simple, very inexpensive, and it can take the "nominal" 50-watt *output* of a 75-watt transmitter for extended

periods. It can also handle 100-watt transmitters for periods long enough to make necessary adjustments and take power output readings. Its impedance is about 50 ohms, which is just right to match the output impedance of almost all pi-network transmitters; they are normally designed to work into load impedances ranging from about 30 to 100 ohms.

Construction is simple. The whole affair can be mounted in a small aluminum box, roughly 5×3×2 inches. No special construction techniques are required—just mount a standard SO-239 chassis-type coaxial connector to the minibox and neatly group the twenty-two (22), 270-ohm resistors around it in two bands of 11 resistors each. The two bands are connected in *series-parallel* as shown in the diagram, to result in an "equivalent resistance" of approximately 50 ohms (49, to be exact!) This can be done in any number of ways, and so, no special *physical arrangement* of the resistors need be followed—just make sure that they are mounted neatly, that their bodies don't touch one another (for heat dissipation), and that all connecting leads are as short as possible, in order to minimize lead inductance which could upset performance on the higher bands. Of course, all the resistors should be of the same value. I recommend drilling a number of ventilating holes (at least ten on each side of the cabinet) to allow the heat generated by by the resistors to dissipate. The unit is connected to the transmitter by a short length of 50 to 53-ohm coax, such as RG-58/U.

If you've standardized on 72 or 75-ohm coax in your station (such as might be the case if you're using dipole-type antennas, which have characteristic impedances in this range), use 22, *390-ohm resistors* instead of the 270-ohm ones. This will give you a good "simulation" of your dipole antenna and a good match to RG-59/U coax. Of course, if you're handy in the math department, you can make up an almost unlimited variety of load resistor networks to handle a wide range of load impedances and power levels. For a good discussion of how to do this, read Bill Wildenhein's article, "Dummy Loads You Can Build," which appeared in the October, 1977 issue of *Ham Radio Horizons*. You can also get a "feel" for how resistor networks function (in regards to the effects of series and parallel-connected resistors on overall circuit resistance and power-handling capability) by cracking the pages of a good basic electronic-theory text, or the *Radio Amateur's Handbook*. (It's simple!)

Also, since you'll need a good-sized handful of resistors, bear in mind that high-wattage resistors cost from 25 to 40 cents a piece if purchase *singly* from franchised-type radio outlets or mail-order outlets. So look for them at hamfests or swapfests, or look for them in quantity buys (10 or more) from the many small solid-state parts supply houses that regularly advertise in the amateur radio magazines. You should be able to get them for 5 to 20 cents apiece if you shop wisely. (Resistors having a tolerance rating of 10% or even 20% are perfectly good for our purposes here).

Another point: While the r.f. ammeter shown in the diagram isn't absolutely necessary and may be eliminated if you prefer, it's handy because it allows you to *measure* your transmitter's output using a simple Ohm's Law calculation: Power, in watts, is equal to current, in amperes, squared, and multiplied by resistance, in ohms. This is more easily written as an equation: P (power) = I^2R.

For example, say you build and use the 50-ohm load described in fig. 2. If you read a current of 1 ampere flowing through your ammeter, plugging into the formula shows your output *power* to be 50 watts. This would be about right for a 75 or 80-watt transmitter. The size or rating of the r.f. ammeter you use isn't critical; I'd suggest using whatever you can find at your local surplus emporium. In general, though, a 1-ampere meter should be o.k. for up to 75-watt (input) transmitters, while a 2 or 3-amp meter will handle more power than the dummy load we've built here can take. And, if you don't want to invest in an r.f. ammeter, there is also a provision in the load shown here for connecting a d.c. milliamter (such as in your multimeter or v.o.m.) to the output jack for *relative* power output monitoring.

For maximum versatility, you'll probably want to use the dummy load in conjuction with an s.w.r. bridge/power meter that gives an indication of forward and reverse power. Since most power meters are designed to work into a known, predetermined load impedance, using the dummy loads described here will enable you to get a very accurate picture of your transmitter's output power. You can check on the accuracy of your dummy load by switching to the *reflected power* function on your power meter or s.w.r. bridge. It will normally read below abot 1.2 to 1 with any of the loads described here. (If you keep the resistor leads short, you should have no trouble in using the home-built 50-watt load on 15 and 10 meters; but the impedance of the load will probably start to rise quite a bit as you go *higher* in frequency, and it may or may not perform well on 6 and 2 meters, where it is no longer acting as a purely *resistive* load.)

Of course, after completing testing and tune-up with the dummy load, it's important to insure that maximum power is being transferred to the *antenna*—it's the r.f. that jumps off your antenna that *counts*. This means that you must have a good impedance match between your transmitter and the transmission line, and between the transmission line and the antenna. A grid-dip meter or antenna noise bridge will help you to obtain a good match to the antenna, and an s.w.r. bridge left in the transmission line will allow you to keep a "running check" on your overall s.w.r. for maximum power transfer and resultant "DX potential."

Don't be a "dummy" when it comes to on-the-air testing and adjusting of your transmitter or transceiver. Use a dummy load, and make maximum use of its capabilities—"Dummy-Up for DX!"

This lightweight, air-cooled Barker and Williamson dummy load/wattmeter will handle power output levels to 250 watts. It presents the transmitter with an s.w.r. of less than 1.3 to 1 up to 230 MHz, and it can be used as high as 300 MHz. Note the four selectable wattmeter ranges–10, 50, 125, and 250 watts. The low-range selection makes it useful in checking QRP rigs, CB transceivers, and v.h.f. handi-talkies in addition to Novice-powered h.f. transmitters. (Photo courtesy B&W).

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1. Moody, Willard R., WA3NFU. "Getting the Most from Your Transmitter." *Popular Electronics*, August 1973.
2. Wildenhein, Bill, W8YFB. "Dummy Loads You Can Build." *Ham Radio Horizons*, October 1977.

a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

WA6WTN And WB6APP QSO On SSTV Via OSCAR 8, a First?

On Oscar 8 passes #244 and #258, Earl Mathison, WB6APP of Lancaster, CA and Ted Jenson, WA6WTN, of Palmdale, CA made two-way SSTV contacts which they believe are the first on Oscar 8.

Although Ted and Earl live only 8 miles apart, their slow scan QSO *via* Oscar 8 occurred while the satellite was crossing the equator. The quality of the displayed SSTV was virtually closed-circuit as can be seen in fig. 1.

The two enthusiastic slow scanners who really got a big "kick" out this exciting QSO are shown in their respective shacks in figs. 2 and 3. Congratulations to these talented amateurs who have mastered two of amateur radio's newest technical phases!

For this contact in space, Ted and Earl used the satellite in its mode "A" operation. Because of the recommended use of 100 watts e.r.p., Earl was using left-handed circular polarization on a dual rotator, 10 element beam. Ted was using a homebrew, cophased, horizontal turnstile antenna, ¼ wavelength over 808 sq. ft. of radiation surface.

All of the communications between Ted and Earl *via* Oscar 8 were copied on tape recorders for further data and photography. (Note from W2DD— If *you* try SSTV via the satellites, be *sure* to follow the good example set by WB6APP and WA6WTN in getting their QSO on tape. You'll be glad you did!)

Congratulations for this apparent "first SSTV" via Oscar 8. If you know of others who are working SSTV *via* this satellite, please let me hear from you!

The SSTV Scene At Dayton, '78

Biggest news on the SSTV scene is the impending issuance of an FCC Special Temporary Authorization for experimentation with Medium Scan TV (including motion) in the ten meter band, as announced by Dr. Don C. Miller, W9NTP, at Dayton. The STA may very well be in effect by the time this issue of *CQ* is published. (The exact date of effectiveness was not available at Dayton.) Permissible bandwidth under the STA will be 35 kHz. The ten meter band frequency to be used will be above 29 MHz.

As Don pointed out at the SSTV seminar, the system he is proposing could provide the *first* transmission of motion pictures across the Atlantic (or other international distances) *ever*! He is currently making arrangements with some G stations to take part in experiments with him. (See below for how *you* can get involved.)

Don calls his system Medium Scan TV. The heart of the system is a Model 400 *Robot* Digital Scan Converter modified by adding a second memory and additional control circuitry designed by W9NTP. *CQ*'s busy photographer captured Don on film at Dayton, see fig.4.

In addition to motion transmission and reception, two-memory scan converters can: display two-color SSTV; accomplish frame-to-frame integration to reduce "noise" in pictures; make possible operation as a 256 × 128 or 128 × 256 systems; be used to caption pictures with call (or titling). Motion is transmitted by a method of "frame subtraction" which greatly reduces the total information that must be transmitted per frame.

Dr. Miller is anxious to enlist others to take part in experimentation with this advanced technology. In time, schedules will be set up for intercontinental contacts but at present much needs to be done in establishing a group properly equipped for medium scan operation. Here is *the* perfect opportunity for slow scanners to pioneer in a phase of SSTV that is just getting under way.

Dr. Miller plans to have further information available on this matter in the near future. There will be documentation, a p.c. board, and a p.c. board plus parts. For prices and further details please do NOT write to W2DD, write to Dr. Don. C. Miller Box 95, Waldron, Indiana, 46182.

Don Miller, W9NTP, has really started something with his two-memory scan conversion approach to Medium Scan TV. See text for details.

MORE SSTV AT DAYTON

Dr. George Steber, WB9LVI, described some of his current projects to those attending the seminar and forum. George is working on a digital frame integration system which can be used to improve picture quality when receiving SSTV under adverse conditions. The operation of the system is quite different from frame, line, or pixel averaging. Pixel by pixel, the information from one frame is added to that of the one (or more) previously received by the use of an adder circuit.

Dr. Steber did not say that his work on this subject would be published but we hope that this will occur in the near future.

Examples of the effectiveness of frame integration were displayed by Dr. Steber during his presentation. These examples can be seen (but not appreciated due to image size!) in fig.5.

The performance of Dr. Steber's frame integration system is quite similar to that obtained with a storage tube scan converter when two or more frames are written onto the tube's target before read-out. Readers of "In Focus" may recall several examples of this type of frame integration published in earlier columns.

*2112 Turk Hill Rd., Fairport, NY 11450

The Night of the Iguana

BY TIM SCARLETT, WD5BWL

It was Friday afternoon and Carl sat half-dozing in his last period Trig class when a note came from the office. The note said for him and Frank to meet Mr. Toler in the Biology room after school.

It seemed there was a problem with the boys' latest project, which was a joint effort by the Biology Department and the school amateur station. They were doing a study into the mechanism of Ectothermy in cold-blooded animals.

Ectothermy is the process by which some cold-blooded animals control their body temperatures by varying intervals in the sun and shade.

The test subject was a large lizard, found in the southwest, somewhat like the Gila Monster.

A small biotelemetry transmitter was attached to the lizard and data was sent back to the Biology room. The way in which the data was transmitted and processed was rather elaborate and the boys were very proud of it. An audio tone was sent from the transmitter that varied frequency when there was a change in temperature.

The transmitter was frequency modualted at around 450 MHz, with 500 milliwatts output. A frequency counter was connected to the receiver, and a graph was made to show temperature as a function of frequency.

The distance from the telemetry transmitter to the school was about 12 miles, so at first this presented a problem. The frequency, power, and distance called for the use of a repeater similar to the kind used for two-meter communications work.

When Frank arrived at the Biology lab, Carl was already there talking to Mr. Toler, the Biology teacher and amateur station sponsor.

"Well, boys," explained Mr. Toler, "we have recorded no change in the temperature since 10:00 o'clock, except normal outside variations."

"Looks like the poor fellow may be dead," remarked Carl.

"Or, he's busted loose from the transmitter," reasoned Frank.

"Well, at any rate, I'd like you boys to go and have a look. I haven't collected nearly enough data for a complete study. Go up to the old Cooper silver mine to look first; he usually doesn't stray from that area. I'll connect the speaker to the receiver and if you find the transmitter, make a break in the battery wire and send three dots or dashes. If you find him and he has died, send two dots and I'll come up to investigate, myself. I've got some papers to grade, so I'll be here for a couple of hours."

As the boys drove to the mine, they discussed some of their new projects.

"Well, how's the radio astromony work coming along?" asked Carl.

"Slow, but sure. I've got the right kind of low-noise high-gain receiver I want, but the antenna's the hairy part. My dad has a surplus parabolic dish that I'm trying to get him to part with. I think I'm going to use a non-resonant rhombic for now."

"Are you planning to just listen, or maybe send?"

"Transmitting is no real problem, but I don't like the idea of waiting around 10 years for an answer."

"Wow! That would really be something," said Carl, "you could be the first kid on you block with a QSL card from Alpha Centauri. What kind of message would you send, if you wanted to?"

"Good question, partner. My Dad seems to think that music and mathematics would at least be universal."

"It seems reasonable to thing that pi would be 3.14 in another galaxy, as it is here on earth."

"I think if I were going to send any one thing, it would be some sort of counterpoint music, like Bach. This would have a musical and mathematical sense."

"By the way, how are the experiments in voice synthesis coming along," questioned Frank.

"Oh, not bad. I was thinking I could use it in a repeater indentifier, but the voice isn't very friendly; and I don't think that amateur radio is ready for 1984, yet."

As the boys neared the mine, they noticed something lying on the ground about two feet from the mine shaft.

"Hey," said Frank, "see that lying on the ground by the entrance?"

"Yeah, looks like the transmitter and collar."

"Bet he's probably in the mine," added Frank.

"What do you say we go in and have a look?"asked Carl.

"I don't know, man; I don't think it would be very safe. That mine's pretty old and the timbers are probably rotten."

"Since when has something being a little unsafe stopped us?" said Carl.

"Okay, I guess a little peek wouldn't hurt. I should have known you had something like this in mind when you brought along that flashlight."

The boys got about six feet into the mine, when something came charging toward them from the darkness. To avoid whatever it was, they moved to the side and Carl hit one of the rotten timbers. Just as he did, the roof fell in about two feet behind them.

After the dust had cleared a little, Carl found the flashlight and called to Frank, "Hey, man, you alright?"

"Yeah, what happened?"

"Well, it looks like you were right about this mine being old and rotten," commented Carl.

"Looks like we're really trapped in here," added Frank, "and I don't think it would be cool to dig out through this end. But at least we've got the handi-talki and the 01-61 is just about four miles away."

"Afraid not," said Carl.

"Afraid not? Why?"

"Well, to make a long story short, the batteries are dead."

"That's just great! Why did you bring the darn thing, anyway? "

"I'm so used to wearing it, I kinda feel naked without it."

(Continued on page 92)

RTTY Can Be Easy!

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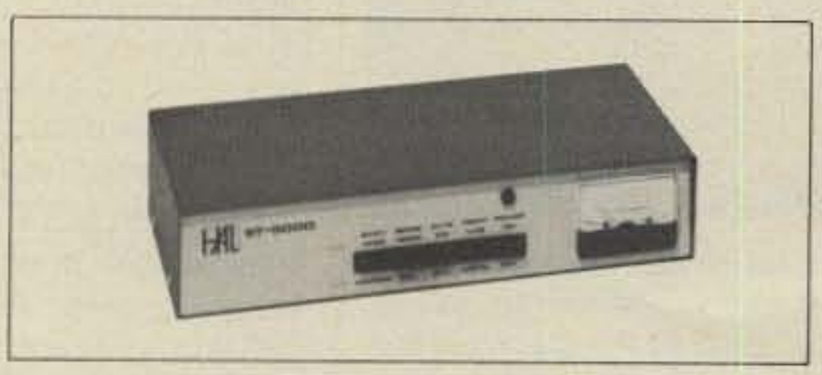

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Our sales and service staff will be happy to assist you in your choice of RTTY equipment, answer questions about RTTY, and provide assistance if problems do arise. In addition, all HAL amateur RTTY equipment manuals can be purchased for $10.00 each for an advance look (applicable to future purchase of that unit).

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SSTV picture sent through OSCAR 8 by WB6APP, Earl Mathison, Lancaster, CA.

Ted Jenson, WA6WTN, of Palmdale, CA. looking very pleased with his OSCAR 8 SSTV QSO. Contrary to any impression that you may have, Ted is in HIS shack, not the stock demonstration room at Henry Radio!

Earl Mathison, WB6APP is shown here in his well-appointed shack. In addition to the handsome array of gear in the background, Earl has an extremely effective antenna for the 432 MHz. band.

Dr. George R. Steber, WB9LVI, presented an excellent review of his current work on digital frame integration at Dayton. See text for more details.

What Else Is New?

In answer to repeated inquiries at Dayton, *Robot*'s president, Joe Hawkins, and sales manager, Dave Smith, reported that they have no plans for a new model scan converter for the immediate future. The *Robot* Model 400 is selling at a remarkable pace. It appears that now that practically every amateur in the U.S. has equipped himself with an fm rig (in addition to the sideband gear etc.) he is seeking new worlds of action and right at this moment, SSTV is *it*!

All stock that *Robot* brought to Dayton for sale was actually sold before noon on Saturday. They had trouble hanging onto their demonstration gear—maybe that explains the big smiles on Joe and Dave in fig.6!

SSTV People

It's hard to estimate how many slow scanners actually attended the Hamvention. My guess would be around 150, a very small percentage of the gate. So, SSTV is still young in one respect. For a look at some SSTVers who've been with it for a while, see Tony Gallo, W3LDS, the handsome trio of Peter Kuehn, WB6TOC, Dr. Frank Biba, now K5GH, and Bob King, WB5IXK. And that sly looking chap is Warren Weldon, W5DFU, from Tulsa, in figs.7, 8, and 9.

Slow Scan Station Of The Month, HR2HH

Hal Holler, HR2HH, of San Pedro Sula, Honduras, operates one of the best known slow scan stations in the world. A long-time amateur who migrated to Honduras about thirty years ago, Hal is General Service Manager for the Caterpillar Tractor dealership. He and his wife have two married daughters and a son who is attending college.

Hal started in slow scan with a home-brewed W6MXV monitor and a WØLMD fast-to-slow scan converter for his fast scan camera. He then added WØLMD SSTV keyboard (which he also built). His present equipment includes an *SBE* camera and monitor combination, a fast scan *Panasonic* monitor, and a WB9LVI scan converter which he built up from the p.c. boards. You can see the well-articulated results of Hal's building efforts in fig. 10. For a look at Hal and his spacious shack see figs. 11 and 12.

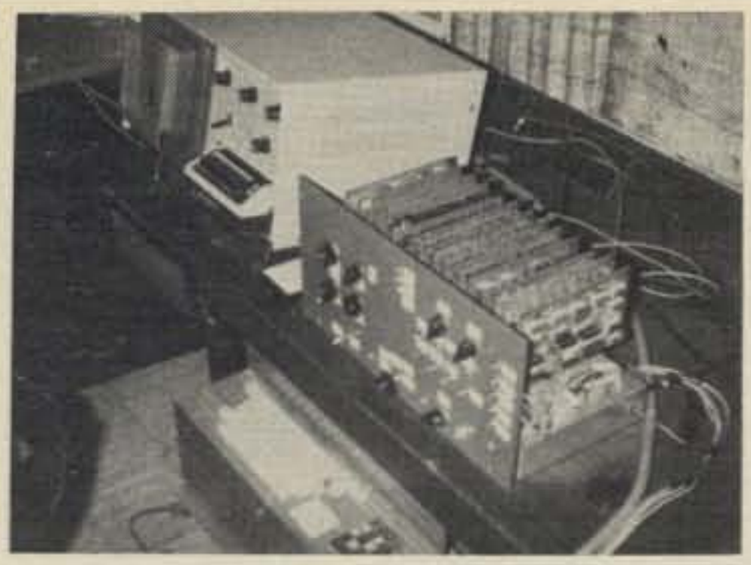
Although HR2HH is frequently found on the 14.230 SSTV spot, he has pioneered in trying to keep slow scan action going on the ten meter band. He is very active on 28680 kHz. every Saturday and Sunday. For an interesting contact with a slow scanner who's really tried just about every phase of SSTV (including color transmissions), fire up your rig on 10 meters some weekend and give HR2HH a call! Thanks Hal, for the pix!

You'd smile too if you had sold all of your stock at Dayton in the first few hours! Robot's *president, Joe Hawkins, and sales manager, Dave Smith are understandably happy as seen here at noon Saturday–Dayton.*

Tony Gallo, W3LDS, has at least one of everything showing in this picture. If you are computer-oriented and want to mix your computer with SSTV or what have you, Tony is the man to see.

QRM on 14230 kHz. was at a low ebb when this picture was taken. Peter Kuehn, WB6TOC, Dr. Frank Biba, K5GH, and Bob King, WB5IXK were mapping strategy for the next SSTV contest when caught by CQ's roving cameraman.

That devilish glint in Warren Weldon's eye signifies new plans for his lofty-lookie fast scan camera. Keep an eye on the pix from W5DFU for further developments.



HR2HH built this beautiful scan converter and the SSTV keyboard just in front (and below) it. Scan converter is WB9LVI designed, SSTV keyboard designed by W0LMD.

The pipe smoking Hal Holler, HR2HH, keeps slow scan in action on 28680 kHz.

A general view of the spacious shack of HR2HH.

See text for details of this nifty SSTV lay-out at VK2NM. Note the TV terminal-looking combination of SSTV monitor and keyboard. BEAUTIFUL!

From "Down Under", Pictures Of Another Famous SSTVer, VK2NM

Len Pollack, VK2NM (ex-G3SZX), who operates out of Mount Druitt, N.S.W., Australia, is typical of that inner-core of long-time slow scanners who just keep building the next, and the next, and the (!!!) next piece of slow scan gear—year after year. In addition to his SSTV interest, Len is very active in RTTY operation.

Len describes the equipment shown in fig. 13 as follows: "Top left to right, RTTY demodulator, control unit for TX/RX and selection of Teletype® equipment, models 14 TD, 14 perforator, multi-purpose power supply with clock displays, fast-to-slow sampling converter, fast scan monitor and camera control unit, HW32A transceiver, fast scan monitor/shack television. Middle row contains light dimmers master control panel, etc. Lower left to right, Model 15 Teletype®, YTDX 560 transceiver, SSTV monitor and keyboard. The SSTV monitor is a home-brew copy of a *Robot* 70.

Len uses an 8 inch E26 phosphor tube in his monitor as do many other VK hams. I believe that VK3LM reported some time back that this phosphor is less subject to excitation from ambient light than is the P-7.

Built into Len's keyboard is the ability to generate normal and double-size letters, back space, individual line selection, plus a checkerboard pattern and 3, 7, or 14 step gray scales. A nice collection of "can-dos" to have on tap! See fig. 14. For flexibility in handling a variety of subjects (flat copy) when transmitting "live," Stan has mounted his fast scan camera so that it can be used either vertically or horizontally with a minimum of effort. Good idea!

Stan hasn't given up c.w. operation entirely—as you can see in fig. 15.

Many thanks to VK2NM for a most interesting letter and the fine photographs reproduced here.

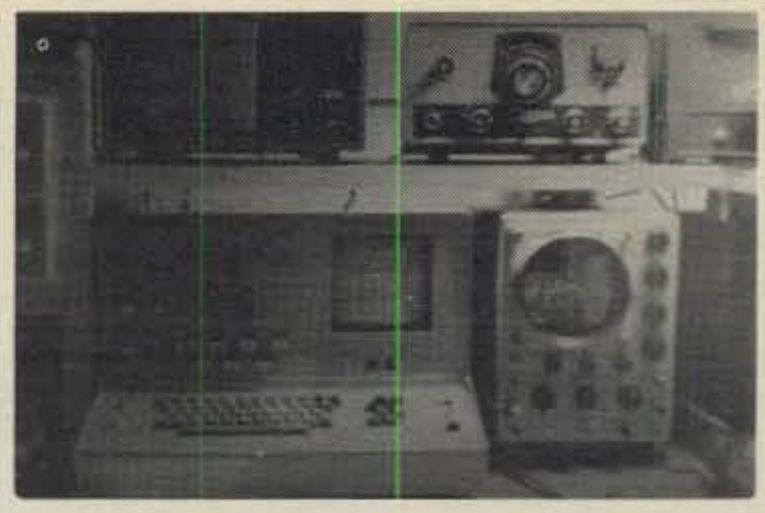
What's New On The Continent?–Goodies From DL2RZ

A brochure received recently from Volker Wraase, DL2RZ, announces the availability of an SSTV keyboard designed for use with (and *only* with) the DL2RZ scan converter. It's called the KB-420, and it carries a price tag of $265, including air parcel post (but plus customs of course). The KB-420 is pictured in fig. 16.

An interesting feature of Volker's new keyboard is that any picture stored in the memory of the SC-420 scan converter can be used as a background for the alpha-numeric information generated by the keyboard. See fig. 17.

Other features of the KB-420 include a built-in cursor which shows where the

(Continued on page 93)



Close-Up view of VK2NM's homebrew combined SSTV monitor and SSTV keyboard. Scope at the right is used for monitoring TV waveforms, etc.

Could that be a c.w. key that Len Pollack, VK2NM is caressing? Horrors!

New product announced by Volker Wraase, DL2RZ, the KB-420 SSTV keyboard to be used as an add-on with the Wraase SC-420 digital scan converter. See text for details.

The KB-420 SSTV keyboard can be used to super-impose alpha-numeric information on pictures or other background material stored in the scan converter memory.

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast opened the door to the refrigerator and removed a *Life Support System*. He expertly popped the lid and took a long , refreshing drink from the frosty can.

"Ah!", he said. "Just the thing for these hot days!"

"Since when have you been drinking *Rocky Mountain Cool-Aid*?", I asked enjoying the broad smile on his face.

"Any port in a storm", he replied. "That's all you had in the box. Regardless of the name, it tastes *great* when its free!"

"Have another one", I responded." I'm on a diet. And we still have a pile of letters to read that arrived during my vacation".

Pendergast reached out and speared a letter with a screwdriver blade. "All right", he said, "Here's the first one. And it is from Don, K5DUT, in Fort Worth, Texas. Don says that activity is at an all-time high in "Cow Town." Bob, W5MOK, has put up a seven element Quad on a 62 foot long boom. And Luke W5VGE, is running experiments on an *eight element Quad* on a 58 foot boom.

48 Campbell Lane, Menlo Park, CA 94025.

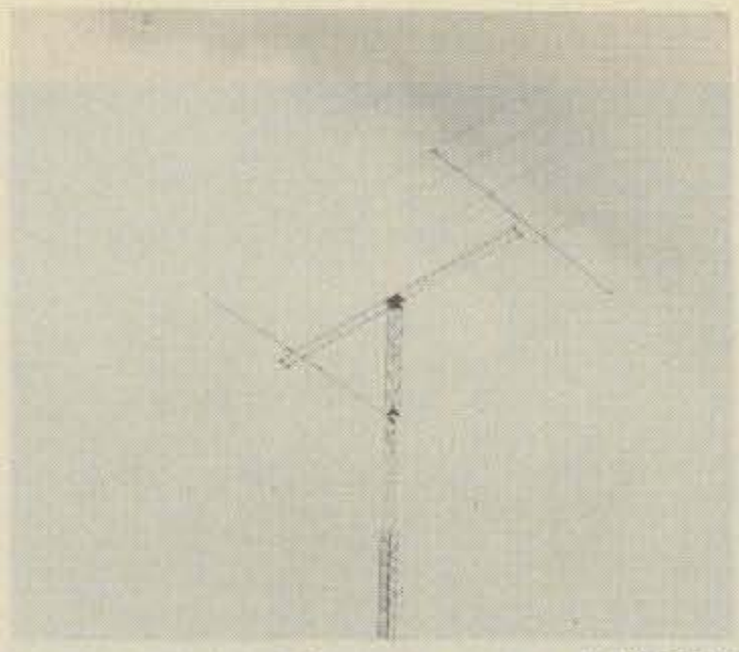


Fig. 1 – The block-buster antenna at KP4RF. It consists of two five element Yagi beams, collinear, with 55 foot spacing between the booms. The antenna is 155 feet in the air, atop a 3,000 foot high hill in Puerto Rico. Anybody working Pedro can attest to the remarkable signal from this fine antenna.

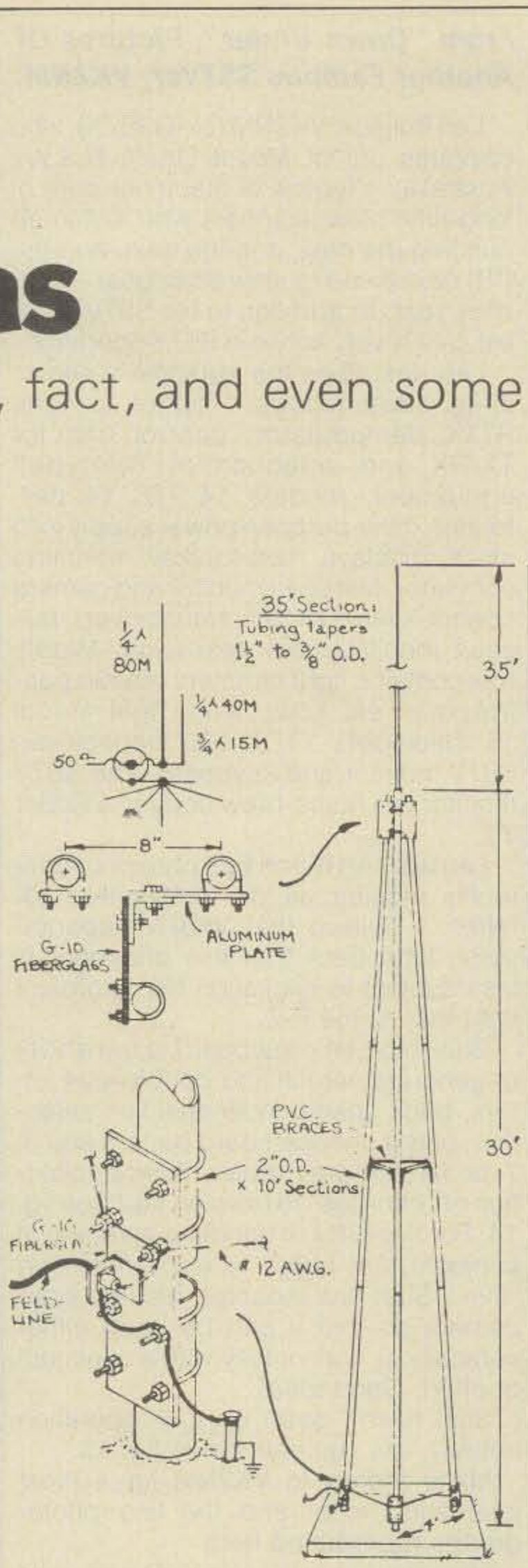


Fig. 2 – The new KLM vertical antenna for 80, 40 and 15 meters features broadband response. Antenna is freestanding and requires only a modest base to support it.

And he's planning to put *eleven elements* on 10 meters on the same boom. Hmm-m-m! No wonder Don calls Fort Worth the Monster Quad Capital of the world!"

"Well, I must admit they have a lot going for them. However, they aren't the only peanuts on the shelf. When I was in Hawaii last spring I heard the fantastic signal of Pedro, KP4RF, in Puerto Rico.

"Japan is a pretty tough place to work from Puerto Rico, but KP4RF had a tremendous pile-up of JA stations calling him. I ran across the pile-up by accident and it sounded like a beehive, and it was pinning the meter of my receiver. Then KP4RF came on with his block-buster antenna and really blew the frequency clean! A very impressive antenna (fig. 1).

"It is composed of two five element Yagi beams, collinear, with 55 feet spacing between the booms. The antenna is 155 feet high in the air, atop a 3,000 foot high hill near the sea".

"How much gain would KP4RF get from a big beam like that?", asked my friend as he sipped his brew.

"Well, I would guess each beam provides a power gain of about 10.5 decibels over a dipole. And Pedro probably picks up about 2.5 decibels from the stacking arrangement. That makes the total power gain about 13 decibels over a dipole. And that's a *lot* of gain on 20 meters. Add the excellent location to it. . . ."

"And don't forget the KP4 call, too", exclaimed Pendergast. "A KP4 call is worth at least six decibels in a pile-up. Maybe more".

I reached over and took a quick drink from Pendergast's can.

"Right", I said." The signal report increases with the rarity of the DX call. A new country, with a signal just out of the noise level rates at least an S-8 report-possibly S-9. And, of course, no DX station worth his QSL card ever gets worse than an S-7, regardless of how loud he really is".

"True", admitted Pendergast, as he picked up the next letter. "But KP4RF and the boys in "Cow Town" are going to have to watch out. Here's a note from Frank, W6KPC. And Frank is putting up the ultimate block-buster for 20 meters, I'm sure. Imagine a 200 foot self-supporting tower, with the top 100 feet rotatable. And imagine two six element be collinear, at the top. Pretty much like the arrangement that Pedro, KP4RF, has. And imagine two more six element beams at the 100 foot level—all four beams supported by the rotatable section of the tower! That makes 24 elements on 20 meters! That should be good for a power gain of at least 16 to 17 decibels! Wow! It shatters the mind!"

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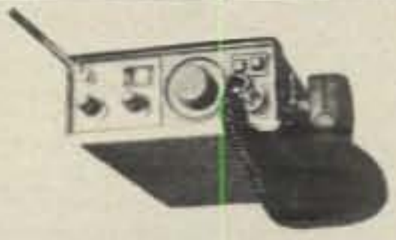

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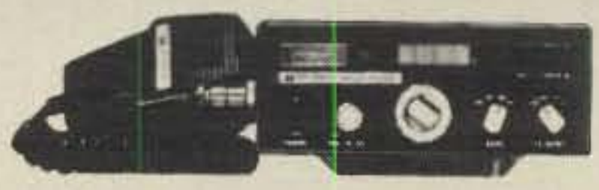

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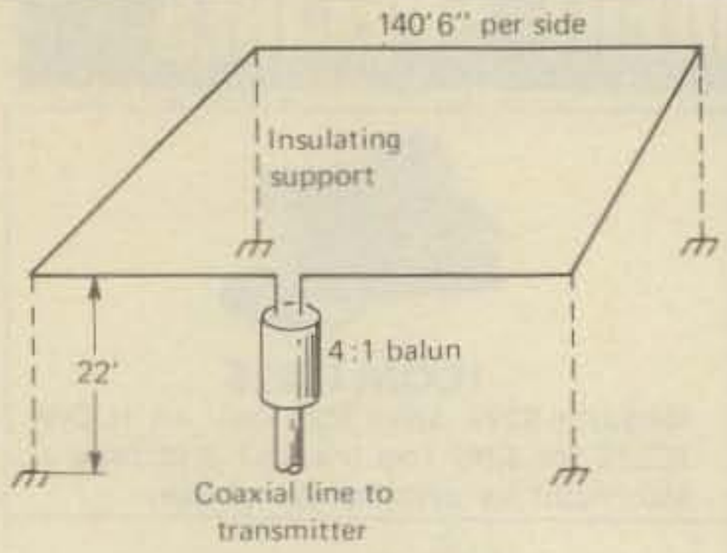

Fig. 3 – The "Merry-Go-Round" Quad loop of W9LZX. Only 140 feet on a side, the antenna works on all bands, 80 through 10 meters. Antenna is fed with a 4-to-1 balun and a coaxial line.

"I hope to get some pictures of this beast", I admitted. "Surely it must be the winner in the race for domination of the frequency on 20 meters".

"Let's come back down to earth", suggested Pendergast. "Sure, it's a lot of fun to talk about big beams, but what about the fella on a city lot? With little cash in his pocket? What does he do about it?"

"There is plenty of DX to be worked with a dipole or a ground plane", I replied. "The ionosphere is a great leveler of signals. The fellow with a modest antenna may not be first in line when the new country comes on the air, but he seems to get there just the same".

"Yes", replied Pendergast. "The Clipperton Island gang worked over twelve thousand stations, and I'm sure not all of them had monster beams".

"Still up-tight because you didn't work Clipperton?", I asked.

Pendergast smiled. "Yes, but not so much now. Time heals all wounds, and I'm sure that somebody will go there again in the next 20 years. So, all I can say is wait until next time".

"That's a good mental attitude", I replied. "But, just the same, you are right. The ionosphere can lend a helping hand to the QRP DKer, or the DXer with a modest antenna. A few weeks ago I pulled out all my foreign QSL cards and looked them over. Almost 60 percent of the foreign DX stations used ground plane antennas. And some of those signals were *loud!* So don't look down your nose at the vertical antenna".

I reached in the drawer at the operating desk and brought out a drawing (fig. 2). "Here's a very interesting vertical antenna designed for operation on 80, 40 and 15 meters. It is freestanding, has very low wind resistance and requires only a modest base to support it.

"Bandwidth is excellent. Eighty meter coverage from 3.8 MHz. to 4.0 MHz. is achieved with an s.w.r. of less than 1.5-to-1. And on 40 meters, the whole band is covered with an s.w.r. of less than 1.8-to-1. And on 15 meters, the whole band is covered with an s.w.r. of less than 1.5-to-1. Now, that's good news for the fellows using solid-state amplifiers which are very sensitive to the s.w.r. of the antenna circuit.

"Basically, the antenna is composed of two separate verticals: one for 80 meters and one for 40 and 15 meters. The physical arrangement of the tower legs makes for a rather wideband affair. Ultimate operation, of course, is determined by the radial system. A minimum of three radials for each band is suggested. This particular antenna (a prototype) uses three 80 meter radials and nine 40 meter radials. An additional six radials were used for 15 meters".

"Interesting", remarked my friend. "What is the construction of this antenna. And who makes it?"

"Two-inch irrigation tubing is used for the lower portion of the antenna—the tower", I explained. "The top section is made of telescoping tubing, 1-½ inches down to ⅜ inch at the tip. The prototype used surplus G-10 fiberglass material as an insulator. The center insulator should be high quality as rather high r.f. voltage exists at this point. The base insulator isn't so critical. And, for your information, the antenna will be marketed by *KLM Electronics,* I believe".

"It looks like a great antenna for the fella with restricted space", remarked Pendergast, as he made a drawing of the antenna in his notebook.

"Here's another interesting antenna", I remarked. "My old friend, Clarence Moore, W9LZX, the inventor of the Quad antenna is at it again (fig. 3). He calls this his "Merry-Go-Round" Quad. Basically, it is a very large, horizontal Quad loop measuring 562 feet in circumference. That amounts to 140 feet six inches on a side. The wire is parallel to the surface of the ground and about 22 feet in the air. It is fed in the middle of one side with a coaxial line.

"Because of the relatively large size of the loop, the antenna has a broadband response that is very useful. The s.w.r. on 80 meters is about 1.4-to-1 at 3.5 MHz., rising to about 2-to-1 at 4.0 MHz. And on 40, 20, 15 and 10 meters the s.w.r. is less than 1.5-to-1 across the whole band. Clarence is working on a simple network to make the antenna work on 160 meters, too. Right now, with these dimensions it is resonant at 1787 kHz., which is a little low for anything except the low end of the 160 meter band".

"This looks like the universal, all-band antenna", remarked Pendergast. "Is there any useful information about directivity?"

"Too early to tell", I replied. "It has only been up for a short time, but W9LZX reports good results, on working casual DX on all bands. Hopefully, we'll know more as time goes on. It is a very simple antenna to erect.

"The antenna is fed with a 4-to-1 balun. And that's all there is to it", I concluded.

"Have you seen the simple antenna that Keith, K6WG, is using on 40 meters?", asked Pendergast as he drew a sketch in my log book (fig. 4). Keith has done a lot of experimental antenna work and he has found this "inverted vertical" antenna to work well for either 80 or 40 meters. Basically, it is an upside-down ground plane. The radial system is a half-wavelength long tip-to-tip, which you can look at as two (or more) one-quarter wave radials. The radiator is a quarter-wave wire that drops down from the center of the radials. It is fed at the top.

"The antenna is built around a 33-foot TV slip-up mast. The mast is guyed by four wires, which are the radials. Each radial is a quarter-wavelength long. The feedline is taped to, and runs up one of the radial wires. The center conductor connects to the vertical section and the outer braid of the line is attached to the radials. So you see, it is an inverted ground plane, with the high current portion of the antenna at the top of the vertical wire, instead of at the bottom."

"That should reduce ground losses", I admitted. "It looks like a good idea. I had a version of this idea once. It used two radials, in a line, and the vertical antenna was dropped down from the center point. I was in an apartment at the time and strung a half-wave wire across the building and then dropped the quarter-wave wire down at the center. I ran the coax cable out to the center point. The vertical radiator was actually below me, as it almost reached to the ground. But it worked fine; there's no law that says the ground plane has to be right-side up, or upside-down!"

Interesting antennas such as these (and others) are described in W6SAI's handbook: *Simple Low-Cost Wire Antennas,* available for $4.95 plus 50¢ postage from: Radio Publications, Inc., Box 149, Wilton, CT 06897.

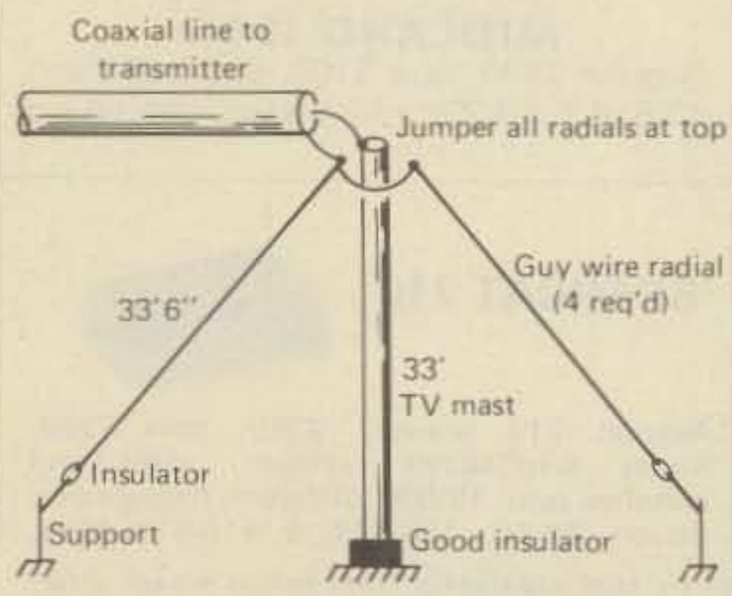

Fig. 4 – The K6WG "inverted vertical" antenna for 40 or 80 meters is an upside down ground plane, fed at the apex.

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

On the following page there is an important correction to the July Math's Notes Column.

From time to time we get requests for the names and addresses of various integrated circuit manufacturers, as a result we annually publish a list of these companies. This year we are going to do things a bit differently. With the growing number of surplus outlets, more and more IC's are being made available to amateurs, and most times the manufacturer is simply not identified. What we have done is to borrow part of an article appearing in *Electronic Products Magazine* which listed the logo's, or symbols, of most of the integrated circuit manufacturers, and published these symbols here. While many are obvious, many are not and by referring to the list, identification of the manufacturer should be much easier.

In addition, the numbers on the packages often contain the part number, as well as package code and a date of manufacture code. Be sure to ponder these numbers carefully, and not dismiss them with a glance if you do not figure out the correct part immediately. If you anticipate using many of these "unknowns" a good cross-reference guide is also quite helpful.

We would like to apoligize for the two missed columns of Math's Notes that have occurred recently. With a turnover in the procedure of CQ Magazine, a "lost in transit" situation occurred with our column. This is all straightened out now and we promise uninterrupted service from now on. Thanks very much for all of the concerned mail, however, it is nice to know that we have so many loyal readers.

Now, on to the list.

---

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No - 67-68

The printing Gremlins really did a job on us last month and misplaced the drawings for Math's Notes. Our apologies to you the reader and to author Irwin Math for this mistake. Here are the drawings that should have accompanied last month's text.

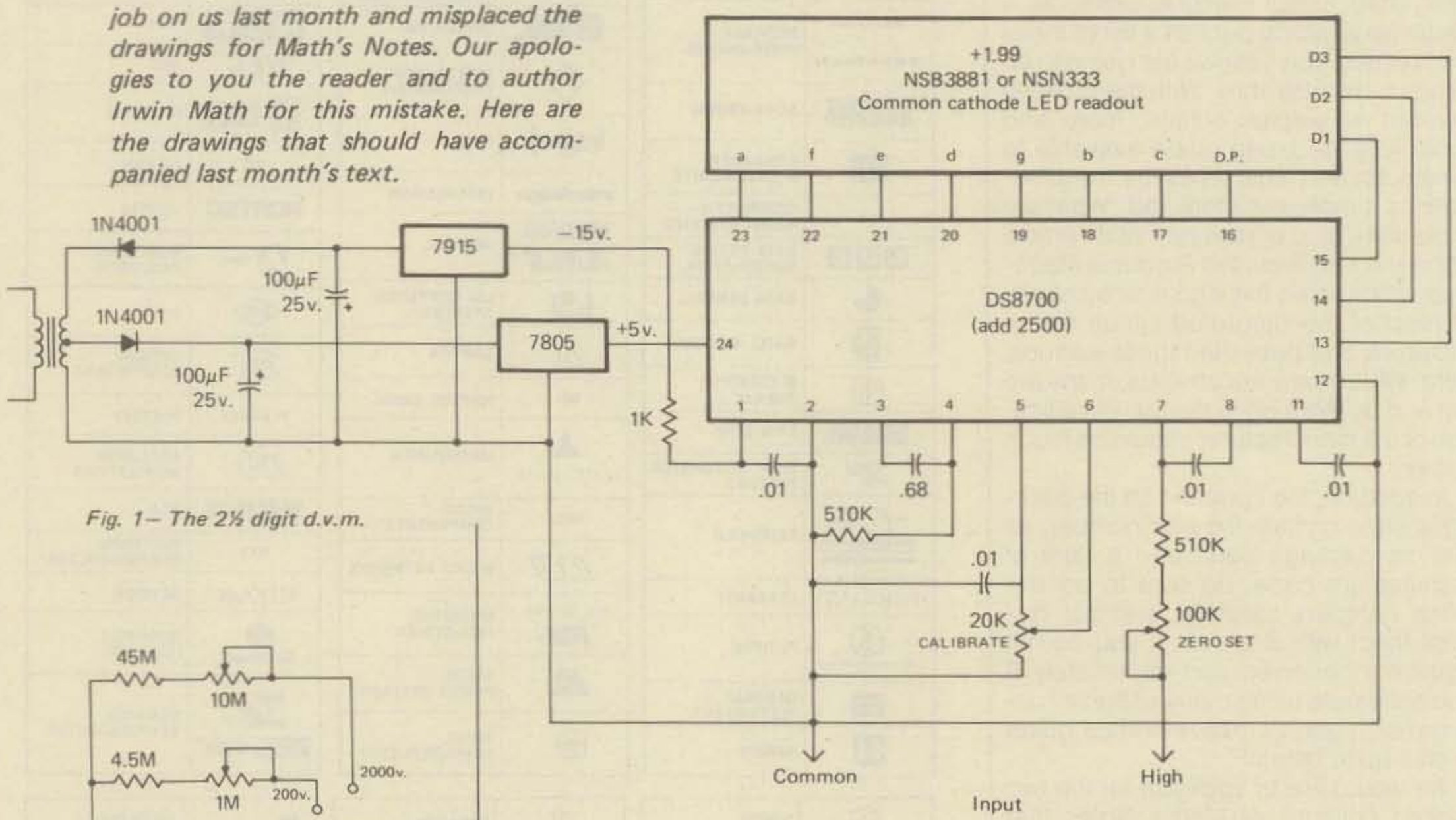

Fig. 1— The 2½ digit d.v.m.

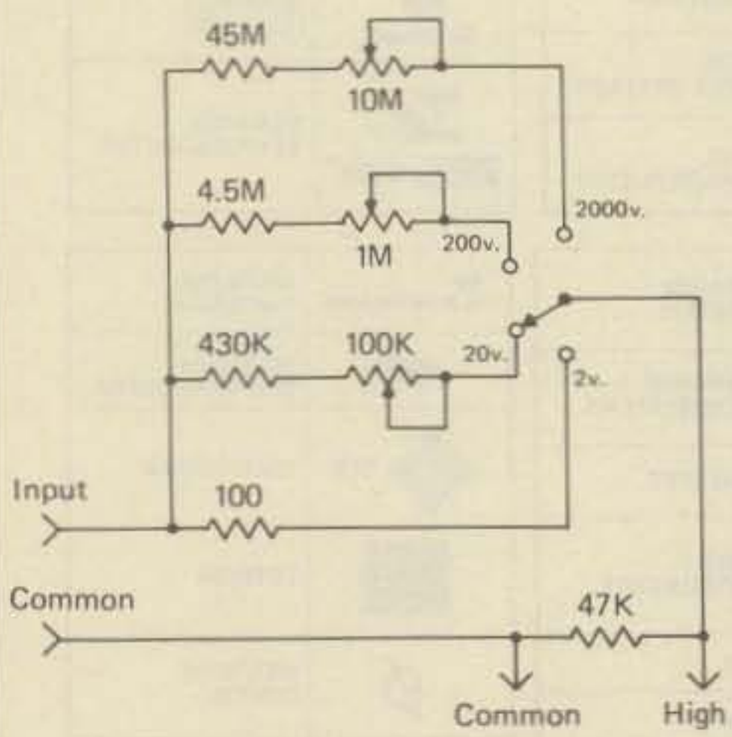

Fig. 2— Modifying the input as shown results in a multi-range instrument.

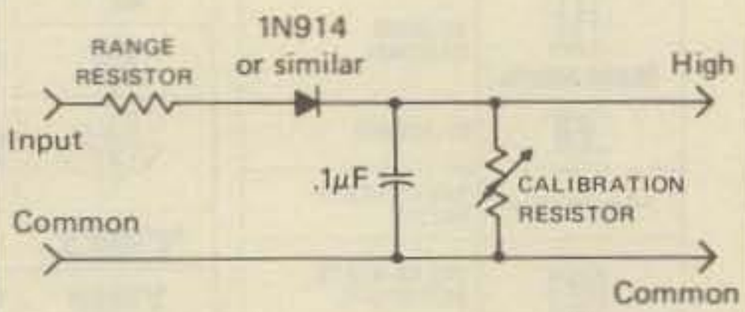

Fig. 3— By adding three components, the meter will measure a.c.

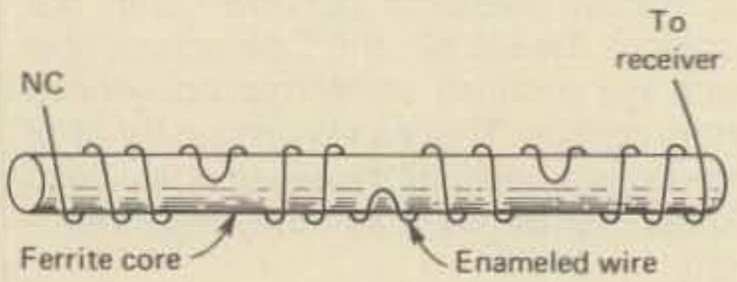

Fig. 4— The v.h.f. ferrite rod antenna as described in the Jan. 1978 issue of Electronic Design.

This conversion of one of the popular CB antennas to 2 meters requires only substitution of the loading coil, retaining use of the hardware, transmission line, and whip. Inserting the original loading coil restores 27 MHz operation. Theory also covers other CB antenna types.

Gimmicking a CB Mobile Antenna for Two Meter Use

BY DAVID T. GEISER*, WA2ANU

Introduction

This article describes step-by-step conversion and tuning of the General Electric Model 3-5701B 3-way CB antenna to two meters by modification of the loading coil alone. Enough theory is included to help make similar modification to CB antennas with lengths of 36-50 inches.

Theory

Vertical antennas such as are used for 2 meters are usually of the ¼ or ⅝ wavelengths type,[1] dimensions that do not always agree with the length of a base-loaded CB whip. The whip here is almost exactly (with the mounting spring) a half-wave, a good antenna for local work and to repeaters, but "hard to load." A ball park estimate for feedpoint resistance at half-wave resonance might be 1000 ohms. Without matching, this would be a 20:1 s.w.r. to a fifty ohm coaxial cable.

While the most efficient matching network is the L-type made up of an inductor and a capacitor, I decided to use two cascaded L-networks, intending that the first one would match from 50 to 224 ohms, and the second from 224 to 1000 ohms. This seemed to me to allow more chance of finding the actual impedance match more quickly.

There are four choices for such a circuit (fig. 1), and I picked the (d) version. In appearance this looks like a single tapped coil, a variable capacitor, and two pieces of solid hookup wire, twisted together. (Two unconnected pieces of insulated hookup wire twisted together make a "gimmick," a capacitance that can be changed by wire untwisting. The "classic" value is 1 pF per inch.) The large variable capacitor (C_1) is a glass piston type, but either mica trimmer or air variable should be satisfactory. Ceramic variables should also be satisfactory on low power, but I know of none with r.f. power (current or voltage) ratings. I chose the particular type used as it was available and I could fit it in a ⅜ inch diameter hole drilled through the coil form.

Antennas of course can be calculated for apparent resistance and reactance, but there are a tremendous number of unknowns in any mobile installation. Just the movement of a few inches in mounting location causes changes in an amazing number of equations. The ordinary amateur should feel no embarrassment in experimentally adjusting to fit the actual situation in cases where a math or physics PhD could well be confused.

Construction

The particular CB antenna chosen has the coil molded in a tough rubbery two-layer material. (On some of the models the layers could be separated, but on most of them it comes off in one piece.) Clamp the body of the coil in a vise securely and cut through the rubbery material lengthwise two or three times (a single line) until you can feel the knife running along the metal and wire surface underneath. (A short-bladed knife such as is used to cut plastic floor tile is good.) Use a screwdriver and strong fingers to separate the cover at the

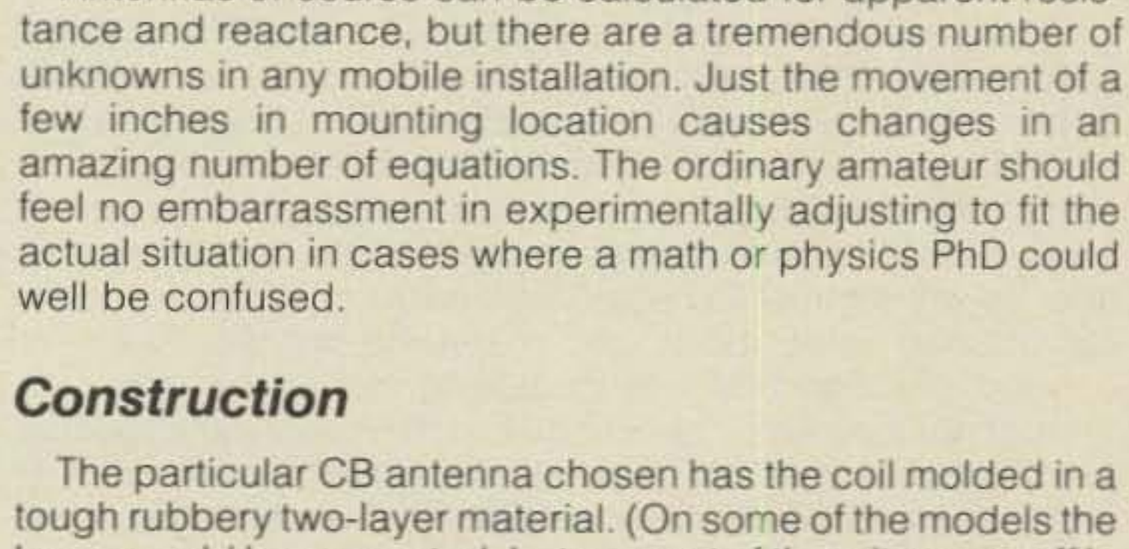

Fig. 1 – Four possible forms of 2-stage "L" matching networks. Form (d) was chosen because L_1 and L_2 may be a tapped coil and provide the whip a d.c. path to ground.

*RD 2, Box 787, Snowden Hill Rd., New Hartford NY 13413

[1] Typical "⅝ wave" antennas are described in Brier, "A ⅝ Wave Vertical for 2", *CQ*, Feb 1964 p 45; ARRL, *FM and Repeaters for the Radio Amateur*, 1st ed, 1972 p. 93.

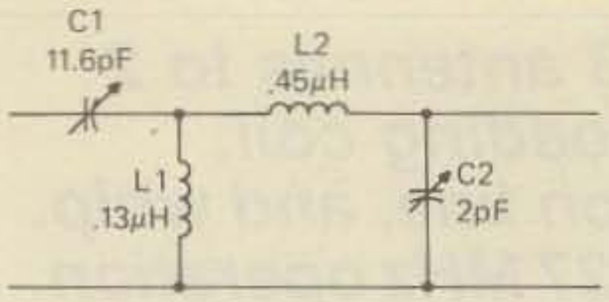

Fig. 2 – Target values of the network. The C_1 shown was an obsolete JFD type VCJ2555 1-40 pF capacitor which may be replaced here with JFD NMC623TT (about $10.55). A 3-30 pF mica trimmer or air capacitor should be ok, as final adjustments measured various values between 10 and 20 pF.

cut, and peel off the rubbery material. The coil will then look like the second from left (vertical) coil in the photograph. With a little practice (I've made six of these) the cutting and peeling takes less than a minute. (A defective loading coil works fine.)

Unsolder the coil at the top collar, the bottom collar, and the tap. A fairly-heavy soldering iron (100 watts or more) is helpful here, and will be more so later. Save the wire if you haven't nicked it badly in cutting the cover off. The enameled wire is more than enough for the new loading coil.

Now you must decide (based on the capacitor you intend to use for C_1) whether to mount the C_1 capacitor entirely outside of the coil form, through the coil form, or partly (just the shaft) through the coil form. My opinion is that a hole through a diameter of the coil form should be no greater than ⅜ inch, and that only if well centered. (I suggest putting a small pilot hole through first so a larger bit won't wander. Any metal drill can be used to make the holes.) The hole should be at least ⅜ inch above the tap solder point to make sure of clearing the base-mount center conductor.

If they are loose, tighten the end collars on the plastic form. Later soldering will tend to bind them in place.

Clean and tin one end of the enameled wire. (If you have badly nicked the original wire, any solid 18, 16, or 14 AWG copper or silver-coated or tinned wire will do.) Solder one end of th wire to the lower (knurled) collar at the original solder point and wind 2½ turns in the two center grooves on the lower part of the form. Clean and tin the wire at this point as later we will connect C_1 here. Continue the coil 7½ turns to the upper collar solder point, and solder the coil here.

If the decision had been made to mount the capacitor through the coil form, it would be best to mount the capacitor before the coil winding. That way the coil turns can avoid its body, and the coil tap can be soldered directly to one of the capacitor connections.

If the coil has been wound before the capacitor was mounted, mount the capacitor now. One connection of the capacitor should be fixed to the tap point (center conductor) of the coil form, the other capacitor connection to the tap point of the new coil. I prefer connecting the tap point of the form to the side of the capacitor that is connected to the adjustment screw or shaft, as this side of the capacitor is at the lowest impedance and may make the later adjustment less touchy.

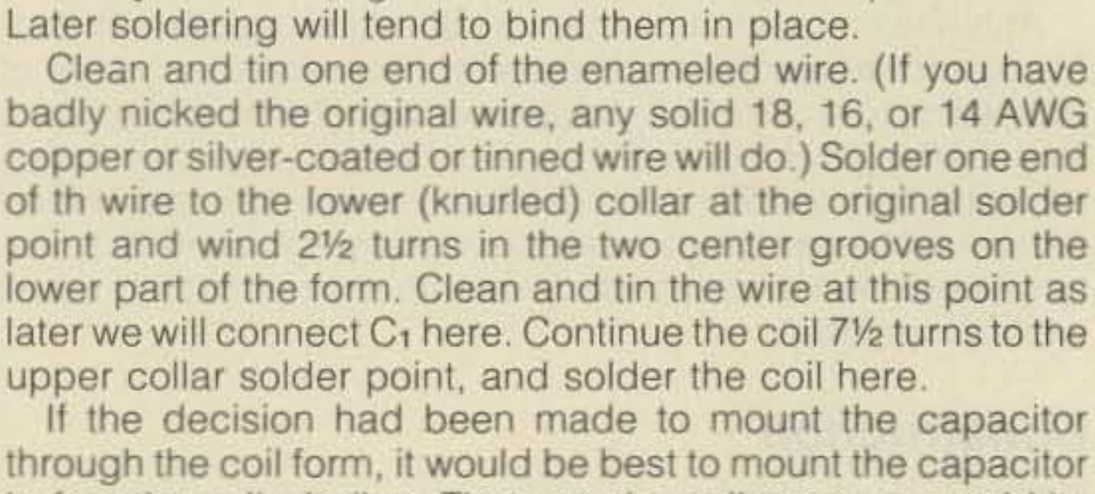

Fig. 3 – Layout of the coil. Solder is puddled into the hole in the coil form to contact the "tap point."

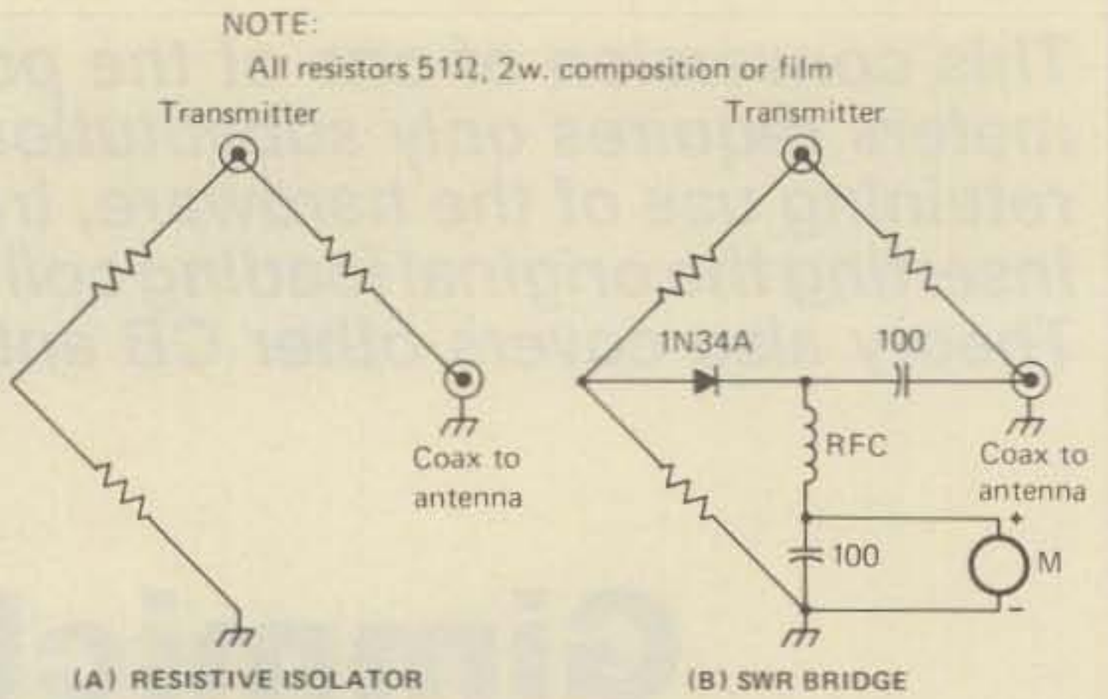

Fig. 4 – (a) "Isolator" prevents xmtr load from falling below 33 ohms or rising above 100 ohms, reducing chance of transmitter damage. (b) Addition of four parts and 0-1 mA meter changes the isolator to s.w.r. bridge.

Now for the Gimmick. (Another version will be described in the *Comment* section.) Tack-solder two 4-inch pieces of insulated hookup wire to the collars, one to each the upper and to the lower. Twist the insulated parts of the wire together for about an inch. (fig. 3)

Assemble the antenna on the desired part of the car if you don't already have it installed as you wish. Screw the modified loading coil in place, and screw the whip into it. Now you are ready to make the initial tune-up.

It's quite proper to be curious about why so many variables would be wanted if I were sure about the impedances. The answer is that I *wasn't* sure, and wanted to be able to adjust. For instance, if the installed whip looked like more than a half wave it would appear somewhat capacitive, and I'd need less capacity. If it looked like more than two pF, I'd eliminate the gimmick and squeeze the .45 μH coil turns. (fig. 2)

If the antenna looked like less than a half wave it would appear to be inductive. I would need more capacitance so I would put more twists in the gimmick.

Tuneup

In the tuneup procedure described here, we will be adjusting C_1, L_2, and C_2, the gimmick.

Tuneup tools are a plastic-shaft screwdriver (or a plastic extension for the shaft of C_1) and a pair of wire cutters. A two-meter transmitter (1-10 watt, depending on the s.w.r. indicator) and s.w.r. indicator are needed. It may be helpful also to have a field strength (f.s.) indicator and resistive isolator. (The resistive isolator keeps the s.w.r. seen by the transmitter 2:1 or less.) A grid-dip oscillator (g.d.o.) switched to "diode" may be used in place of the f.s. indicator. (Both the resistive isolator and s.w.r. indicator are combined in the "s.w.r. bridge" of fig. 4, which should be rated at about 4 watts maximum.)

Arrange the test equipment as shown in fig. 5. (It helps to have the meter of the s.w.r. indicator visible through the car window closest to the antenna.) If using a g.d.o., locate the axis of its 2-meter coil on a circle around the whip and about 2 feet away.

Key the transmitter on a vacant channel (preferably near 147 MHz) and adjust C_1 for maximum f.s. or g.d.o. indication.

Untwist a little of the gimmick, and repeat the previous step. If the s.w.r. is less and the f.s. larger, repeat until the s.w.r. is minimum and f.s. maximum. If the f.s. is smaller, twist more of the gimmick together and repeat. (It's a good idea to write down the readings—it helps you remember which way you're going.)

If the f.s. is still increasing when you have completely

untwisted the gimmick, spread the turns of L_2, twist the gimmick together half an inch or so, and repeat the previous two steps. (The inductance of L_2 may also be decreased by placing a small shorted loop of hookup wire around L_2. Maximum effect occurs when the loop is around the middle of L_2.)

The antenna may look longer than a half wave, as indicated by maximum f.s. and lower s.w.r. with L_2 squeezed together and the gimmick untwisted. Try adding one or two turns to L_2 and repeat.

I place a small plastic pill bottle over my loading coil, with a hole drilled in the top for the whip stud and one drilled in the side to adjust C_1, if needed. If C_1 is not mounted through the body of the coil, a larger polyethylene bottle is recommended. The bottom may be drilled for the stud, and the sides split apart to fit over the coil. A wrap with vinyl electrical tape will then hold the bottle together and weatherproof it. (I put a dab of electrical tape across the C_1 adjustment hole to seal that.) A wad of rubber tape wrapped around the knurled lower end of the loading coil closes the bottle's open end to make a splash (but not hermetic) seal.

(Continued on page 92)

(L-R, rear) An unmodified loading coil, loading coil with cover removed, modified loading coil, pill bottle cover for completed unit. (Left side) Modified loading coil with external C_1. (right side) Same type with electrical tape protection.

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

How To Get Started In Amateur Radio-Part II

As the heading indicates, this is the second installment of a two-part article intended to help people who want to become licensed amateur radio operators. Typical questions are used as paragraph or subject headings and they are followed by related information. It is advisable to review the first part of this article before reading this concluding portion.

A definite commitment to a regular study program is required to be sure one will become licensed as an amateur radio operator. Consistent effort is required over several months to be sure one will upgrade from Novice to General, but the initial effort to obtain a Novice license is not as extensive.

Novice licensing courses are conducted by hundreds of clubs in America. It is usually possible to obtain dates and locations of local courses by visiting local electronic distributors. If course information is not readily available from this source, it can normally be obtained by requesting it from the Clubs and Training Department of the American Radio Relay League (ARRL) at 225 Main Street, Newington, Connecticut 06111. It is advisable to list the postal zip of your own town or city, plus the zip numbers of each bordering municipality, to make it easier for ARRL personnel to provide a good response.

Last month's Novice column lists the books and infromation sources I have found to be most useful to my licensing program students. You will need a license manual for sure, and I strongly urge you to get a dictionary of electronic terms. The license manual will lead you through the basic material you must know to pass the FCC exam. If you make it a practice to look up unknown terms and abbreviations in a dictionary of electronic terms, you will quickly learn that even the most technical things are really quite easy to understand. It is helpful to obtain some backup radio-electronics textbook to help clear away any problems you might have in understanding any subject related to your licensing studies. I believe *The Radio Amateur's Handbook* by the ARRL is the best possible choice, to be the third major source of information,

It is not advisable to spend a lot of money on equipment and accessories when you are getting started as an amateur. On the other hand, there are certain things you will get a lot of service from for many years and you should get the best available. A couple of obvious examples of items that should not be in the junk category are the manual telegraph key and the set of headphones.

Do not buy a junk handkey since it can cause you to develop bad sending habits. Get a top quality handkey with adjustable keying gap, adjustable return spring tension, smooth action at the pivot points (possibly using ball bearings), and large keying contacts which are perfectly aligned and plated to minimize wear due to electrical arcing. Do not get a handkey with a "skirt" under the key knob because it will encourage you to develop bad sending habits. This "skirt" is a flat wafer about the diameter of a silver dollar and it is located immediately below the sending knob. Some of the high priced manual telegraph keys are mounted on a high baseplate; this is not good because it causes one's hand to be raised uncomfortably high, tending to cause bad sending.

The second initial item you should purchase is a good set of communication headphones. Amateur communications are normally conducted within the relatively narrow frequency range of about 200 to 3000 hertz. Do not get high fidelity headphones with extremely wide frequency range reproduction capability, since they are not as suitable as communication headphones for amateur communication purposes. It is advisable to get a comfortable pair of headphones instead of a single earphone headset. You are strongly advised to use headphones at all times while practicing code and operating.

The code practice oscillator does not have to be an expensive device. However, it should have adjustable volume, adjustable pitch, and a headset output jack which mutes any internal speaker.

The November 1977 thru March 1978 *CQ* Novice columns contain a five part series about installing one's initial amateur station. You are advised to obtain this entire series of articles and to read them very carefully, since they contain information that is useful before one is ready to actually install their first amateur radio station. Incidentally, I do not have copies of previous Novice columns but *CQ* sells back issues for $1.25 plus postage. If you are particularly interested in headphones, you are welcome to a free copy of a class aid I wrote on this station accessory. Simply send a large (10 by 12 inch) envelope with 24¢ postage attached, plus your name and address. Remember to enclose a note stating what you need.

There are several correspondence courses available to help you get a satisfactory knowledge of electronic and radio fundamentals. There is even one correspondence course available on amateur radio.

One of the best sources of help for the aspiring amateur is still nearby active amateurs. It is usually even more beneficial to attend classes at a local amateur radio club. If you locate an amateur radio club which is interested in conducting licensing courses, prompt them

*2814 Empire Ave., Burbank, CA 91520

This is Kathy Balvin (WDØBMR), one of just three amateurs (and the only YL) in Claire City, South Dakota. Kathy has her 40 meter WAS (worked all states) award and almost has a 15 meter WAS award. Her Tempo One and home brew 10/15 meter ground plane have enabled her to contact stations in England, Japan, and Yugoslavia. Kathy is happy to keep a schedule with anyone who wants a QSO (contact) with South Dakota.

to request help from the ARRL Clubs and Training Department. If the club is not affiliated with ARRL, or if they want other licensing course aids, they can request a set of the aids I use, and they can have them at our cost of three dollars including postage. It should be understood that I am advising club instructors to participate in the ARRL licensing program and to help improve it.

It is beneficial to join an active local amateur radio club, and local electronic store personnel usually can provide leads to clubs. Some clubs register with their local Chamber of Commerce and can be located by contacting this organization. If all else fails, the ARRL Clubs and Training Department will help you locate a club in your area. As stated before, it's best to send the ZIP numbers of your own town or city and of each city and town within easy travel distance.

How much does an initial station cost?

As previously stated, the November 1977 thru March 1978 *CQ* Novice columns cover initial amateur radio stations in detail. However, that series did not go into cost considerations except in general terms.

An honest answer is that I have recently had students pay as little as $100 and as much as $5,000 for initial stations. I push my students to get an efficient and versatile initial station because it has been my experience that good operating results usually keep the beginner enthused enough to progress to a renewable license. Naturally, it is easier to get good performance from excellent equipment and accessories than from junk items. However, as the father of seven children, I do understand that it is not always possible to spend a lot of money on something like an amateur radio station. It has been my experience that most of my students spend about $500 to $900 on their initial stations, depending on whether they purchase used or new gear.

It is my observation that the quickest route to the General license is to get on the air as a Novice with good equipment and to do a lot of operating. I do not like to have students spend a lot of time building kits; I want them operating and studying in all their spare time.

Used equipment usually provides the best value. Another benefit associated with club membership is that no fellow club member would be likely to intentionally sell another member a defective piece of gear. It is generally safe to buy used gear from active local amateurs. If you are going to purchase used equipment from a store, you should only deal with an organization which allows you to return unsatisfactory items at full refund or (more commonly) full allowance towards other gear. You are advised to avoid equipment which has been stored for a long time, particularly if it was stored in a garage, shed, covered patio, or cellar.

Is code still required to get all classes of amateur licenses?

We keep hearing noises about a code-free Communicator license and it may someday exist. However, there is no doubt in my mind that the demise of our Amateur Radio Service will quickly follow the establishment of such a code-free amateur license. It is my opinion that the FCC should handle its problems with the Citizens Radio Service (CB) without degrading the Amateur Radio Service. I do not believe amateurs would succeed in upgrading CB; I think we would sink into their bad habits. I have no doubt that reducing licensing requirements can only harm amateur radio.

Yes, one must know the International Morse Code to get any class of amateur radio license. The Novice and Technician code test rate is just 5 words per minute, which amounts to reasonably fast code symbol recognition at minimum code proficiency. The code proficiency required of General and Advanced class license applicants is 13 w.p.m. and the Extra class license applicants must pass a 20 w.p.m. code test.

The international language on the air (not just in amateur radio) is English. Consequently, the Morse code which matches the English language alphabet is called the International Morse Code. There is no special magic which enables foreign amateurs to understand what they copy in the International Morse Code. If they did not understand English, it would do them little good to copy International Morse Code transmissions. There are several other Morse code systems that match other alphabets such as Turkish, Russian, and Japanese. It is legal to use such known Morse codes on the amateur radio bands as long as all operators involved in the contact agree to their use and all identifications are made in the international Morse code.

Amateurs use a system of 3-letter Q-signals to ask questions and to make statements. These Q-signals can be used in all modes of transmissions but they are used with more frequency during code contacts. As an example, QTH? asks where is your station located, whereas QTH means my station is located at. Obviously, if a foreign operator wants to find out where you are located, he can just send QTH? and if your response is QTH Bedford, Massachusetts, you are telling him that is your location. The use of Q-signals minimizes language problems. Q-signals are also used when no language barrier exists, such as when talking to another American; they are used in this case because they provide a fast way to ask questions and to make statements. An extensive list of Q-signals adapted to amateur radio use is available free to anyone requesting one and furnishing the usual sase.

Another time saving procedure commonly used in code contacts is generally referred to as the Phillips code. It is just a phonetic code which eliminates letters that can be left out without losing the meaning of the word. As an example, one operator might send R U WRKG DE CONTEST? to ask "are you working the contest?". There are many other short cuts which are peculiar to code operation. A farily complete code sheet is availabe free to anyone requesting one and supplying the usual sase.

It is apparently not well known to the majority of licensed amateurs that it is now legal for them to allow an unlicensed guest to make a code contact from their stations. The licensed amateur is, of course, responsible for such transmissions. I believe it would be a much more realistic code test if each Novice license applicant were required to complete an unassisted two-way radio contact during which the names, locations, and signal reports of both operators were exchanged correctly. I often have my students make their first on-the-air contact at the time I supervise their FCC Novice Code test.

New operators should not hesitate to ask more proficient amateurs to ease up on them. One simple way to get immediate extra consideration is to add a slant bar and the letter N after your call sign to tell others you are a Novice. If your FCC assigned callsign is WB6ADP, just identify as WB6ADP/N, which is legal. It is also acceptable to ask the other operator to slow down; this can be done in plain English or by simply using the QRS signal. It is inconsiderate of an experienced operator to use a lot of abbreviations, short cuts, and Q-signals when working an operator who has obviously had little opportunity to learn such things.

Code remains extremely popular with thousands of active amateurs and this popularity is not easily understood by outsiders. Code still provides the most effective long distance communication capability. Simply stated, the code emission is packed into a very narrow frequency spectrum. This concentration of signal output energy provides maximum intelligibility, even under the worst conditions. Another factor in favor of code operation is that the receivers and transmitters can be simpler and less expensive than what is required for voice, television, radioteletype, or other

methods of communication. In addition to the long range (DX), low power superiority of code, proficient operators also enjoy its reduced probability of errors in names, callsigns, and locations. I know an ardent code enthusiast who firmly contends that all it takes to become a confirmed voice-only operator is to have no real ability to send and receive code. I do not personally know any proficient code operator who prefers voice operation most of the time he/she is on the air. Code truly does provide great communication capability.

Aspiring amateurs commonly consider code to be an almost insurmountable barrier, but this is not the true situation. Code is easy to master and there are many aids now available to help the newcomer. There are punched paper tape code receiving practice machines such as Gardiner and Instructograph produced. There are inked paper tape code receiving practice machines available to help you, including war surplus TG-10 and TG-34A units. Several companies have produced code training records and record albums. There are reel and cassette tape recordings available from several sources to help those who want to learn the international Morse code. All of the preceding aids make it easier than ever to learn code. I advise you to limit code practice sessions to less than one hour per day, to practice code at least 5 days per week, and to avoid any system which involves sight. Code is a language of sound.

How does one obtain an up-to-date list of amateur radio companies?

As is true in most fields, amateur radio gains some new companies each year and loses others. A simple way to get a list of the organizations presently manufacturing and distributing amateur radio equipment, accessories, and related items is to extract names, addresses, and telephone numbers from the recent issues of *CQ*, *Ham Radio*, *QST*, *WorldRadio News*, and *73*. Some outfits advertise in more than one of these publications, whereas others just run their ads in one publicaton. There is an advertiser's index among the last few pages of each magazine. This index makes it easy to locate each company's ad. It takes a lot of effort to maintain a current list of the organizations associated with our Amateur Radio Service. It is more practical to just use the latest publications to obtain specific required information as it is needed.

If you do not know where electronic parts and equipment stores are located in your area, it is usually easy to locate them by using your telephone directory's yellow pages. Incidentally, store salesmen are not always a source of dependable information, and they do not have time to educate you in electronics while they are waiting on customers. If you are lucky enough to find a helpful salesman, please do not abuse this opportunity to obtain assistance.

What does h.f. mean?

The term h.f. is used to designate the high frequency band which extends from 3 thru 30 megahertz. Almost all amateur radio operation occurs in the h.f. (3-30 MHz.) and v.h.f. (30-300 MHz.) ranges. The amateur 80, 40, 20, 15, and 10 meter bands are all in the h.f. range. The amateur 6, 2, and 1.25 meter bands are in the v.h.f. range. As the following examples show the frequency classifications have a definite relationship; they usually start and end at a point where 3 is the significant number. The most commonly discussed frequency classifications are as follows:

Abbrev.	Frequency Classification	Frequency
v.l.f.	very low	Below 30 kHz.
l.f.	low	30-300 kHz.
m.f.	medium	300-3000 kHz.
h.f.	high	3-30 MHz.
v.h.f.	very high	30-300 MHz.
u.h.f.	ultra-high	300-3000 MHz.
s.h.f.	super-high	3000-30,000 MHz.

David Roche (WB2RKW) believes amateurs need to have more pride in their service. He states that proper operating procedures must be followed at all times. Since David did not state which band(s) he uses, it is assumed that his description of layers of signals probably applies to the 40 meter Novice band. Those of us who work this band regularly recognize it easily from his description. It is a shock when a new Novice first tries to operate on a crowded band, and the shock can develop into frustration as layers of signals cover the signal one is trying to copy. Crowding gets so bad at times that there simply is no frequency one can use that won't cause interference to communications already in progress. This bad situation occurs most frequently on the 40 meter Novice band because more Novices operate on this band than on the other three bands combined. The choice of the 40 meter band as an initial operating point is easy to understand. Novices are usually hesitant about trying to erect an 80 meter antenna, whereas they will put up a 40 meter antenna since it only requires half as much room for equivalent types of antennas. The performance of marginal equipment is usually satisfactory on 40 meters, even when it is unsatisfactory on 15 and 10 meters. Since Novices quickly learn that a directional antenna system is desired for satisfactory operation on their 10 and/or 15 meter bands, they usually refrain from using these higher frequencies and become part of the din on 40 meters. The unfortunate result of these contributing factors is that the 40 meter Novice band does have several layers of signals during peak operating times. Remember that the 40 (7100-7150 kHz.) and 80 (3700-3750 kHz.) Novice bands are each just 50 kHz. wide, whereas the 10 (28.1-28.2 MHz.) and 15 (21.1-21.2 MHz.) Novice bands are each 100 kHz. wide. The 40 meter Novice band becomes even more of a mess when conditions for long range reception are good and international shortwave broadcast stations boom in at every 5 kHz. point (7105, 7110, etc.) throughout the band. These shortwave broadcast stations are legal in Region One (Europe) and Region Three (much of the Southern Hemisphere) where 7000-7100 kHz. is the maximum extent of the 40 meter band. It is just in Region Two (North, Central, and South Americas) that the 7000-7300 kHz. wider spectrum 40 meter band can be used. If all of this explanation has convinced you that you should normally operate on any Novice band other than 40 meters, you have received my message without error. The first choice for Novice operation should now be the 10 meter band which offers superb long distance communications. The antennas for 10 meters are smaller, lighter, and less expensive than their counterpart antennas for use on the 15, 40, and 80 meter bands. The light weight of a 10 meter directional antenna (such as a beam or quad) makes it possible to mount it on an inexpensive telescoping push-up TV antenna mast and to rotate it with a relatively low cost antenna rotator. The 10 meter band's DX capability dies earlier than it does on the 15 meter band and it is essential for a Novice to have both low band (40 and/or 80 meters) and high band (10 and/or 15 meters) operating capability to have operating capability at any time of the day or night. The 15 meter Novice band also provides very good long distance communication capability and it is useful during more hours of the day than one can work DX on the 10 meter band. However, 15 meter antennas are larger, heavier, and more expensive than 10 meter equivalent antennas. A suitable initial Novice station antenna system is a 10 or 15 meter rotatable beam or quad for daytime operation and a longwire antenna (with tuner) for 80 or 40 meter nighttime operation. Station considerations were detailed in the November 1977 thru March 1978 *CQ* Novice columns, including coverage of antennas.

Those of us who instruct amateur radio licensing courses often make it a point to stress good operating practices and pride in our Amateur Radio Service. Most operators do have a lot of pride in both our service and their own good operating. Unfortunately, it is the occasional poor operator who is easily

noticed and remembered. There is no way to know about the many good operators who avoid unnecessary interference by listening on a frequency before using it to ascertain they are not going to bother a contact already in progress.

Peter Jeffery (VK2NJQ) advises that Australian Novices are no longer required to use crystal controlled transmitters; they have joined American Novices in being allowed to use variable frequency oscillators (vfo). Australian Novices are allowed to run a final amplifier input power of 10 watts on code and 30 watts p.e.p. (peak envelope power) on s.s.b. (single sideband). Their 80, 15 and 10 meter bands are 3525 to 3575, 21,125 to 21,200, and 28,100 to 28,600 kilohertz. It should be noted that American Novices share common frequency spectrum with Australian Novices on 21,125, 21,200 and 28,100 to 28,200 kilohertz. Their written exam includes a 50 question theory test and a 30 question regulations test with a 70 percent minimum passing grade for each. They are allowed a maximum of 10 errors during a 5 w.p.m. (words per minute) 5 minute code receiving test. They are allowed to make a maximum of 4 errors during the 2.5 minute sending test which is part of the Australian Novice exam. Peter has worked 47 states so far on 10 meters with 35 already confirmed. American Novices with directional antennas are urged to listen for VK contacts; perhaps you will be lucky enough to work VK2NJQ.

A few of the amateurs I have had the pleasure of working recently on the Novice bands are:

WB1OPE Chas @ Woburn, Mass.,
WB2SJS Jay @ Rockville Centre, N.Y.,
WB3JWU Dieter @ Lebanon, Penn.,
WD4HRT Kevin @ Pensacola, Fla.,
WD5BRY Dick @ Artesia, Miss.,
WD6GYQ Sam @ Northbridge, Calif.,
WB7VED Don @ Casper, Wyoming,
WD8QDQ Stan @ Cincinnati, Ohio,
WD9IFW Jack @ Malta, Illinois,
WDØAEC David @ Minnetonka, Minn.

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscription (or renewal) to *CQ*. A brief description of operating activities and some personal background information are needed with your picture.

73, Bill, W6DDB

a monthly feature by

JOHN A. ATTAWAY, K4IIF

DX

News of communications around the world

August is a time of DX doldrums in the northern hemisphere. It's the last month of the summer for outdoor activities, and many an OM, YL and XYL are on the golf courses, tennis courts and around the swimming pools putting the finishing touches on their summer sun tans. Others are taking advantage of the last opportunity before the start of school for a family vacation to the beach or mountains. Quite a few will find their way here to Florida where our summer season is almost as popular as the winter season now.

But don't give up on DX! With the "new and improved" sunspot count, DX can be worked. There should be good openings on 10 and 15 meters, and some very noteworthy contests are scheduled. These include D.A.R.C.'s (German Amateur Radio Club) European contest where the world works the Europeans, and the 19th. annual All Asian DX Contest, sponsored by J.A.R.L., wherein the world works the Asians. See Frank Anzalone's Contest Column for full details.

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*P.O. Box 205, Winter Haven, FL 33880.

CQ's DX Advisory Committee member in Puerto Rico is David Novoa, KP4AM, President of the DX Club of Puerto Rico. Dave was first licensed in 1961 as WP4BDL and now holds an Extra ticket. In April, 1977 he operated the first N prefix, NP4A, during Amateur Radio Week. Dave uses a TH6DXX at 77 feet plus inverted VEE's for 40 and 75. He is a lawyer, is married and has one son.

De Extra

If you had been on Clipperton — What an opportunity it would have been!

In many ways Clipperton was a more eagerly awaited DXpedition than those to some entirely new countries, which have come on the air in recent years. It is an established amateur radio country which has been on almost everyone's want list for 20 years. Many new countries are suspect, for one reason or other, and you always wonder if after 2 days of calling you'll find that it wasn't a "new one" after all, because of some vague criteria in the country rules.

Don Leal, N6EO/K6ACU, has been an active amateur for 25 years, but he only started collecting awards recently. His c.w.-phone WAZ certificate is number 4168.

Not so with Clipperton. It's been tantalizing the country list for 2 decades. So near, right there in zone 7, yet so far. Accepted by everyone as a country but no one could get permission to land. Finally it came about, thanks to the perseverence of Charlie Signer and the French team, and what a bedlam it was!

If *you* had been there, how would you have handled the pileups? Here was the perfect laboratory exercise in the science of *Advanced Pileup Management*. Call it PM-499, for graduate students only, undergraduates need not apply.

After 3 days the Clipperton gang had logged enough stations to allow the use of normal procedures. No transceiver operation and, of course, no master of ceremonies, but things were going smoothly with *relatively* little flap. However, those first 3 days were as hectic as any we've heard, including the Don Miller and Gus Browning days. On s.s.b. a spread of 40-60 kHz. in the listening range was necessary to spread out the callers, as compared to the normal 10-20 kHz. There were many complaints from desperate callers who were not getting through and felt the broad tuning range was to blame.

This brings us to the "bottom line" of the editorial, if *you* had been on Clipperton, how would you have managed that pileup? What were the alternatives? The wide tuning range, used successfully, is alternative number one. However, it produced many complaints from non-DXers whose QSO's were repeatedly interrupted by those randomly calling while listening outside the U.S. phone band for the Clipperton station. This objection is understandable.

A second alternative, suggested by several, was to subdivide each U.S. call area by prefix. For example, listen for WD4, then WB4, then WA4, then K4, N4 and finally for W4. The numbers calling at any one time could have been reduced by a sizable margin in this manner, but it would have taken a long, long time to work through all the U.S. prefixes.

A third alternative, suggested by a low power colleague, was to work them according to power level. His idea is to announce first that you are listening only for stations using less than 100 watts, then less than 200 watts, then 500 and finally listen for the kilowatts last. He feels that the high power stations would be ashamed to call when the rare station announced that he was listening only for low power stations, but would they? Some might succumb to this kind of "peer pressure," but others would look on it as a golden opportunity to be heard.

So we repeat, if you had been on Clipperton, what would your system have been? De Extra would like to know. Drop us a line at P.O. Box 205, Winter Haven, FL 33880.

Do You Need Chatham?

If so, put Oct. 28–Nov. 7, 1978 on your DX calendar. The ZL-gang is organizing a major effort for Chatham during the CQ Worldwide Phone Contest weekend and the week which follows. They plan to be active on all bands 10–160 meters, c.w. and s.s.b., plus 2-meter satellite operation. This rare island is located in zone 32, about 55 miles east of Wellington, New Zealand.

Coordinator for the DXpedition is Chuck, ZL1ADI, and others on the team include Marion, ZL1BKL; Carol, ZL1AJL; Jim, ZL4NF, Ron, ZL1AMO and Jan, WA6YQW. Marion and Carol are well known for their successful DXpedition to Kermadec Island, as well as for the last major operation from Chatham in 1974. Probable call signs are ZL3YL/C and ZL3CQ/C.

And Speaking of Rare Countries

Hey Dale! When do we hear Malpelo again? Its been a long time since HKØTU was on the air. Baja Nuevo and Serrana Bank have been pretty quiet also.

The many personal sacrifices to put these rare countries on the air during the 50's and 60's, plus behind the scenes help to many other DX causes, earned Dale Streiter, W4QM/W4DQS, a spot in the DX Hall of Fame. With a little encouragement, maybe the old gang which used to be known as the Florida DX Club will get moving again. Things aren't so hectic in the space shot business anymore, so drop Dale a line.

And speaking of the Florida DX Club, what ever happened to Ed Cushing, W4QVJ, or Juan Fernandez and KS4 fame? Let us hear from you Ed.

Attention novices and technicians!

A letter from Jan, WA6YQW, advises that the Chatham DXpedition crew plans to make a special effort to listen in the novice bands after the CQ Worldwide Phone Contest is over. They will be listening 10 kHz. above the bottom of each novice sub-band. This is a great opportunity to confirm a tough country as a novice or tech.

The January-February issue of *Break-In*, sponsored by NZART, has a delightful article by Marion describing their DXpedition to the Kermadecs during last year's CQ Worldwide Phone Contest. That group included ZL1AJL, ZL1BKX and ZL1AMU. They made over 12,000 contacts as ZL1YL/K.

Looking for . . .

If you are looking for some of the Caribbean islands this month, you may be in luck as Alex, W1CDC, and Mac, WA1ZSW, are embarking on "Caribe 1978". They plan a multi-island DXpedition on both phone and c.w. and will carry v.h.f./u.h.f. equipment for satellite operation.

They will leave Connecticut on July 29, with Dutch Sint Maarten being the first stop. PJ8USA will be the call for about a week, during which they will make a 2-day side trip to Anguilla to activate VP2E. Starting August 6, listen for them from Montserrat as VP2MBC for 2-weeks, including a 3 day side trip to either Antigua or Guadeloupe.

Alex advises that his c.w. operation will be 25 kHz up from the band edge, for example 7025 kHz, but he will listen at a slightly higher frequency such as 7027-7030. Do not call on his transmitting frequency. Top band operation is a big IF as QRN levels on 160 meters can be horrendous; 20 over S9 during the late summer months.

It won't be all DXing as Mac and Alex plan to do some hiking and mountain climbing on each island they visit, and hope to take several hundred pictures.

Masayoshi Haneda, JE1BSD, earned the Single Band WAZ award on 21 MHz. s.s.b. with this neat station and a 6-element, 15 meter yagi. Mayayoshi is a member of FEDXP.

QSLs should be directed to W1CDC at 43 Dover Road, Manchester, CT 06040. Self-addressed, stamped envelopes (s.a.s.e.) are a must.

Navassa!

Super rare, KC4-Navassa Island will be on the air late this year, possibly during the CQ Worldwide C.W. Contest, thanks to a group of largely midwest DXers. At press time we don't have many details, but likely participants include NØTG, WØRJU, WØZH, WBØRSL, NØWL, W6OIG, N2KA and W2PAU. The likely time frame is Nov. 26–Dec. 4, 1978.

An Alternative to the I.R.C.

If you're interested in an alternative to the expensive, 42¢ International Reply

The CQ WPX Program

649 . . . UA3AAU
650 . . . UK5WBG
651 . . . UK6AAJ
652 . . . YU2CAO
653 . . . JR1RNC
654 . . . DJ8SG
655 . . . EA7TV
656 . . . W2KLN
657 . . . DJ5XO
. . .

S.S.B.

1043 . . . UK3R
1044 . . . UK9XAN
1045 . . . UA3IJ
1046 . . . UK6AAJ
1047 . . . I4LRH
1048 . . . F6DZL
1049 . . . K9BQL
1050 . . . DJ6VH
1051 . . . F6DUK
1052 . . . VK3OT

C.W.

1687 . . . UK6LWA
1688 . . . UA2CM
1689 . . . UB5KAK
1690 . . . UA3IN
1691 . . . UA3WZ
1692 . . . UK3VAR
1693 . . . UV9BT
1694 . . . UA9AAB
1695 . . . UW9AT
1696 . . . UL7PBN
1697 . . . UK5WAZ
1698 . . . HA1ZH
1699 . . . JR3GDY
1700 . . . DM2BEO
1701 . . . HA8DZ
1702 . . . DF4QW
1703 . . . WA8LWK
1704 . . . OK3YCV

WPNX

114 . . . WBØYWP
115 . . . WB2FFY

VPX

138 . . . UA9-154-101
139 . . . UA3-170-646
140 . . . UA3-170-842
141 . . . UA4-095-176
142 . . . UA3-155-75
143 . . . DM-2235/L
144 . . . PA-10234
. . .

Endorsements

Mixed: 400 YU2CAO, JR1RNC, DJ8SG, EA7TV, DJ5XO. 450 46YMH, HAØHW. 550 W2HAZ. 600 W2KLN, DJ8WD. 750 UK5WBG. 800 W2FLD. 900 YU2CBM. 1100 I2PHN.

SSB: 300 I4LRH, K8BQL, DJ6VH, VK3OT. 350 F6DZL, DK5WQ. 400 F6DUK, DJ6VH. 950 I2PHN.

CW: 300 JR3GDY, HA8DZ, DF4QW, WA8LWK, OK3YCV. 350 WB8ZRV, HA1ZH, DM2BEO. 400 VO2CW. 550 N6UH. 600 SP6BAA. 750 UK5WAZ. 900 DJ7CX. 1000 UK5WAB, OK2QX, K4IEX. 1050 N6JV. 1100 W4BQY.

15 meters - UK4WAC, VK3OT.

20 meters - UK3R, UW9AT, W4BQY, DJ1YH, JH1VRQ, EA2OP.

80 meters - DL8IH, DF2ME, HA8DZ.

160 meters - K3IXD.

Asia - UK3R, UK5WBG, UB5WK, UA6JAD, UA9OBJ, DJ1YH, HAØHW, I2OMF.

Europe - UK3R, UB5KAK, UK5WBG, UW9AT, UK5WAB, UB5KAW, UA9OBJ, UB5XY, YU2CAO, WA4QMQ, DF2ME, HA8DZ, EA2OP.

No. Am. - UK5WBG, UK5WAB, JH1VRQ, EA2OP.

Oceania - UK5WAB.

So. Am. - UK5WAB.

Complete rules for WPX can be found in the May, 1976 issue of CQ Magazine. Application forms may be obtained by sending a business-size, self-addressed, stamped (foreign stations send extra postage if air-mail desired), envelope to "CQ WPX Awards", 5014 Mindora Dr., Torrance, Calif. 90505. U.S.A.

Another new WAZ winner is Orestes Caballero, N6OC (Formerly WB6OMF) of Auburn, California. Orestes says the big hurdle was Zone 23 which he finally confimred through JT1AN thanks to QSL Manager W7PHO. During the 1950's, Orestes held the calls CM8EM and CO8EM.

The Scotto brothers, Roger, 9H1BZ (seated) and Walter Louis, 9H1DV (standing) are very active on Malta and will extend a helping hand to visiting amateurs. (Photo courtesy Scotty, 9H1FC/K5CO)

Coupon (I.R.C.), then the DX Stamp Service may be the way to go.

George Robertson, W2AZX, will sell you the correct stamp for an air mail return of a QSL card from almost anywhere in the world. This will enable you to send a self-addressed, stamped envelope to an overseas DX station or QSL Manager in lieu of I.R.C.'s and a self-addressed envelope. The savings to you can be substantial. Here are a few examples, with the stamp prices based on the DX Stamp Service price list as of February, 1978:

Republic of China, Taiwan, BV - Requires 3 I.R.C.'s for air mail return or $1.26. A stamp from DX Stamp Service costs only 75¢.

Uruguay, CX - 4 I.R.C.s or $1.68, vs. stamp for 70¢.

Liberia, EL - 5 I.R.C.s or $2.10, vs. stamp for 70¢.

Iran, EP - 4 I.R.C.s or $1.68, vs. stamp for 70¢.

Columbia, HK - 4 I.R.C.s or $1.68, vs. stamp for 55¢.

Australia, VK - 3 I.R.C.s or $1.26, vs. stamp for 75¢.

Hong Kong, VS6 - 6 I.R.C.s or $2.52, vs. stamp for 75¢.

Nicaragua, YN - 4 I.R.C.s or $1.68, vs. stamp for 50¢.

New Zealand, ZL - 3 I.R.C.s or $1.26, vs. stamp for 60¢.

South Africa, ZS - 5 I.R.C.s or $2.10, vs. stamp for 60¢.

Trinidad, 9Y4 - 3 I.R.C.s or $1.26, vs. stamp for 50¢

Obviously you should plan to buy several stamps per order, to minimize the domestic postage. If interested, send an s.a.s.e. for the latest price list to G. N. Robertson, 7661 Roder Parkway, Ontario, N.Y. 14519, or phone him at (315) 524-8806.

"Vojo", YU1OCV, has worked WAZ and WPX plus DUF and WAE, 99% of which by the c.w. mode. His antennas are groundplanes for 7, 14 and 21MHz. plus inverted vees for 3.5 and 1.8 MHz.

Social Events of Interest to DXers

The National Capitol DX Association plans to sponsor its biennial extravaganza, DXPO '78, during the Sept. 16–17 weekend. If you attended DXPO '74 and DXPO '76 you know what a fun time these events are for the DX oriented amateur. This year's bash is scheduled for the Ramada Inn in Tyson's Corner, Virginia. The specific location of this Inn

One of the most prominent signals from the Tampa Bay area radiates from the QTH of Bob Willoughby, W4NNH, of Largo, Florida. Bob recently received his WAZ certificate.

is the intersection of Routes 7 and 123 with I-495. For complete details write to: Richard Vincent, K3AO Route 1, Box 230 Bryantown, MD 20617

In November, the Northern California DX Club is embarking on an "Eyeball QSO Tour of Japan." The iteniary will include stops in Tokyo, Kamakura, Hakone, Atami, Nagoya, Kyoto, Shodu Island, Okayama and Osaka. There will be visits to 4 or 5 DX clubs including a luncheon with the Okayama DX Club on Nov. 15. Unfortunately, the signup date for this tour will be past before you received this issue of *CQ*. However, in the hope of a cancellation or if you would like general information write to W6FOJ or K6SSJ at P.O. Box 896, Los Gatos, CA 95030. Travel arrangements are being handled by East and West Travel Corporation, 391 Sutter Street, San Francisco, CA 94108.

The WAZ Program

Single Band WAZ

40 Meter C.W.

7 . . . W8AH

20 Meter C.W.

43 . . . YU2CBM
44 . . . UAØYT
45 . . . UA3RM
46 . . . W8AH
47 . . . W2BAI

20 Meter Phone

108 . . . YU2CBM
109 . . . W2SGK
110 . . . UK5WBG
111 . . . W2MIG
112 . . . ZL2AH
113 . . . VS6HJ
114 . . . SM3EVR
115 . . . W8AH
116 . . . WD8BJK
117 . . . WA3YYW
118 . . . W9CTY
119 . . . VE7DFW
120 . . . I4WZK
121 . . . JA1LFR
122 . . . WD8CRY

All Band WAZ

Phone

542 . . . W6BCQ

S.S.B.

1456 . . . WB2LOF
1457 . . . K2UO
1458 . . . W1WXZ
1459 . . . LU2AFH
1460 . . . UK2BAS
1461 . . . UL7NW
1462 . . . UK5WBG
1463 . . . F6DZL
1464 . . . KØFF
1465 . . . G3XPO
1466 . . . W8AH
1467 . . . OZ1WL
1468 . . . DL8YX
1469 . . . DJ9GW

C.W.-Phone

4245 . . . W4YE
4246 . . . JA8SW
4247 . . . TBA
4248 . . . JA7GBS
4249 . . . HM2JN
4250 . . . WA4TLI
4251 . . . VE7KL
4252 . . . UK2BAS
4253 . . . UA3UH
4254 . . . UY5ZH
4255 . . . UB5KAW
4256 . . . JA1IZ
4257 . . . WB9SEJ
4258 . . . W8CTR
4259 . . . WA6DNM
4260 . . . W5FL
4261 . . . WA2GEZ
4262 . . . W8KI
4263 . . . VE1MX
4264 . . . WB8OFG
4265 . . . W1KGH
4266 . . . DJ2YE
4267 . . . K9UQN
4268 . . . GM3GJB
4269 . . . OK3CGP
4270 . . . DL2ZM
4271 . . . DK5JX
4272 . . . DJØJK
4273 . . . DJ8SW
4274 . . . N5UR
4275 . . . JA2OJ
4276 . . . N8AC

The complete rules for the WAZ awards are found in the May, 1976 issue of CQ. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the WAZ Award Manager, Mr. Leo Haijsman, W4KA, 1044 Southeast 43rd. St., Cape Coral, FL 33904.

The DX Department will help "spread the word" regarding events of special interest to DXers. If you would like our help please give us the details at least 3 months in advance, by letter, to the DX Editor, P.O. Box 205, Winter Haven, Florida 33880.

Good Prefixes for WPX

A beautiful feature of WPX is that new prefixes are assigned regularly by governments around the world. The WPX buff doesn't have to wait for a major DXpedition to stir up the excitement. When all seems dull, he tunes around the bands and finds an unexpected "new one" calling CQ.

The major reorganization of the prefixes alloted to U.S. possessions, announced a few weeks ago by the F.C.C., will lead to a number of new ones for the list as shown below:

KH1 — Canton Island
KH2 — Guam
KH3 — Johnston Island

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total, regardless of an operator's all time count.

Mixed

1725 W4WV	1319 W4BQY	1081 N6JV	905 SM7TV	782 K8LJG
1630 K6JG	1302 PAØSNG	1070 K6ZDL	902 K7NHG	782 K2ZRO
1609 K6XP	1300 K2VV	1062 DL1MD	872 DL1CF	782 YU4EBL
1608 F9RM	1290 N4MM	1055 YU2OB	859 W4BYU	777 JH1VRQ
1501 YU2DX	1250 WB4KZG	1055 I6SF	849 G3DO	758 PY4OD
1436 VE3GCO	1215 K5UR	1030 W8CNL	848 I3ANE	750 K8UDJ
1433 W9DWQ	1200 N6AV	1028 W6ISQ	844 WØSD	749 WA5LOB
1429 ON4QX	1184 W9FD	1025 N4NO	832 JA1AG	749 CT1LN
1425 YU1BCD	1181 W8ROC	1008 WA1JMP	811 W9WHM	735 PY4AP
1424 W2NUT	1162 N6CW	1000 SM6DHU	811 YU3EY	733 KØBLT
1415 W3PVZ	1152 WB4SIJ	960 K4KQB	811 W6NJU	713 WA6EPQ
1390 W2NC	1123 N2AC	950 W4IC	807 W9ZTD	706 PAØVB
1380 W7LLC	1123 I2PHN	949 WA6TAX	807 WA2AUB	705 UA3FT
1368 W8LY	1107 WØAUB	923 K5DB	803 IØJX	622 OE6RP
1358 W4CRW	1094 WAØKDI	918 YU1ODS	793 W6ANB	600 WB9CGL
1350 DJ7CX	1089 YU1AG	906 W3YHR	791 IT9AGA	

S.S.B.

1507 W4UG	1124 PAØSNG	941 WB2NYM	863 N4UU	750 W2NC
1506 F9RM	1086 HP1JC	923 CT1PK	850 N2SS	720 W6YMV
1432 IØAMU	1050 K2VV	916 IT9JT	822 W6RKP	719 YU20DS
1374 IØZV	1033 DL9OH	913 N4NO	818 W3DJZ	708 WB6DXU
1357 K6JG	1031 DK2BI	904 F2MO	817 OK1MP	702 IØMBX
1263 I8KDB	1022 ZL3NS	900 WB4KZG	808 PY3BXW	702 CX2CN
1200 I8YRK	1000 WB4SIJ	896 DJ7CX	800 W4IC	670 N2AC
1158 I4ZSQ	975 WA6TAX	889 OE2EGL	794 YU1AG	654 W4BQY
1149 N4MM	967 I2PHN	884 WØYDB	783 K8SQE	653 I4LCK
1142 W9DWQ	965 K5UR	883 K2POA	765 G3DO	636 JH1VRQ
1137 YU1BCD	948 DL1MD	881 W3YHR	747 WA5LOB	613 CR7IK

C.W.

1372 W8KPL	1091 W9FD	953 K6ZDL	809 VK3AHQ	660 DL1MD
1350 W8LY	1044 W4BQY	932 VO1AW	800 VO1KE	649 KH6HC
1253 K6JG	1040 N6JV	920 K5UR	790 SM5BNX	649 K2ZRO
1245 ON4QX	1031 G2GM	905 N4MM	768 W4BYU	646 PY4OD
1232 DL1QT	1031 DJ7CX	900 K2VV	754 W4IC	629 K1LWI
1224 W2NC	1006 WA2HZR	885 YU1AG	716 YU1ODS	604 LZ1XL
1190 K6XP	990 W3ARK	829 I6SF	703 I5IZ	600 OK2QX
1165 YU1BCD	976 WAØKDI	825 IT9AGA	700 WB4KZG	600 VE4OX
1126 W2HO	972 W2AIW	824 W6ISQ	698 OK2BLG	
1104 N4UU	966 N2AC	812 K7ABV	693 OK2DB	

KH4 — Midway Island
KH5 — Kingman Reef
KH5 — Palmyra Island
KH6 — Hawaii (No change)
KH7 — Kure Island
KH8 — Samoa
KH9 — Wake Island
KP1 — Navassa Island
KP2 — Virgin Islands
KP3 — Serrana Bank
KP4 — Puerto Rico (No change)
Also unchanged are Guantanamo, KG4, the Marshalls, KX6, and the Canal Zone, KZ5. Others of interest include:

H4 — The new prefix for the Solomon Islands, fomrerly VR4.

H5 — Used in the new country of Bophutatswana in southern Africa.

HD1 — HD1A was a special contest station in Ecuador operated by WA4UAZ during the WPX Contest last spring.

NN3 — NN3SI was heard on 21020 c.w. at 1840 GMT working G3NKQ.

OG1 — OG1AA was reported on 14275 working G4CQK.

S9 — D4CBS will be signing S9CBC from Sao Thome until the end of the year.

TF6 — TF6M, July 20-23, 1978, operated from Kirkjubaejarklaustur, 40 miles southwest of the Vatnajokull glacier in eastern Iceland. Operators included TF3CW, TF3JB, TF3KX, TF3SB, TF3UA, TF3US and TF3YH. QSL to P.O. Box 1058, Rekjavik, Iceland.

The CQ DX Awards Program

S.S.B.

563 . . . W7NJ	565 . . . HAØHW
564 . . . PA2TMS	566 . . . SM4ACH

S.S.B. Endorsements

310 . . . K6YRA/313	275 . . . K9RF/292
300 . . . W4DPS/307	275 . . . DJ2AA/277
300 . . . ZS6LW/307	275 . . . K9PPY/277
	150 . . . EL3A/150

C.W. Endorsement

310 . . . . ON4QX/315

Complete rules and application forms for the CQ DX Awards Program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX Awards", 5632 47th Avenue S.W., Seattle, Washington 98136 U.S.A.

TR8 — TR8AC2 is an unusual call issued by Gabon to Al Curley, II. It is the custom in Gabon to use the licensees initials as the suffix. QSLs go to WB4RZN.

WP4 — This prefix was formerly used exclusively by Puerto Rican novices, but KP4AM, President of the DX Club of Puerto Rico, was recently issued his old novice call, WP4BDL, for use in the CQ WPX Contest.

YI1 — YI1BGD, in very rare Iraq, operates chiefly on 14030, 21030, 28030, c.w., and 14230, 21300 and 28600 on s.s.b. A good time to listen is from 2200 -

Syozo Okuya "Aki," JA2RGH, is another Japanese DXer to qualify for Single Band WAZ. He uses a TS 510-D barefoot to a 2-element quad for 20 meters.

2400 GMT. Hope you get him.

YK — OE2JSL/YK operated form the Golan Heights. His stateside QSL Manager is K4KBL. European DXers QSL to OE5REB.

YM1 — YM1ZB in Turkey was heard on 14003. QSLs go to Box 188 in Istanbul.

4K1 — 4K1GM has been active from the South Shetland Islands. Good signals were reported on 14027 and 7003.

QSL Information

The following DXers have expressed interest in being a QSL Manager for any interested DX station. If you are planning to operate outside the U.S. during the CQ Worldwide Phone and c.w. contests in October and November, respectively, you might give one of these fellows a call:

Clint Aberly, K5JBC, 105 Cherry Laurel Dr., Covington, LA 70433
Paul C. Brote, WA1YGA, RFD 2, Dolan

(Continued on page 93)

EA8BK is one of the big, big guns from Las Palmas, Canary Islands. Julian won the first Single Band WAZ for 10 Meters.

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

The Swiss Federal Solar Observatory at Zurich reports that sunspot activity during April, 1978 was at a level higher than at any time since November, 1970. The daily count ranged from a low of 61 on April 15th, to a high of 139 on the 25th. The monthly mean was 94.7. This results in a smoothed sunspot number of 48.5, centered on October, 1977. A smoothed sunspot number in the mid-80's is forecast for August, 1978, as the present sunspot cycle increases at a considerably more rapid rate than previously.

This rapid increase in solar activity has had its bad as well as its good points. On the good side, of course, is the stronger ionosphere and the much improved DX propagation conditions that it permits. The bad side has been the considerable increase in solar flares that have been associated with some large sunspot groups. These flares emit X-rays and other types of energy which can blanket the ionosphere and cause blackouts, radio storms, widespread auroras and periods of generally poor DX conditions. Fortunately, on a time basis, the periods of exceptionally good propagation conditions far exceed the poorer periods.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For August, 1978

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 13, 21	A	A	B	C
High Normal: 2-3, 8, 14-15, 22-23, 29-30	A	B	C	C-D
Low Normal: 1, 7, 9, 11-12, 20, 24, 26, 28, 31	B	C	D	D-E
Below Normal: 4-6, 10, 16, 19, 25, 27	C	D	D-E	E
Disturbed: 17-18	C-E	D-E	E	E

Where *expected signal quality is:* A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB., with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, some with 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 day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be *fair* (C) on August 1, *good* (B) on the 2nd and 3rd, and *poor* (D) on the 4th through 6th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD. 20902.

August DX Conditions

August and early September is perhaps the most difficult period of the year for which to make a shortwave propagation forecast. On many days, typical summertime conditions will prevail, and the bands will sound much as they did during July. On other days, particularly as September approaches, conditions will begin to conform more to a winter pattern of higher daytime and lower nighttime useable frequencies. Since this is a period of transition, this month's *DX Propagation Charts* cover only a *one month* period, rather than the usual two month span. *Short-Skip Charts* for use during August appeared in last month's column.

Fairly frequent *10* meter openings are expected during the daylight hours in August, towards Central and South America, Africa and the South Pacific areas. By the end of the month, some openings should also be possible to Europe and the Far East. These east-west openings should increase considerably during September.

Excellent daytime DX openings are forecast for *15* meters to Latin America, Africa and the South Pacific areas. Some east-west openings to Europe and the Far East should also be possible, and these should increase considerably as September approaches. Exceptionally strong signal levels are expected during many openings this month, and *15* meters should be the best band for DX to many areas of the world from shortly after sunrise, through the late afternoon hours.

Excellent world-wide propagation conditions are forecast for *20* meters during August. Peak conditions should occur, often with exceptionally strong signal levels, for a few hours after sunrise, and again during the late afternoon an early evening hours. To many southern and tropical areas, the band should remain open throughout much of the darkness period as well. As September approaches, the band will tend to close earlier than it did during June and July.

Static levels are expected to decrease considerably by mid-August, with a noticeable improvement in *40* meter DX conditions during the hours of darkness and the sunrise period. Fairly good *80* meter DX openings are also forecast for the nighttime hours, with conditions expected to peak just as the sun begins to rise on the "light" side of the path. By mid-August, some *160* meter DX openings may also be possible during this same time period.

Short-Skip Conditions

For openings over distances ranging between 50 and 250 miles, use *80* meters during the day and *160* meters at night. Between 250 and 750 miles, the best bands should be *40* meters during the day and *80* meters during the hours of darkness. For openings between 750 and 1300 miles, best band should be *20* meters during the day, with some fairly good openings also possible on *15* meters. From sundown to Midnight, try *40* meters, and from Midnight to sunrise conditions should be best on *80* meters. Between 1300 and 2300 miles, best daytime band should be *20* meters, with some good openings also possible on *15* meters. Try *40* meters during the hours of darkness.

V.h.f. Ionospheric Openings

While sporadic-E propagation is expected to taper off considerably by mid-August, some *6* meter openings should still be possible over distances of approximately 750 ot 1300 miles. During periods intense and widespread sporadic-E ionization, two-hop openings may be possible considerably be-

*11307Clara St., Silver Spring, MD 20902.

yond this range. Check the 2 meter band for an occasional sporadic-E type opening between approximately 1200 to 1400 miles. While these type of short-skip openings can take place at anytime, as its name implies, during the late summer there is a tendency for it to peak between 8 a.m. and noon and again between 6 and 9 p.m., local daytime time. The occurrance of sporadic-E openings should decrease considerably by mid-September.

Trans-equatorial (TE) openings on 6 meters should begin to improve during August, and become fairly frequent by the end of the month. The best time for these openings is between 8 and 11 p.m., local daylight time. This type of propagation favors considerably openings from the southern tier states into deep South America, but an occasional opening should also be possible from more northern states.

The *Perseids*, one of this years major meteor showers, is expected to take place between August 10-14. It should peak at around noontime, EDT on August 12, with an expected count of about 50 meteors an hour. Ionization produced by meteor shower, especially during the period of maximum intensity, is expected to make possible frequent meteor-scatter type openings on the 6 and 2 meter bands, over distances of several hundred miles.

Although August is usually not a very good month for auroral-type scatter propagation on the v.h.f. bands, some openings may occur this August as a result of the higher incidence of solar flares now taking place on the sun. Auroras are most likely to occur when shortwave conditions are BELOW NORMAL or DISTURBED. Check the *Last Minute Forecast* appearing at the beginning of this column for those days during August that are expected to be in these categories.

Auroral-scatter openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading, and Doppler shift on s.s.b. signals.

73, George, W3ASK

August 15-September 15, 1978
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-15 (1)	08-10 (1) 10-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 13-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 20-21 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & European USSR	09-13 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-02 (1) 20-21 (1)* 21-00 (2)* 00-01 (1)*
Eastern Mediter-ranean & Middle East	11-14 (1)	08-09 (1) 09-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	07-09 (2) 09-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-01 (3) 01-03 (2) 03-07 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	11-14 (1) 14-16 (2) 16-17 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-02 (3) 02-06 (2) 06-09 (1)	20-23 (1) 23-02 (2) 02-03 (1) 21-02 (1)*
Eastern & Central Africa	13-16 (1)	10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	20-02 (1) 21-01 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	08-15 (1) 15-17 (2) 17-21 (3) 21-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	20-22 (1) 22-01 (2) 01-03 (1) 21-02 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for meter openings.

3. The *propagation index* is the number that appears in () after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-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.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

Central & South Asia	*Nil*	09-12 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	08-10 (1) 10-12 (2) 12-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 08-10 (2) 10-11 (1) 19-22 (1) 22-00 (2) 00-01 (1)	*Nil*
Far East	*Nil*	09-11 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	12-20 (1) 20-22 (2) 22-00 (3) 00-01 (4) 01-03 (3) 03-05 (2) 05-07 (1) 07-08 (2) 08-10 (3) 10-12 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Austral-asia	16-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	06-08 (2) 08-10 (3) 10-11 (2) 11-16 (1) 16-18 (2) 18-22 (1) 22-01 (2) 01-03 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-18 (3) 18-21 (4) 21-23 (3) 23-01 (4) 01-03 (3) 03-04 (2) 04-06 (1) 06-07 (2)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-08 (1) 20-00 (1)* 00-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-23 (4) 23-03 (3) 03-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-23 (1) 23-05 (2) 05-07 (1)) 03-06 (1)*
McMurdo Sound, Antarctica	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	18-20 (1) 20-21 (2) 21-01 (3) 01-03 (2) 03-07 (1) 07-09 (2) 09-10 (1)	01-05 (1)

Time Zones: CDT & MDT (24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	09-14 (1)	09-11 (1) 11-12 (2) 12-13 (3) 13-15 (2) 15-17 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-00 (1)	19-22 (1) 22-01 (2) 01-02 (1) 20-01 (1)*
Northern & Central Europe European USSR	08-12 (1)	11-16 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 21-00 (2) 00-01 (1)	19-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	10-11 (1) 11-13 (2) 13-15 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-00 (2) 00-02 (1)	19-00 (1) 20-23 (1)*
Western Africa	10-12 (1) 12-16 (2) 16-17 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-21 (2) 21-22 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (4) 22-01 (3) 01-02 (2) 02-09 (1)	20-23 (1) 23-01 (2) 01-02 (1) 21-00 (1)*

Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	09-11 (1) 11-13 (2) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-18 (1) 22-23 (1) 23-01 (2) 01-02 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central Europe & European USSR	*Nil*	09-11 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (1) 22-00 (1)	18-20 (1) 20-22 (2) 22-23 (1) 21-22 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-22 (3) 22-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	11-13 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	06-09 (1) 13-15 (1) 15-18 (3) 18-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-01 (1) 21-00 (1)*
Central & South Asia	*Nil*	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	*Nil*	10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-13 (1) 19-21 (1) 21-23 (2) 23-01 (1)	06-08 (1)
Far East	*Nil*	09-11 (1) 15-16 (1) 16-19 (2) 19-21 (1)	19-22 (1) 22-00 (2) 00-02 (1) 07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1)	03-06 (1) 06-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-23 (3) 23-03 (4) 03-05 (3) 05-08 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Austral-asia	09-11 (1) 14-16 (1) 16-19 (2) 19-20 (1)	09-11 (1) 15-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-03 (3) 03-08 (2)	02-04 (1) 04-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-23 (4) 23-02 (3) 02-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	12-16 (1) 16-17 (2) 17-19 (3) 19-22 (4) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	20-22 (1) 22-05 (2) 05-07 (1) 02-05 (1)*
McMurdo Sound, Antarctia	*Nil*	13-15 (1) 15-17 (2) 17-20 (1)	17-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	01-06 (1)

Eastern Mediter-ranean & Middle East	*Nil*	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (1) 19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)
Western & Central Africa	13-16 (1)	08-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-01 (2) 01-07 (1) 07-09 (2) 09-10 (1)	21-00 (1)
Eastern Africa	*Nil*	09-13 (1) 13-16 (2) 16-18 (1)	13-15 (1) 15-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	20-22 (1)
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-23 (1) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-08 (1)
Southeast Asia	16-19 (1)	09-11 (1) 15-17 (1) 17-20 (2) 20-21 (1)	21-01 (1) 01-03 (2) 03-04 (3) 04-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 19-21 (1)	03-07 (1)
Far East	15-18 (1)	09-11 (1) 14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	21-23 (2) 23-01 (3) 01-04 (2) 04-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (1) 02-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	05-09 (2) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-22 (3) 22-02 (4) 02-05 (3)	22-23 (1) 23-04 (3) 04-06 (4) 06-07 (3) 07-08 (1) 23-01 (1)* 01-03 (2)* 03-05 (3)* 05-06 (2)* 06-07 (1)*
Austral-asia	09-14 (1) 14-18 (2) 18-20 (1)	09-11 (1) 14-18 (1) 18-19 (2) 19-21 (4) 21-22 (2) 22-00 (1)	13-20 (1) 20-22 (2) 22-23 (3) 23-03 (4) 03-05 (3) 05-08 (2) 08-10 (3) 10-13 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-21 (4) 21-01 (3) 01-05 (2) 05-06 (3)	19-20 (1) 20-21 (3) 21-04 (4) 04-05 (2) 05-06 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-07 (1) 07-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-05 (1) 00-04 (1)*
McMurdo Sound, Antartica	*Nil*	13-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 17-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-04 (1)	23-03 (1) 03-05 (2) 05-07 (1)

* Indicates best time for eighty 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 (20, or higher.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The "Story of The Month" for August, as told by Herb is:

Herbert M. Perry, W0GQR
All Counties #150, 6-15-76.

Although Herb went with the Lord, 3-23-78 while at the V.A. Hospital in Kansas City, due to another heart attack, I feel sure he would want me to write his "Story" submitted to me some months ago.

"My father was a farmer and a mail carrier, later retiring from the Postal Service, and my mother was a school teacher.

"Dad bought our first broadcast receiver in 1927, it was a Crosley battery powered receiver. I would stay up all night and log as many stations as I could over the U.S., Canada and Mexico. Guess that was my real start toward the ham world.

"In 1929 I enlisted in the U. S. Marine Corps and traveled all over the world until I retired in 1952. During that time I was on all the Continents, all the States except Alaska and in all 115 Counties in Missouri, I worked in Motor Transport and served in all positions from grease monkey to Company Commander.

"My side-lines were auto racing and flying and part owner of an Airport in North Carolina.

"I got started in ham radio in 1957 in North Carolina as KN4RHG. Eleven months later I received my General ticket and moved to Cocoa, Florida. My first project there was to work W.A.S., Novices only, which took only one month and 26 days with all the cards in for verification.

"After 4 years in Florida, I moved back to the old home area as W0GQR.

"In the later part of 1966, I got to checking into the County Hunter Nets on 14336 and 3943, to help those needing Grundy County, Missouri. In the summer of 1967, I finally got the bug and decided to go for them *ALL*, but due to the actions of two of the 20 meter Net Control Stations, I gave up 20 and stayed on 75. Twice, after working mobiles on the 20 meter Net, the Net Control Stations said they did not recognize my call and as I was not a County Hunter, they would appreciate it if I would get off the Net frequency. (*I feel sure we have no such Net Controls, these days–Ed*).

Nell Dewitt, WB6ERF who, thanks to OM Don, Bill, W6NV, and others, is #1 to give out to the County Hunters, all 50 States, #2 to give out all 49 States and #6 to give out all 48 States. Thanks Nell, also thanks for all who helped and cooperated.

"Thus I made them all endorsed, all 75 2XSSB, (#1 so endorsed) and they were all made from W0GQR at this home QTH. My very first contact entered in the County Hunter Book was with Ruth Nissen, W4BWR/M in Hillsborough County, Florida. I knew Ruth when I lived in Cocoa and she in Cocoa Beach where she operated a taxi company.

"I had several rig setups including a few home-brew ones on up to a Swan 500CX for all bands but 40, where I used a Swan 270B. Have a Swan 350C in the pickup, but due to a hearing problem, I do not operate mobile often.

"Ralph Alley, W9JR/M gave me my last 7 Counties, 2 in Georgia, 2 in Montana and 3 in North Dakota, with Mountrail being the last one. Ralph made that long trip for 5 of us.

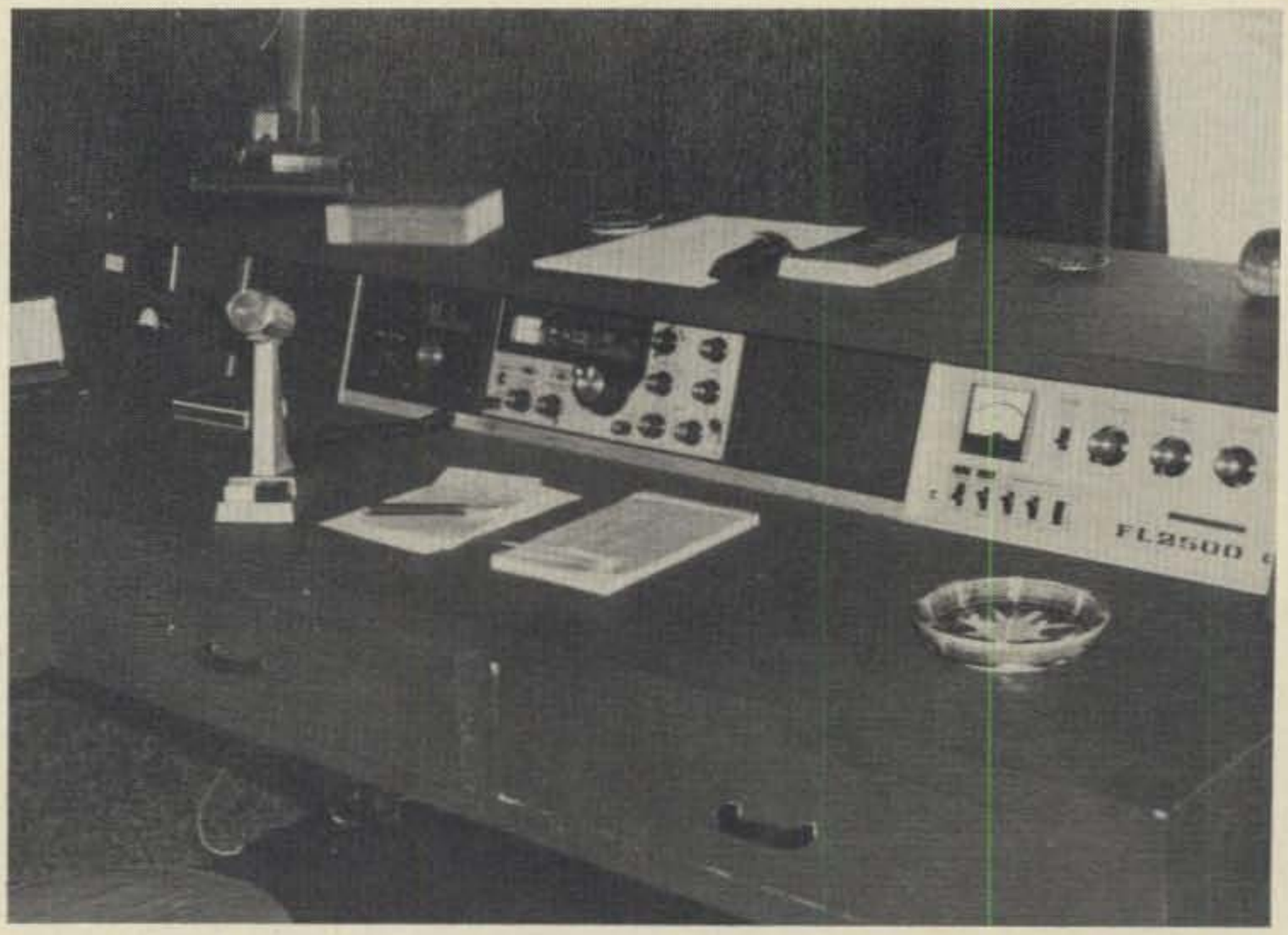
I would like to thank all who helped me, especially the mobiles and NCS. A good NCS is hard to find, but there are some real good ones on the 75 meter Net".

Awards Issued

Joe Lindley, WB0CQO (ex-WA3FED) made them *all* endorsed *all* SSB.

Steve Hammerberg, WA7IJN also made them all.

Bea Dietz, WA2GPT (Story and photograph in *CQ* August 1977) who made them *all* #137 9-18-75 endorsed



Some of the equipment at, CT1TZ, "Mat".

*P.O. Box 73, Rochelle Park, NJ 07662

Iowa–Queen of Sports Award.

Mixed, upped her endorsement to all SSB, all mobiles.

Bruce Roberts, WB9AAJ qualified for USA-CA-500 through USA-CA-2000 endorsed all SSB.

Russell Fish, W7KWI claimed USA-CA-1000, 1500 and 2000 endorsed ALL SSB.

Dick Peterson, W4KFA was issued USA-CA-1500 endorsed ALL SSB.

"Mat" Santos, CT1TZ acquired USA-CA-1000 endorsed ALL SSB (#5 to CT1).

Carryl Randolph Weyant, WA2PFF won USA-CA-500 and USA-CA-1000.

Mixed USA-CA-500 certificates went to:

The Worcester Polytechnic Institute Wireless Association, W1YK (Club President K1UR).

Inaki Alcorta Goni, EA2IA.

The Milan Award–Diploma Milano.

Antonio Petroncari, I2PJA had me send him USA-CA-500 endorsed all SSB.

Awards

Canadian Amateur Radio Awards Directory: This first, exclusive, inclusive Canadian Amateur Radio Awards Directory has over 60 pages of rules, maps, check lists and application forms. All you need to know about Canada's FB Awards program of Diplomas, certificates, pins and plaques. Send $3.00, (any currency) to co-authors VE3HLL, Eric Walden, Gowanstown, Ontario, Canada *or* VE3GCO, Garry Hammond, Listowel, Ontario, Canada (Garry is an avid U.S. County Hunter). The Directory will be available after July 1 and will be sent via first class mail.

Iowa—Queen of Sports Award: This is a Non-Chapter and non-proliferating award. All contacts must be made after January 1, 1978. Applicant must hold a 10-X number and contact other 10-X members in Iowa to qualify as follows:

Canadian–Pee Gee Award.

A. U.S. stations (excluding Iowa and contiguous states) must contact *ten* Iowa 10-X stations *plus* one 10-X station in Knoxville, Iowa.
B. DX, Iowa, and states bordering Iowa must contact *five* Iowa 10-X stations *plus* one 10-X station in Knoxville, Iowa.

Send log excerpts of contacts to: WBØWRL, D. J. Swisher, 601 W. Main, Knoxville, Iowa 50138, *OR* WØMHK, William Grim, 517 E. Madison St., Knoxville, Iowa 50138. Be sure to include $1.00 to cover costs.

Pee Gee Award: This award is sponsored by the Prince George Chamber of Commerce and the Fort George Amateur Radio Club. Work five (5) amateur radio stations located in the city of Prince George. Also available to s.w.l.s on a "heard" basis. Phone, c.w. or mixed contacts permitted. QSLs not required, send log data only. There is no charge for the certificate, but I am sure one IRC would be appreciated. Send application to: Fort George Amateur Radio Club, Box 835, Prince George, B.C. Canada V2L 4T7.

Five Band Italian Prefixes Certificate: The Trieste DX Radio Club is pleased to announce the issue of the 5 Band Italian Prefixes Award to all Radio Amateurs and s.w.l.s, worldwide. Applicants must submit proof of QSOs with 10 Italian stations with different prefixes on each of five separate bands, a total of 50 QSOs, 10 different prefixes per band. Contacts to be made in two-way c.w. - s.s.b. - RTTY after January 1, 1975. Crossband not permitted. Submission of the QSL cards is not required, but your log data must be certified by two other amateurs or by an officer of your Radio Society or Club. Send your log/application with 20 IRCs or 3 U.S. dollars to: Trieste DX Radio Club, P. O. Box 1342, 34100 Trieste, Italy. The certificate will be sent with a colorful flag of the Club.

Special Honor Roll
(All Counties)
#182 Bryon L. Lindley, WBØQO 4-11-78
#183 Steven J. Hammerberg, WA7JN 4-20-78

The Milan Award: The Milan section of Associazione Radiotecnica Italiana (A.R.I.) establishes this award in order to increase contacts between Amateur Radio Stations located in Milan and the Province of Milan, and all Amateur Radio Stations in the world.

1. Two-way contacts with licensed stations located in Milan and the province of Milan, beginning January 1, 1965, on all bands will be valid.

USA-CA Honor Roll

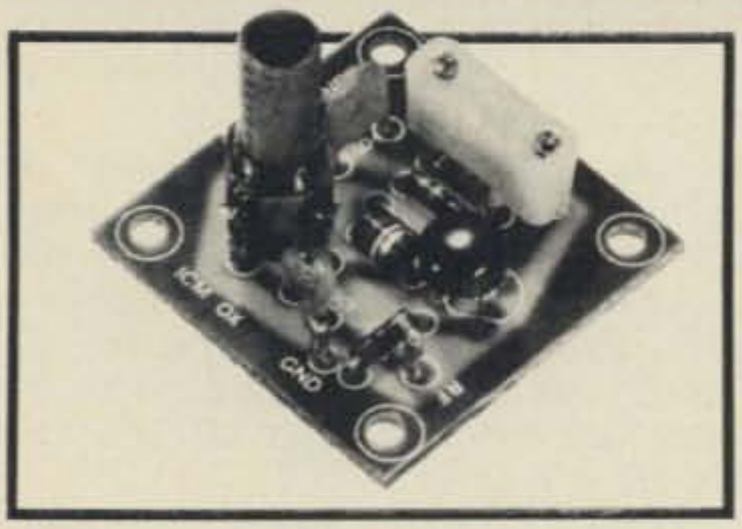
2000		1000		500	
WB9AAJ	303	W7KWI	472	W1YK	1234
K7KWI	304	CT1TZ	473	I2PJA	1235
1500		WA2PFF	474	EA2IA	1236
W4KFA	357	WB9AAJ	475	W3HU	1237
W7KWI	358			WA2PFF	1238
WB9AAJ	359			WB9AAJ	1239

2. To obtain this Award it is necessary:
   a. for amateurs stations in Milan and within the Province of Milan, to work at least 40 amateur stations on three bands.
   b. for European Amateur Stations and the remaining Italian stations to work at least 20 Amateur Stations on 2 bands.
   c. for Extra European Amateur Stations to work 10 stations without band limits.
3. All types of licensed transmissions are permitted, except crossband contacts. Mode type will be indicated on the Award (AM, SSB, CW or Mixed). The Award can be obtained several times for each transmission (mode) type. S.w.l.s can also obtain this Award.

FOR THE EXPERIMENTER

INTERNATIONAL CRYSTALS & KITS

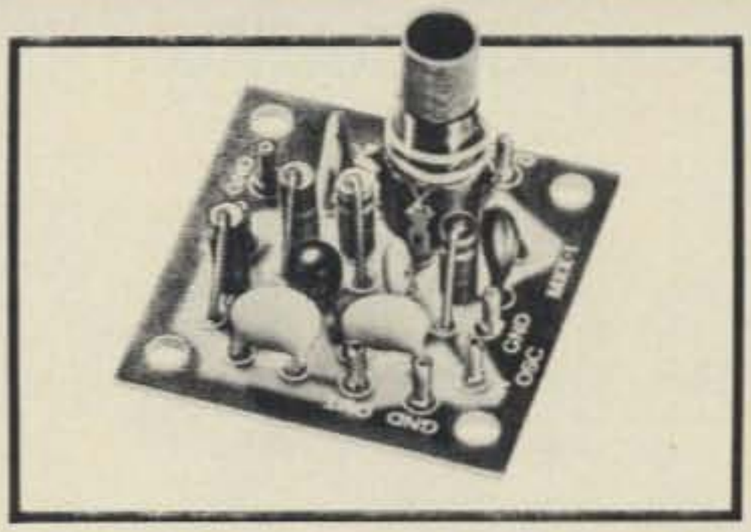
OSCILLATORS • RF MIXERS • RF AMPLIFIER • POWER AMPLIFIER



OX OSCILLATOR

Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101.
Specify when ordering.

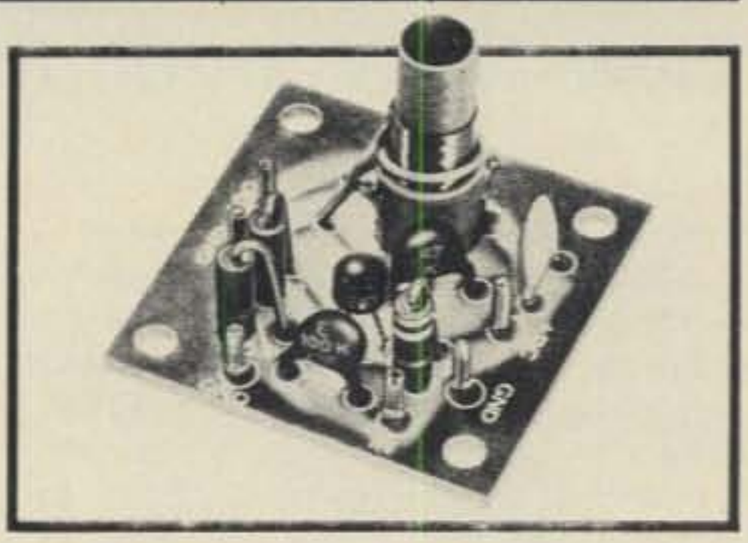
$4.95 ea.



MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106.
Specify when ordering.

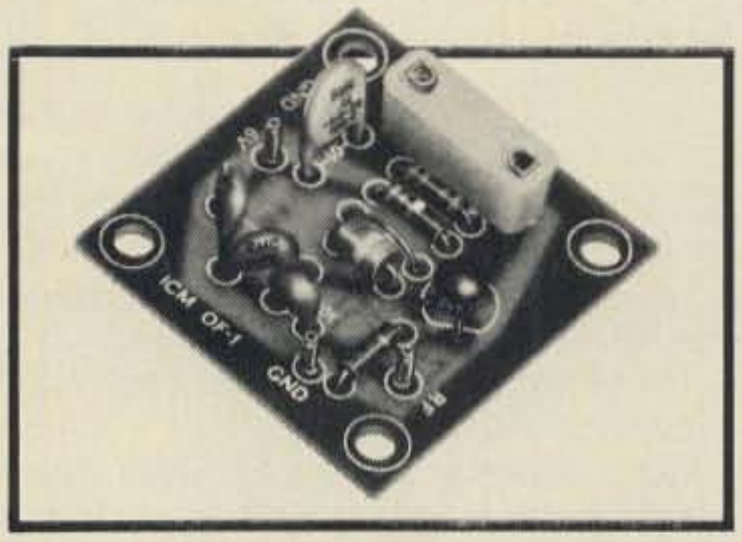
$5.50 ea.



PAX-1 TRANSISTOR RF POWER AMP

A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated 3 to 30 MHz, Cat. No. 035104.
Specify when ordering.

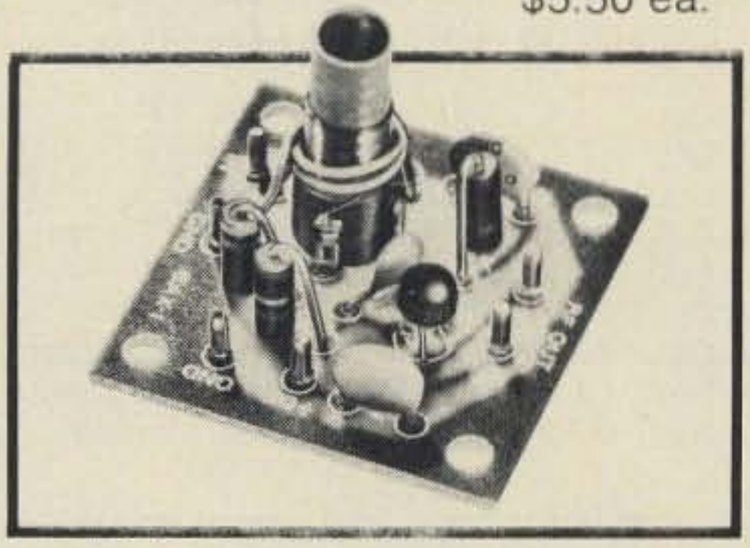
$5.75 ea.



OF-1 OSCILLATOR

Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109.
Specify when ordering.

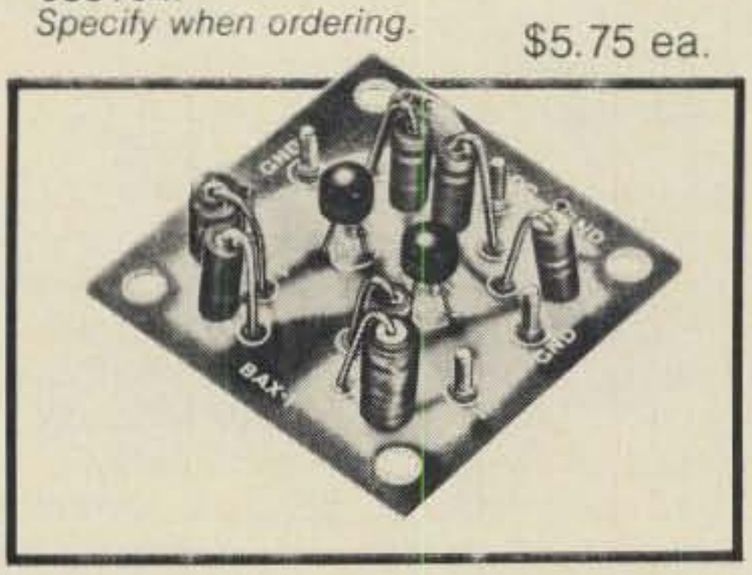
$4.25 ea.



SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.

$5.50 ea.



BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107.
Specify when ordering.

$5.75 ea.

.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo	
	Specify when ordering	$5.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi	
	Specify when ordering	$5.95 ea
031300	3 to 20 MHz — For use in OF-1L OSC	
	Specify when ordering	$4.75 ea.
031310	20 to 60 MHz — For use in OF-1H OSC	
	Specify when ordering	$4.75 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
M/S Dept., P.O. Box 32497,
Oklahoma City, Oklahoma 73132.

International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

It was again my pleasure to attend and be part of this year's Dayton Hamvention.

Once again new records were set for attendance and participation. There were hundreds of Exhibitors and acres and acres of surplus equipment in the Flea Market.

However it was the Hospitality Suites in the downtown hotels that was the big attraction for the wall to wall Contesters and DXers from all over the world.

And the "Contest Forum" early Saturday morning again was one of the better attended programs. My presentation of a dozen Plaques won in *CQ* Contests was only a minor part of the Forum. Bernie, W8IMZ must be congratulated for his presentation of a well rounded and most interesting program.

Most important however was a high level meeting with our "boss man" Al Dorhoffer, K2EEK. After giving him first hand proof of the many requests for a C.W. WPX Contest, we finally received permission to run one in 1979. No details as yet but it will follow the same pattern as the WPX SSB Contest, and will probably be held on the last week-end in May.

We have already received several Trophy donations but are still open for more. Anyone wishing to sponsor an award for this new contest should contact me.

And speaking of new contests, we received an announcement from the Federation of Cuban Radio Amateurs, of one they are running on June 3/4 and 10/11. Unfortunately it was received much too late to make the June Calendar. Send me a s.a.s.e. if you want more details.

Also received too late for publication was the World Telecomm. held in May. I can forgive the Cubans, after all this is something new for them, but there is no excuse for the latter. We had our Brazilian contact make several phone calls to LABRE who runs this affair, but could not get a decisive answer. *C'est la vie.*

73 for now, Frank, W1WY

*14 Sherwood Road, Stamford CT 06905

Calendar of Events

July	22-23	SEANET C.W. Contest
**July	29-30	Venezuelan C.W. Contest
*July	29-31	County Hunters C.W.
*July	29-31	New Jersey QSO Party
Aug.	5-6	Illinois QSO Party
†Aug.	5-6	Romanian Contest
†Aug.	12-13	European C.W. Contest
Aug.	19-20	SEANET Phone Contest
Aug.	19-20	CAN—AM Contest
Aug.	19-20	S.A.R.T.G. RTTY Contest
**Aug.	26-27	All Asian C.W. Contest
Aug.	26-27	Kentucky QSO Party
Sept.	2-4	FOUR Land QSO Party
Sept.	9-10	Pennsylvania QSO Party
†Sept.	9-10	European Phone Contest
*Sept.	10	North American C.W. Sprint
Sept.	16-18	Maryland/DC QSO Party
Sept.	16-18	Wash. State QSO Party
Sept.	23-24	Delta QSO Party
Oct.	7-8	VK/ZL/Oceania RTTY
Oct.	7-8	VK/ZL/Oceania Phone
Oct.	14-15	VK/ZL/Oceania C.W.
Oct.	14-15	R.S.G.B. 21/28 MHz Phone
Oct.	14-16	Manitoba QSO Party
Oct.	21-22	R.S.G.B. 7 MHz S.S.B.
Oct.	**28-29**	**CQ. WW DX Phone Contest**
Nov.	4-5	R.S.G.B. 7 MHz C.W. Contest
Nov.	**25-26**	**CQ WW DX C.W. Contest**

† Not Official
* Covered last month
** See June Calendar

SEANET World Wide DX Contest

C.W.: July 22-23 Phone: Aug. 19-20
0001 GMT Sat. to 2359 GMT Sun.

This is the 4th annual contest organized by the Singapore Amateur Radio Transmitting Society. The aim is to call attention to the 8th SEANET Convention to be held in Singapore on November 10, 11, 12th, and the Southeast Asia Net every day at 1200 GMT on 14320 kHz.

Classifications: Single operator, single and all band, and multi-operator, all band.

Exchange: RS (T) plus a 3 figure QSO number.

Scoring: For stations outside the SEANET area. (a) Contacts with stations within the SEANET area with following prefixes: HS, YB, DU, 9V1, 9M2, 9M6, 9M8. 20 points if on 160, 10 points if on 80 and 40, 4 points if on 20, 15 or 10 meters.

(b) Contacts with other stations in the NET area. 10 points on 160, 5 points on 80 and 40, 2 points on 20, 15 or 10 meters.

(c) Contacts between stations outside the SEANET area have no value.

(d) Multiplier is 3 points for each NET country worked.

For stations within the SEANET area.

(a) Contacts with stations outside the NET area. 10 points on 160, 5 points on 80 and 40, 2 points on 20, 15 or 10 meters.

This panel of "experts" in no small way contributed to the success of the 1978 Dayton Hamvention. All members of the Dayton Amateur Radio Association. (L. to R.) Bernie Welch, W8IMZ, CQ WPX Contest Director and Moderator of the Contest Forum. Frank Schwab, W8OK was elected as the Hamvention Amateur of the Year. And John Basilotto, WA8ZAN General Chairman of the '78 Hamvention.

Earlier in the month of April the West Coast DXers were having their own "DX Bash" at Visalia. In a joint meeting of the Northern and Southern California DX Clubs. Our West Coast representative Larry Brockman, N6AR (CQ WW Contest Co-director) presented the Bernie Welch, W8IMZ WPX SSB Contest Expedition Award to Lloyd and Iris Colvin (W6KG & W6QL) for their operation from VP2MAQ in the 1977 Contest. (Photo by Conrad Bluhm, WA6QDN)

(b) Contacts between stations in the Net area. 6 points on 160, 3 points on 80 and 40, 1 point on 20, 15 or 10 meters.

(c) Contacts between stations in own country have no value.

(d) Multiplier of 2 for each Net country worked. And 3 multiplier points if country is outside the SEANET area.

Final Score: Total QSO points from all bands times the sum of the multiplier points.

Awards: Commemorative certificates to all entries. Trophies to Top scorers will be presented at the SEANET Convention.

SEANET Area Country Prefixes

A4, A51, A6, A7, A9, AC3, AP, BV, BY, CR9, DU, EP, HL/HM, HS, JA/JE/JF/JG/JH/JI/JR, JD1, JY, KA, KC6, KG6, KH6, KX6, P29, S21, S79, VK, VQ9, VS5, VS6, VS9K, VS9M/8Q6, VUZ, VU (Andaman, Nicobar, Laccadive Islands), XU, XV5, XW8, YB, YJ8, ZL, 3B6, 3B8, 3D2, 4S7, 4W1, 5Z4, 9K2, 9M2, 9M6, 9M8, 9N1, 9V1.

The same station may be worked only once per band, cross-band or cross-mode contacts are not allowed, and only one signal at the same time for multi stations. The usual disqualification rules will be observed and enforced.

Logs and summary sheets must be received before October 31st by the SEANET Contest Committee, Att: Henry Woo, 9V1RD, P.O. Box 2728, Singapore. Include a s.a.e. with one IRC if you desire a copy of the results.

Illinois QSO Party

Two Periods GMT
1800 Sat. Aug. 5 to 0500 Sun. Aug. 6
1200 Sun. Aug. 6 to 2300 Sun. Aug. 6

This is the 16th annual party sponsored by the Radio Amateur Megacycle Society. The same station may be worked on each band and mode.

Exchange: QSO no., RS(T) and QTH. County for Illinois stations; state, province or country for others.

Scoring: One point per contact, 2 points if it's with a Novice or Technician.

Illinois stations multiply total QSO points by sum of states, (max. 50) VE/VO call areas (max. 10) and no more than one DX country worked. (DX may be worked for QSO points but only one multiplier.)

Out of state stations multiply total QSO points by Illjnois counties worked. (max. 102)

Illinois mobiles or portables operating away from normal QTH may add 200 to final score for each county of operation from which 10 or more contacts were made.

There is a bonus for out of state stations, a multiplier of one for each group of 8 contacts with same county.

Frequencies: C.W.—About 60 kHz. from low end of each c.w. band. Phone—3975, 7275, 14275, 21375, 28675, and 25 kHz. from low end of each Novice band on the half hour.

Awards: Certificates to the top scorer in the following categories: Single operator, multi-operator, mobile, portable, Novice and Technician. In each state, VE/VO province, DX country and first 3 places in Illinois. There are also club awards.

A summary sheet is requested showing the scoring and other essential information. Include a large s.a.s.e. for a copy of results.

Mailing deadline is Sept. 15th to RAMS, K9CJU, 3620 N. Oleander Ave., Chicago, Ill. 60634.

Romanian Contest

Starts: 1800 GMT Sat. August 5
Ends: 1800 GMT Sun. August 6

This one is sponsored each year by the Romanian Amateur Radio Federation.

You may work other European countries as well as the Romanian stations on each band and mode, 3.5 thru 28 MHz. The same station may be worked only once per band, either on c.w. or on phone.

Classes: Both single and multi-operator, single and all band for both divisions.

Exchange: RS(T) and a QSO number starting with 001. YO stations will also include two letters denoting their county. (569001/SJ)

Scoring: For Europeans—Two points for DX contacts, six points if it's with a YO station.

For others: Two points for European QSOs, 10 points if it's with a YO station.

Multiplier: DX countries worked on each band for the Europeans, others will use European countries and YO countries worked on each band. (There are approximately 40 YO counties)

Final Score: Total QSO points times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each country in each class. And a Crystal Cup to the overall champion.

Include a summary sheet and a signed declaration with your entry. (Inquire about the several YO awards. No details were given.)

Mailing deadline is September 1st to: Romanian Amateur Radio Federation, P.O. Box 1395, 7000 Bucuresti 5, Romania.

European DX Contest

C.W.: Aug 12-13
Phone: Sept. 9-10
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 24th annual contest sponsored by the DARC. The activity will be between the European countries and the rest of the world.

Use all bands 3.5 thru 28 MHz. There are two classes, Single operator, All Band, and Multi-operator, Single Transmitter.

Only 36 hours out of the 48 hour contest period may be used by single operator stations. The 12 hour rest period may be taken in one, but not more than three periods any time in the contest.

Exchange: RS(T) plus a QSO number starting with 001.

Scoring: One point per QSO and one point for each QTC reported.

Multiplier: For non-Europeans, number of EU stations worked on each band. Europeans will use the ARRL list and call areas as follows: JA, PY, VE/VO, VK, W/K, ZL, ZS, UA9/UAØ. In addition the multiplier on 3.5 may be multiplied by 4, on 7 MHz. by 3, and on 14/21/28 by 2.

Final Score: Total QSO points, plus QTC points, times the sum total multiplier from all bands.

QTC Traffic: Additional QSO points may be realized by reporting a QTC. This is a report of a QSO you have made earlier in the contest and later sent back to a European station.

1977 S.A.R.T.G. RTTY U.S.A. and Canada Results

W3FV	140,600	K6WZ	34,400
K8JUG	130,680	WA9AKT	27,550
WD8KBL	103,515	W6JOX	9,750
W4CQI	102,080	W3KV	7,370
K3KD	99,900	VE7DLX	6,080
K5ARH	90,210	K8UFW	5,400
KH6AG	68,620	WAØTAS	3,975
VE5RG	66,240	W4YZ	1,650
VE2QC	60,630	VE8CM	750

W3FV and K8JUG were 3rd and 4th world high.

1977 All Asian C.W. North America Results

1.9 MHz	
W7DL	**42**
WB6PXP	42
3.5 MHz	
W6ZGM	**2,392**
7. MHz	
N6BT	**26,270**
W7KW	19,283
W6DYD	17,000
K6RU	15,470
WA7ZVV	1,350
W5AT	462
14 MHz	
WA7JCB	**7,174**
N6JM	2,025
W9OA	1,029
W6SZN	680
WA6NEL	568
N4MM	133
N4RJ	68
21 MHz	
W6AM	**4,176**
K6CL	408
28 MHz	
W6PVB	**1**
All Band	
N6RO	**185,455**
W7RM	**171,648**
N6MU	81,900
N6AW	78,903
W7OM	76,300
K6NA	48,884
N7AM	33,726
N6AA	19,152
K5TM	**12,825**
W7JYW	7,392
K3ZO	**6,235**
K1ZZ	**5,434**
WA6KHB	2,376
W0IUB	**1,680**
W5WMU	1,254
W7JKA	1,012
K4RDU	**924**
K2CL	**770**
W5SOD	77
WØMHK	35
Multi-Op	
N7XX	**155,790**
W6NLZ	148,463
K6OQ	139,125
W7OX	126,140
KØRF	95,472
CY2UN	**1,375**
14 MHz	
KL7GN	**2,231**
VE7BC	**8,268**
VE5UA	1,582
VE1AI	924
All Band	
KL7AF	**5,764**
Continental Winners	
ZL3GQ	212,993
N6RO	185,455
EP2SV	173,052
UR2QI	146,775
JA1PIG/PZ	204

The general idea being that after a number of EU stations have been worked a list of these can be reported back to another EU station. One point may be earned for each QSO reported. A QTC can only be sent from a non-European to a European station.

A QTC contains the time, call and QSO number of the station being reported. i.e.: 1300/DK2BI/134. This means that at 1300 GMT you worked DK2BI and received his number 134. It may be reported only once and not back to the originating station.

A maximum of 10 QTC's to the same station are permitted, and the same station worked several times to complete this quota. Only the original contact however has QSO point value.

Keep a uniform list of QTC's sent. QTC 3/8 indicates that this is the 3rd series and that 7 QSO's are now being reported.

Awards: Certificates to the highest scoring stations in each country and call areas listed in the multiplier. Continental leaders and stations having at least half the score of the continental leaders will also be awarded.

Disqualification: Violation of the rules of the contest, or unsportsmanlike conduct, or taking credit for excessive duplicate contacts or multipliers will be deemed cause for disqualification. Decision of the Committee is final.

It is suggested that you use the official log and summary forms. A s.a.s.e. with sufficient IRC's to the DARC will get you a supply. (W/K and VE stations can send their request to WA3KWD, Hartwin E. Weiss, 323 North Street, Millersburg, PA 17061. Figure 40 contacts to the page if you make your own, and use a separate sheet for each band.

North American entries can also send their logs to WA3KWD.

Mailing deadline for logs is Sept. 15th for C.W. and Oct. 15th for Phone. To the DARC Contest Committee, D-895 Kaufbeuren, P.O. Box 262, West Germany.

European Country List

C31 — CT1 — CT2 — DL, DM — EA — EA6 — EI — F — FC — G —GC Guer — GC Jer — GD — GI — GM — GM Shetland — GW — HA — HB9 — HBO — HV — I — IS — IT — JW Baer — JW — JX — LA — LX — LZ — M1 — OE — OH — OHO — OJO — OK — ON — OY — OZ — PA — SM — SV — SV Crete — SV Rhodes — TA1 — TF — UA1346 — UA2 — UB5 — UC2 — UO5 — UN1 — UP2 — UQ2 — UR2 — UA Franz Josef Land — YO — YU — ZA — ZB2 — 3A — 4U1 — 9H1.

Canadian–American Contest

Phone: Saturday, August 19
C.W.: Sunday, August 20
0000 to 2400 GMT - Two 24 hr. periods.

This is the second time around for this contest which was created to increase communication and friendship between amateurs of the two countries. Last year's initial running was a big success.

Contacts may be made on all bands, 1.8 thru 28 MHz. It is recommended however that operation be confined to the General portions of each U.S. band. QSO exchanges will be between the two countries as well as contacts within each country.

Categories: Single operator, multi-operator single transmitter and club competition.

Exchange: RS(T), QSO no., and multiplier area. Postal abbreviations for the 50 U.S. states, "CN" for U.S. possessions in the Caribbean, "PC" for Pacific possessions, and provinces for Canada. (59001 CT, 599001 PQ)

Points: W/K to W/K and VE to VE QSOs, 2 points. W/K to VE QSOs, 3 points.

Multiplier: 50 U.S. states, 2 U.S. possessions, (Carib. and Pacific areas) 10 Canadian provinces, 2 Can. territories, (NWT and Yukon) 1 Can. Island. (Sable and St. Paul) Total of 65 per band, max. of 390 from all bands.

The same station may be worked on each band for QSO and multiplier credit. Stations operating outside their own area must identify their location.

Multi-operator stations must stay on the same band at least 10 minutes before switching to another band.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Phone and c.w. are separate contests. However combined phone and c.w. scores will be used for overall competition.

Awards: Certificates to single operator stations in each multiplier area, and top 5 combined phone and c.w. scores for multi-operator stations.

There are 8 Trophies and Plaques.

Phone—Single Operator—Canadian and American Champ.

C.W.—Single Operator—Canadian and American Champ.

Overall—Single Operator—Canadian and American Champ.

Multi-Operator Champion.

Highest aggregate Club score.

And a one year subscription to *"Long Skip"* the CANADX monthly bulletin to the top 5 U.S. stations.

A disqualification clause will be strictly observed. Violation of amateur regulations, rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts or multipliers and etc. So check your log carefully before submitting it.

Do not use separate log sheets for each band. Indicate the multiplier only the first time it is worked on each band. A summary sheet must accompany each entry, showing the scoring and other pertinent information. Each entry with over 200 contacts must also include a check sheet for each band.

Sample log, summary and check sheets are available from CANADX. A large s.a.s.e. will bring you samples.

Mailing deadline for all entries is September 30th. Canadian DX Assoc.—CC, P.O. Box 292, Don Mills, Ont. Canada M3C 2S2.

S.A.R.T.G. RTTY Contest

Three Periods GMT
0000—0800 & 1600—2400 Sat., Aug. 19
0800—1600 Sunday, August 20

This is the 8th annual contest sponsored by the Scandinavian Amateur Radio Teletype Group. Use all bands 3.5 thru 28 MHz. The same station may be worked on each band for QSO and multiplier credit.

Classes: Single operator, Multi-operator Single transmitter and s.w.l.

Exchange: QSO no., and signal report.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points. The U.S., Canada and Australia call areas count as separate countries for scoring.

Multiplier: Each DXCC country and each W/K, VE/VO and VK call areas worked. A multiplier will not be considered unless the claimed station appears in at least 5 logs, or a log is received from that station.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

S.w.l.s use same scoring but based on the sum of stations and messages copied.

Awards: Certificates to the top scoring stations in each class in each country and each call area of the U.S., Canada and Australia.

Use a separate sheet for each band and include a summary sheet showing the scoring, comments and other essential information. And your name and address in Block Letters.

Logs must be received by October 10th and go to: SARTG Contest Mgr., C. J. Jensen, OZ2CJ, Meisnersgade 5, 8900 Randers, Denmark.

Kentucky QSO Party

Starts: 0000 GMT Sat., August 26
Ends: 2400 GMT Sun., August 27

The Bluegrass A.R.C. of Lexington is again sponsoring this year's party. The same station may be worked on c.w. and one other mode per band for QSO credit.

Exchange: QSO no., RS(T) and QTH. County for Kentucky stations; state, province or country for others.

Scoring: One point per contact. Kentucky stations use states, provinces and countries worked for their multiplier. Others use Kentucky counties worked. (max. of 120) There is also a power multiplier of 1.5 for stations using 250 watts or less input.

Final score: Total QSO points multiplied by the QTH multiplier, times the power multiplier if any.

Frequencies: 70 kHz. up from the lower edge of the band on c.w., and lower edge of General Class portion of phone bands. Also Novice and Tech. portions of bands. VHF is limited to 2 and 6 meter simplex only.

Awards: A distinctive certificate to the high scorers in each ARRL section.

Mailing deadline for your entry is October 1st to: Tom Fitzpatrick, WB4FOT, 3709 Niagra Drive, Lexington, Ky. 40502

Clipperton *(from page 23)*

foot on Clipperton not just for the amateur activity but simply because it would be solid, dry ground.

We discovered that our sonar was not functional and that both systems of radar were out. Although none of us said it, we must all have had visions in our minds of searching for days on end for the 2 square mile dot on the map that we were aiming for, just as the first Kingman Reef DXpedition had done. On Saturday the 18th a bird, hopefully a Clipperton bird, landed on the stilled radar antenna.

During our visits to the bridge, we would note that Jeff Clough had carefully marked our course on the charts, and from his sextant and compass calculations Jeff predicted confidently that we would see the island from about ten miles out at about 10 a.m. Pacific Standard Time on Monday March 20th.

We were all up early that morning anxiously awaiting the appointed hour when we could begin straining our eyes for a first glimpse

About ten mimutes past ten that morning some one noticed that one of the waves dead ahead on the horizon was standing still, and it was land! If seeing was believing, Clipperton was no longer a dream for us, and it was becoming bigger than life each moment. Within minutes of the first sighting, François said that he could see coconut trees on the waves, and soon after that we could see the whole of the island before us. Camera shutters were snapping like popcorn.

Before long we realized that the problem of reaching the island that we had studied for so long had suddenly become a matter of where to land. As the numerous birds came out to hover over us trying to figure out just what we were, we saw the northwest beach marked on the remains of the World War II U.S. Navy LST which Bob Bucaro and others said marked the only possible landing point on the island, but we saw only ten foot waves pounding the sand there. We had hoped to land on that beach and use a ten-foot Avon rubber raft that Herb had gotten for the expedition to commute over the inland lagoon to the deserted French military camp called Bougainville, which was set in a thick grove of coconut trees on the opposite side of the atoll.

We continued counterclockwise around the island and then dropped anchor on the southwest side of the atoll near that large clump of trees. Even though the surf did not appear much more encouraging near Bougainville, the consensus was that this was about as good a place as any to tempt fate. The yacht's 15-foot Avon was set onto the water, and we began to assemble the equipment for disembarkment.

Before I knew it, Don, Willy and Kim had set out towards shore heading to what seemed to us still aboard to be the highest surf on that part of the island. They somehow managed to escape catastrophy at that point, and they moved a few minutes later to a somewhat calmer area. As they edged toward the rocky beach a couple of them got out and stumbled their way onto the fine, white sand. Willy waved to us with both arms as if to silently exclaim, "Clipperton, at last!"

Doug, W6HVN, looking over Herb Johnson's shoulder in preparation for landing at Clipperton. Herb is president of Atlas Radio.

2 Meter Mobile *(from page 73)*

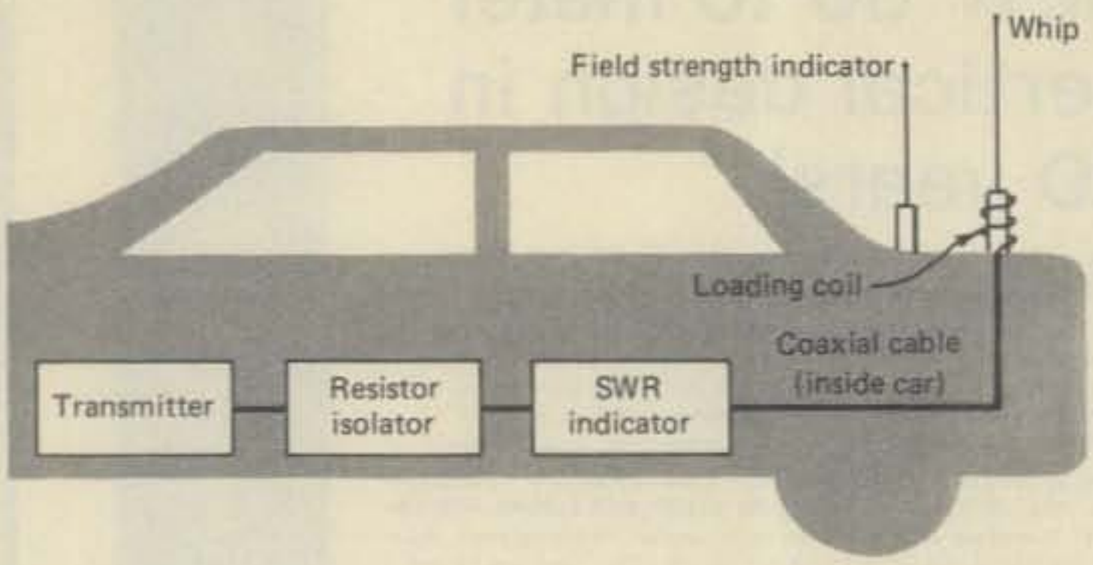


Fig. 5 – Transmission line, transmitter, s.w.r. bridge, and isolator should be inside the car during adjustments.

Comment

The procedure, for me, has resulted in less than 2:1 s.w.r. over the whole range 146-148 MHz.

I've tried (see photo) to weatherproof the assembly otherwise with a wrap of electrical tape, and this can be done. The electrical tape, however, detunes the network, and it may be necessary to unwrap, retune, and re-wrap several times. This is tiresome, but works.

Instead of using a gimmick, it is possible to make a capacitive hat, the lid of a large tin can or piece of sheet metal mounted under the spring and above the coil. The edges may be cut radially, and bent up or down to change C_2. This scheme, and using a shorted turn to vary L_2, may be used to adjust a taped coil. The fingers, however, may cause wind noises.

Speaking of wind, if the user drives fast, it may be desirable to make the final tuneup with the whip pulled backward, held with a length of thread.

The procedure may be done with the s.w.r. indicator alone (no f.s.), but it is necessary to reverse the indicator frequently to make sure there is still power going down the transmission line.

Very little difference is noted between the results of this whip mounted on the rear deck of a small car, and a ⅝ wave antenna similarly mounted. Considering the relatively low cost (under $20, new), the modified CB whip is a good bargain.

The unmodified CB loading coil can be procured as General Electric Part EA68X98 from G.E. Housewares and Audio Servicenters for $6.54 plus tax. If ordered by mail, address: Replacement Parts, General Electric Co., P.O. Box 831, Utica NY 13505.

Antenna Tuner *(from page 25)*

one is trying to load into a random wire that is shorter than ¼λ at the operating frequency. Network B is useful for some antenna that provides a high impedance. Either network can be tried when trying to match an antenna using a coaxial transmission line. Note that a pi-network can be easily formed by using external plug-in capacitors across the appropriate binding posts. Network C is often useful when trying to load an electrical short whip antenna which does not have loading coils. Network D is used similarly when the whip is electrically long at the operating frequency. In networks E and F the inductor is actually used as an impedance auto-transformer. These networks will be found helpful when loading into a whip antenna which has a loading coil so it is resonant at the operating frequency but where its base impedance is less than 50 ohms.

In any case, if one does not know with which network to start, there is no reason to hesitate. As long as the transmitter is operating cooly and one is not causing QRM on a band, try the various networks in turn until the applicable one is found.

Needless to say, the tuner makes an outstanding little unit to take along for field days and for other forms of portable operation. It can be constructed for home station kW level operation by using a 3000 volt spaced capacitor and a heavy duty roller inductor such as the Johnson 229-203.

All of the parts (except the enclosure) to build the tuner for any power level are available as separate items from G.R. Whitehouse Co., Newbury Drive, Amherst, N.H. 03031. For the medium power level construction of the tuner they have a particularly suitable capacitor—the MC325M which has a maximum capacitance of 325 pF and is rated at 1400 volts.

Iguana *(from page 59)*

"We'll just sit down and wait and when we don't come back to the school, Mr. Toler will come to investigate," reasoned Frank.

"I don't know how to tell you this . . . ," started Carl.

"Now what?"

"Well, I told Mr. Toler that if we didn't find the transmitter by 6:00 o'clock, we'd go home and start looking again in the morning."

"Well, this is another fine mess you've . . . ," started Frank.

"Don't say it!" Carl broke in. "I believe it was just last summer that you talked me into going into that cave to test your new v.l.f. receiver design, and we ran into that irate mother cougar. I thought my next QSO would be on the sending end of a Ouija board! And then there was the time . . ."

"Okay, cool it," soothed Frank. "Let's worry about getting out of here . . . this is a terrible inconvenience."

"Wait a minute!" exclaimed Frank. "I'm getting one of my save-the-day ideas."

"Oh no, we're really dead," muttered Carl.

"No, I'm serious. We've got the telemetry transmitter and it's like any other tone-modulated transmitter. We could make a break in the battery wire and send some code to Mr. Toler. Remember, he said he was going to connect the speaker up and listen."

"I can dig it so far," said Carl, "but we might find propagation through this mountain a little difficult."

"Not if we can get a little radiating element out of this rubble and into the open."

"It's a long-shot, but it might work," remarked Carl. "I can see light, and there is some space between the boards and dirt."

"Okay," said Frank. "We'll need some wire. You cut the rubber duckey off the HT to what you think would be about 450 MHz. I'll unwind some of the wire from the loading coil of the telemetry transmitter."

Just then, the sound of something moving came from the rubble on the floor.

"Am I hearing things," asked Carl, "or is there something under those boards,"

"No, I heard it, too," replied Frank. "Help me clear away some of this mess."

After moving the boards to investigate, the boys got quite a surprise.

"Whadda ya know!" exclaimed Carl. "Looks like our friend Rana Pipian didn't make it out, either. That's what came running out of the mine at us."

"Rana Pipian is a bullfrog, not a lizard," stated Frank. "And that gives me another idea . . . what do you think would happen if we attached the antenna to the collar and fixed it to come off easily, then strapped it to the lizard and pointed him to the light outside?"

(Continued on page 98)

Awards *(from page 86)*

4. Documents required:
   a. List of stations worked. State date, band and mode.
   b. The QSL cards of the contacted (or for SWLs, the heard QSLs) *or* certification of the list/application from the Association or Club of which the applicant is a member.
   c. A QSL of the applicant, showing his correct QTH.
   d. Foreign amateurs, U.S.A. $1.00 or 8 IRCs. Italian amateurs, stamps for an amount of Lit. 500.
5. If the applicant has not received the last QSL cards (5 max.), he can send his application specifying exactly their call-signs on the list. The Award Manager, after having checked the logs of the missing amateur stations, will send these cards together with the Award, if possible.
6. All applications to be sent to: Award Manager, I1RCD, Anacleto Realini, via Rimini 13, Milan, Italy.

Notes

A reminder that the WAZ (Worked All Zones) Manager is now: Leo Haijsman, W4KA, 1044 Southeast 43rd Street, Cape Coral, Florida 33904.

Sad to report the passing of:

Willis "Paul" Sutherland, WA9FZR, *All Counties* #63 8-24-71.

Frank D. Pizzuti, W2QK, a friend of all NJDXA members.

Keith Harlow, WA7RKN, who was a very active County Hunter.

As this is being written, two very active County Hunters, are in hospitals: Jack Scroggin, WØSJE and Danny Bassett, K8DCR. I am sure that long before you read this, they will both be A-1 again and very active on the Net.

How was your month? 73, Ed., W2GT.

DX *(from page 81)*

Rd., Millburg, MA 01527

Stuart Corpieri, WA1YIV, P.O. Box 713, Hanover, NH 03755

Thomas J. Mesler, WDØEFX, P.O. Box 357, West Burlington, IA 52655

Robert Wanderer, WB2MCB, 7 Ivy Street, Pompton Lakes, NJ 07442

A35NW — Via K8MN, 5075 Shepherd Rd., Cincinatti, OH 45223

CE9AT — To CE2BIO

CG9UN — c/o M. Wald, VE2EWH, 2224 Noel St., St. Laurent, Quebec H4M 1K9 Canada

D68AE — Via R.S. Finley, G3UAN, 44 Radstock Ave., Kenton, Harrow, Middlesex, England

EP2LI — To WA4PYF

FB8ZN — U.S. cards go c/o J.J. Bernier, W4LZZ, 121 Algonquin Terrace, Indian Harbor Beach, FL 32937

FOØXA through FOØXH, the Clipperton DXpedition — Via H. Bindschedler, HB9MX, Strahleggweg 28, CH-8400 Winterthur, Switzerland

HH2Y/MM — To P.O. Box 428, Port-au-Prince, Haiti

HP1XWL — c/o P.O. Box 5227, Panama 5, Republic of Panama

JA QSL Bureau, new address — Via J.A.R.L., 14-2 Sugamo 1-Chome, Toshima-Ku, Tokyo 170, Japan

JY9EC (by WA4VNB) — To W.C. Ward, Jr., K4IZE, 8023 Linda Lake Dr., Charlotte, N.C. 28215

KM1CC - c/o Duncan Kreamer, W1GAY, Box 637, Vineyard Haven, MA 02568

OA1DT — Via P.O. Box 4, Suliana, Plura, Peru

OD5AO — To R. Saidah, FØDDA, c/o R.E.F. Bureau, 2 Square Trudaine, F-75009, Paris, France

OE6BVG/ZL1 — c/o W. Brenner, DJØFX, Postfach 820126, D-8000 Munchen 82, Germany

PJ9CG — Via C.V. Greene, 187 Stafford Ave., Forestville, CT 06010

TI9WD — c/o JA6EYD

VP1WCS (summer, 1977) — Via Walt Simpson, K5AF/Ø, Box 1013, Basalt, CO 81621

VP2MBB, VP2MDA, VP2MDH, VP2MT and VP2MUZ — To George Taft, W8UVZ, 271 Parkshore Drive, Battle Creek, MI 49017

VR3AH — To Greg Haines, WB4PRU, 3403 Winthrop Drive, Lexington, KY 40503

VR8O — c/o Meterological Station, Funafuti, Tuvalu, Central Pacific

WA4YVG/VQ9 — Via W.R. Woodie, K4GLA/W4XQ, 102 Schoolfield Dr., Danville, VA 24541

WD5PJE/SU — To Chuck Watson, c/o P.O. Box 21, FPO New York, N.Y. 09527

YB2QV — c/o P.O. Box 73, Temanggung, Indonesia

YB3EI/2 — Via P.O. Box 73, Salatiga, Indonesia

YI1BGD — to Svetislav Matic, YU1NZV, D Tucovica 164, 11000 Beograd, Yugoslavia

YN1Z — c/o Robert Moore, WA4ZXC, 2611 Locksley Rd., Melbourne, FL 32935

ZF1CD — Via Ralph W. Schoener, W8TPS, 1205 Lincoln Way, N.W., Massillon, OH 44646

ZL1BDL/ZK1 — To W.L. Kern, W6EDN, 1720 Fairmount Ave., La Canada, CA 91011

ZL4LR/p (Campbell Island) — c/o ZL3FE

ZP5XBC — Via T. Hanazaki, JA1QXY, c/o Kodan 37-305, Yurigaoka 2-5, Kawasaki, Kanagawa 215, Japan

ZP5XBD — To T. Kumagai, JAØCUV/1, P.O. Box 22, Mitaka, Tokyo 181, Japan

ZS2MI — c/o WA4SSU

3AØFM — Via A. Suehs, DL6LF, Paletzerstrasse 41, D-5483 Bad Neuenahr Ahrweiler 1, West Germany

4S7EA — To T.L. Cox, WB9OQU, 1105 Sequoia Trail, Madison, WI 53713

4Z4GH — c/o Clint Aberly, K5JBC, 105 Laurel Drive, Covington, LA 70433

5U7AX — Via Bruno Demeuland, P.O. Box 476, Niamey, Niger

5Z4PU — To K. Sobue, JA5BPF, Denden-Hoshigaoka-Ryo Hoshigaoka, Matsuyama 790, Japan

5Z4QT (by JA3KWJ) — c/o K. Kokaji, P.O. Box 383, Ndola, Zambia

8P6HD — Via J. T. Vavary, WA4TZM, 2324 Dominion Ave., Norfolk VA 23518

9G1RX — To R. Beauchemin WB1ETS, 56 Acrebrook Drive, Chicopee, MA 01020

73, John, K4IIF

In Focus *(from page 63)*

next character will appear; two character formats, selectable by key switch to produce either 56 characters per SSTV frame (8 letters horiz. by 7 lines)—or 32 characters per frame (8 horiz. by 4 lines); a buffer memory which eliminates problems with erroneous character entry and/or multiple character entry. If you have a VW (Volker Wraase!) scan converter, you shouldn't be without this add-on keyboard unit!

Final-Final

That's it for August. Please keep those letters and photographs coming my way. Next month we'll have more about early-on SSTV as described by Ted Cohen, N4XX, as well as more pictures from the Dayton hamfest.

If you write, it's the same old address: 2112 Turk Hill Rd. Fairport, N.Y. 14450.

73, Bill DeWitt W2DD.

Our Readers Say *(from page 10)*

fer again to the Commission's own interference study as support of these contentions. DenTron feels, then, that Docket No. 21117 requring the Type Acceptance of Amateur linear amplifiers, is in itself a 'Ban" on the marketing or manufacture of amplifiers intended for the CB operator. To add to this Docket No 21116 is not only unnecessary and redundant but is strongly inconsistent with the FCC's own internal goal of de-regulation.

In summary, the public record of the CB interference problem as well as the FCC's own study demonstrates that the addition of the Linear Amplifier Ban as presented in Docket No. 21116 will provide no further effectiveness to the Type Acceptance provision of Docket No. 21117. For this reason, Docket No. 21116 will subject the small Amatuer Radio industry to punitive economic hardship not only through the marketing limitations inherent to the regulation but also through severe limitations on export activities to those areas of the world where no such ban exists. DenTron, not unlike our fellow Amateur Radio manufacturers, is simply too small a business enterprise to produce several models of each product, some to meet American FCC requirements and some to maintain our export needs. Inability to utilize the principles of mass production manufacturing is yet another economic burden promulgated by Docket No. 21116. Then, too, the docket discourages Amateur operation on the 28 MHz band, where propagation conditions show an upturn as a remedy to lower frequency congestion. DenTron respectfully submits to the Commission that Docket No. 21117 already establishes limited Type Acceptance on a trail basis which is, in effect, a "Ban" on linear amplifiers capable of the low power input requirements of the 4-watt CB-type transceiver. We consider it therefore a feasible request for the Commission to reconsider Docket No. 21116 as an unnecessary intrusion into the manufacturing marketplace and, as Commissioner White put it, "largely cosmetic in nature".

Dennis J. Had
K8KXK
President of
DenTron Radio Co., Inc.

* The Extent and Nature of Television Reception Difficulties Associated with CB Radio Transmission". FCC/FOB/PD&E, July 1977.

Announcements *(from page 8)*

• **Plain City, OH** — The Union County Amateur Radio Club proudly presents "Hamfest '78" on Sunday, August 27, 1978, at the Plain City Fairgrounds (near Columbus, OH). For further info contact: Mr. Gene Kirby, W8BJN, c/o Union County Amateur Radio Club, 13613 U.S. 36, Marysville, OH 43040.

• **Wentzville, MO** — The Saint Charles Amateur Radio Club, Inc., presents the SCARC Hamfest '78 to be held on August 27th, 1978, at the Wentzville Community Club. Prizes include the Ten-Tec Triton IV xcvr, the Regency scanner, and the Wilson 2M hand-held. Admission will be $1 per car. Talk-in on 34-94 and 07-67. For motel info, camping, prize lists, dealer reservations, and/or airport pick-ups contact: SCARC, P.O. Box 1429, St. Charles, MO 63301.

• **Little Rock, AR** — The Little Rock Ham-A-Rama will be held on August 5 and 6, 1978, at the Arkansas State Fairgrounds, 2 miles west of I-30 on Roosevelt. Dealer displays in air-conditioned building. ARRL forum and MARS meeting. RV hook-ups on fairgrounds. Talk-in on 146.52, 146.34/94, and 3995. For info call, (501) 753-3450 or write: CAREN, c/o Don Gephardt, WB5TSH, P.O. Box 2844, Little Rock, AR 72203.

• **Petoskey, MI** — The 3rd Annual Straits Area Club Swap and Shop will be held on Saturday, August 5, 1978, at the Emmet County Fairgrounds, Charlevoix Avenue. Gates open at 9 a.m. to 3 p.m. Talk-in on 146.52. Food services and prizes will be featured. Tickets are $1.50 at the door. Campsites are nearby. For more info contact: SARC, c/o W8IZS, Box 416, Petoskey, MI 49769.

• **Warren, OH** — The 21st Annual Warren A.R.A. Hamfest will be held on Sunday, August 20, 1978, at the Trumbell KSU Campus on Route 85 at Warren Outerbelt. Dawn to dusk, rain or shine. Huge lawn for our very famous flea market. Family camping is nearby. There will be a $2 prize registration.

• **Cheney, WA** — The fourth Annual Spokane Hamfest will be held on Saturday, August 12 and Sunday, August 13, 1978, at Western Washington University. There will be many exhibits and a flea market. Pre-registration will be $9 which includes both days and a banquet on Saturday night. For more info write: Spokane Hamfest, P.O. Box 3606, Spokane, WA 99220.

• **Carbondale, IL** — The Shawnee Amateur Radio Association's Annual Hamfest will be held on August 19 and 20, 1978, at the North Marcum Access Area on beautiful Rend Lake. Complete recreational facilities will be available. Large flea market with no charge to vendors. Talk-in on 3.925, 146.25/.85, and 146.52. For more info write or call: Gary Wheeler, WB9SWG, Box 229, RR 2, Carterville, IL 62918, (618) 985-3397 or Nick Koenigstein, WB9ELP, 2009 Gray Dr., Carbondale, IL 62901, (618) 549-5931.

• **Hamden, CT** — The WELI Amateur Radio Club's second Annual Flea Market and Auction will be held on Sunday, August 20, 1978, at Radio Towers Park on Benham Street. Gates open at 10:00 a.m. to 4 p.m. General admission will be 50 cents and vendor space will be $5/ea. For further info contact: Mike, WA1PXM, at (203) 934-1063, or Dave, WA1ZWB, at (203) 467-3258.

• **Monticello, IN** — The Tioga Amateur Radio Society of Monticello will sponsor on Lake Freeman, Sunday, August 27, 1978, a Ham Radio Cruise Day aboard the Madam Carroll Boat. There will be fun for the entire family. Advance tickets are $2, at the dock tickets will be $2.50. Send SASE to: Byron Robbins, WD9EXI, Sec'y, 571 South Bluff St., Monticello, IN 47960.

• **Marshalltown, IA** — The Iowa 75 Meter Net will hold its Annual Potluck Picnic and Hamfest on Sunday, August 20, 1978, at the Riverside Park. After the 12:00 noon meal, there will be a short program with awards given and prizes to amateurs attending. All are welcome.

• **Morgantown, W. Va.** — The second Annual Mon Ham Gala will be held on Sunday, September 3, 1978, from 10:00 a.m. to 5:00 p.m., at Westover Park, 300 yards off I-79 near Morgantown. The event is sponsored by the Monongalia Wireless Association. Talk-in on 16/76. For more information write: John Curtis, WB8AHH, 817 Willowdale Rd., Morgantown, W. Va. 26505.

• **Lafayette, IN** — The Lafayette, Indiana Hamfest will be held on Sunday, August 20, 1978, at the Tippecanoe County Fairgrounds, the same place as years past. Easy access to flea market and forum areas. Tickets are available for $2 by mail or at the gate. Talk-in on 146.13-73 repeater and 146.94 simplex. Send SASE with check to: Bill Bayley, WA9ZDI, 1021 Beck Ln., Lafayette, IN 47905, before August 10th.

• Our own Jack Gutzeit, W2LZX, (CQ's Advertising Sales Manager), recently received 5-band WAS award No. 326. Congratulations, Jack!

A VERY IMPORTANT ANNOUNCEMENT FROM MOR-GAIN

WORLD'S LARGEST SPECIALISTS IN THE DESIGNING, DEVELOPING AND MANUFACTURING OF "NO COIL, NO TRAP" ANTENNA SYSTEMS.

(80-10 HD) (Not to Scale)

multi-band HF communications antennas – half size · full performance

We're Pleased to Introduce Two New Models Specifically Designed for the Novice or Technician

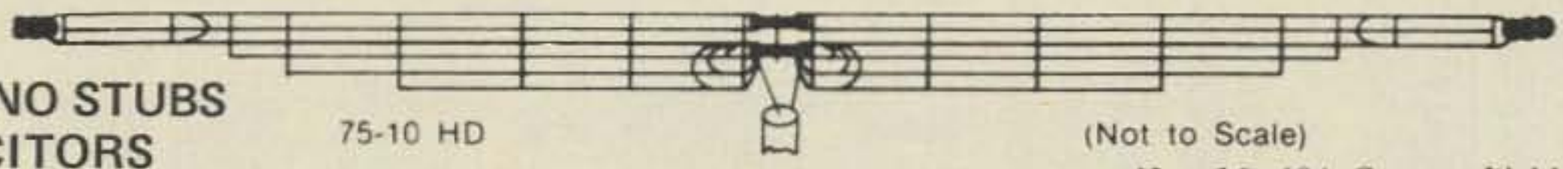
80-10HD (N/T) ... 69' overall length for 80/40/20/15/10 meter coverage $84.50

80-40HD (N/T) ..... 69' overall length for 80/40 meter coverage $63.75

No antenna tuner required. Completely factory assembled and tuned specifically for the novice/technician bands. Both models can be easily re-tuned for higher license class allocations in just a few minutes.

● There is no better antenna at any price . . . W9QIO ● I had a Mor-Gain antenna and liked it extremely well . . . K4JMR ● The antenna has worked out well with very good reports . . . W2TVK ● I can only give glowing reports about it . . . WA2IRN ● I have used these fine antennas before and see no reason to change now . . . W6BF ● It has given me excellent service and results . . . W6CZS ● I believe I have "sold" your antenna to almost every ham I have talked to . . . W4AHN ● Its performance here far surpasses any other antenna that I have had . . . WA5GGS ● For several years I have used the Mor-Gain and have been very satisfied . . . K2TSD ● Am letting everybody know that it has been doing a good job for me . . . VE2VW ● The antenna is performing just beautifully . . . W8WDZ/6 ● My 75-40 has performed beautifully and I'm very happy with it . . . WB8DMB ● Another chap said he had also used it and that it was the greatest . . . W4NSP ● I do not hesitate to recommend the antennas to others . . . K0SPR ● I heard a ham extolling the virtues of your antenna . . . WB0PTM ● I worked a station last night and the Mor-Gain was doing quite a job for him . . . WA3TCV

NO TRAPS, NO COILS, NO STUBS NO CAPACITORS



75-10 HD (Not to Scale)

MOR-GAIN HD DIPOLES . . . ● One half the length of conventional half-wave dipoles. ● Multi-band, Multi-frequency. ● Maximum efficiency - no traps, loading coils, or stubs. Fully assembled and pre-tuned - no measuring. no cutting. ● All weather rated - 1 KW AM, 2.5 KW CW or PEP SSB. ● Proven performance - more than 15,000 have been delivered. ● Permit use of the full capabilities of today's 5-band xcvrs. ● One feedline for operation on all bands. ● Lowest cost/benefit antenna on the market today. ● Fast QSY - no feedline switching. ● Highest performance for the Novice as well as the extra-class op.

EXCLUSIVE 66 FOOT, 75-10 METER DIPOLES

● All models above are furnished with crimp/solder lugs. ● All models can be furnished with a SO-239 female coaxial connector at additional cost. The SO-239 male coaxial cable connector. To order this factory installed option, add the letter 'A' after the model number. Example: 40-20 HD/A. ● 75 meter models are factory tuned to resonate at 3950 kHz. (SP) models are factory tuned to resonate at 3650 kHz. See VSWR curves for other resonance data.

No. 16 40† Copper Weld wire annealed so it handles like soft Copper wire - Rated for better than full legal power AM/CW or SSB-Coaxial or Balanced 50 to 75 ohm feed line - VSWR under 1.5 to 1 at most heights - Stainless Steel hardware - Drop Proof Insulators - Terrific Performance - No coils or traps to break down or change under weather conditions - Completely Assembled ready to put up - Guaranteed 1 year ONE DESIGN DOES IT ALL; 75-10HD - Only $12.00 a band!

Model	Bands (Meters)	Price	Weight (Oz/Kg)	Length (Ft/Mtrs.)
40-20 HD	40/20	$49.50	26/.73	36/10.9
80-40 HD	80/40 ½ 15	57.50	41/1.15	69/21.0
75-40 HD	75/40	55.00	40/1.12	66/20.1
75-40 HD (SP)	75/40	57.50	40/1.12	66/20.1
75-20 HD	75/40/20	66.50	44/1.23	66/20.1
75-20 HD (SP)	75/40/20	66.50	44/1.23	66/20.1
75-10 HD	75/40/20/15/10	74.50	48/1.34	66/20.1
75-10 HD (SP)	75/40/20/15/10	74.50	48/1.34	66/20.1
80-10 HD	80/40/20/15/10	76.50	50/1.40	69/21.0

NOVICE LICENSE OPERATION. The MOR-GAIN HD Dipole is the ideal antenna for the new or Novice operator. As the Novice progresses to higher license classes, he can easily re-tune the HD Dipole to the new frequencies of his higher frequency privileges. The HD Dipole is thus a one-time investment. HD Dipoles are available for all Novice frequencies.

LEAST COST. Dollar for dollar, the HD dipoles are the highest performance, least cost multi-band antennas on the market today. For example: the 5-band 75-10 HD dipole costs less than $15.00 per band - an unbeatable low cost.

LIMITED REAL ESTATE. Where real estate for antenna installation is limited, the HD dipole is the ideal solution. Operation on 80/75/40 meters is now possible since the HD dipole is only half the length of a conventional half-wave dipole. For all around operation, the HD dipole will outperform any trap loaded horizontal or vertical dipole.

Above Models furnished with lug terminations. Cap-female SO-239 connector assembly – $3.75 additional. Include $2.50 for Shipping & Insurance with your order.

Mor-Gain
2200 C South 4th Street
Leavenworth, Kansas 66048
(913) 682-3142
Monday-Friday: 9AM-5PM CST

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BankAmericard, Visa, and Mastercharge are available.

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Please write for fully descriptive 6-page brochure. Contact your favorite dealer or order direct from Mor-Gain.

CIRCLE 24 ON READER SERVICE CARD

Contest results *(from page 43)*

VENEZUELA

N7DC/YVS					
	A	**444,600**	**864**	**63**	**117**
YV4ACY	"	**254,492**	**602**	**42**	**107**
OA4PQ/YV5					
	"	**48,433**	**224**	**34**	**43**
YV4BDB	**28**	**422,400**	**1800**	**23**	**57**
YV2AMM	**14**	**966,328**	**2068**	**34**	**124**
YY4YC	"	743,552	1964	27	101
YV6AUZ	"	198,000	689	26	73

MULTIOPERATOR SINGLE TRANSMITTER

NORTH AMERICA

United States

W1ZA	**1,888,029**	**1437**	**124**	**365**
K1PR	1,621,992	1313	121	335
K1RU	1,410,395	1255	113	300
K2LE/1	887,832	916	95	260
W1HCO	521,420	645	95	215
K1IU	458,436	558	87	215
K1RQ	215,059	391	64	169
K1ZX	52,394	157	43	91
K1IK	30,448	125	38	50
K2BT	**1,332,910**	**1177**	**113**	**297**
W2YV	782,751	847	98	241
N2MM	557,096	657	94	238
K2UO	337,502	517	78	175
W2UI	235,750	387	73	157
WB2DJN	166,617	333	56	131
N2HI	108,580	234	54	124
K2GXT	63,936	188	51	97
N3RD	**1,411,596**	**1115**	**117**	**335**
W4NL/3	1,293,150	1022	127	339
K3RA	977,454	883	107	307
N3AW	795,025	940	86	209
K3RS	675,510	785	98	232
N3UN	669,700	672	100	270
W3HB	322,428	453	92	185
WA3NAN	169,624	348	59	123
W3KA	61,287	229	21	72
N3MM	27,664	104	45	67
W4DR	**1,642,194**	**1217**	**123**	**363**
N4PN	**1,513,932**	**1182**	**127**	**342**
K4VX	1,294,154	1107	118	303
W4FDA	1,101,240	994	105	294
W4QAW	920,808	893	106	272
N4HU	652,460	702	103	237
WA4PYF	423,594	539	92	211
W4LVM	372,970	473	90	212
WA4ENJ	346,368	490	87	177
K4JNM	334,642	443	85	202
WB4SFM	241,875	423	65	150
WA4LZR	230,690	380	73	157
WD4BRE	198,220	329	68	145
WA4JTC	164,749	267	80	167
WB4FOT	158,080	293	70	120
N4YN	121,152	236	71	121
N4YO	54,316	169	46	102
K5JA	**2,643,580**	**1802**	**140**	**384**
K5TM	990,396	974	112	257
N5DX	734,187	751	114	267
K5FUV	135,946	268	71	131
K5NA	84,456	167	81	126
N6SV	**1,994,298**	**1829**	**120**	**259**
W6OKK	**1,233,240**	**1278**	**113**	**231**
WA6IQM	1,104,104	1229	109	207
WA6JUD	870,672	1055	96	195
N6MG	843,364	853	116	240
W6YX	827,576	1168	81	167
N6KT	768,802	1040	90	179
W6VLD	740,880	951	97	183
W6KG	542,250	845	84	141
W6BIP	331,058	540	81	140
WA6AHF	327,429	593	74	127
W6ZYC	231,012	410	75	132
WB6OPD	149,086	361	65	96
K6LY	136,271	400	61	66
K6YK	60,697	253	36	55
W7VRO	**778,277**	**964**	**100**	**189**
W71SX	622,998	900	92	157
K7SA	617,715	832	90	175
WB7OQW	84,645	327	43	52
W8TA	**1,181,657**	**1034**	**117**	**316**
N8RA	1,008,808	1031	102	274
N8JW	980,954	969	105	272
W8FF	783,052	879	98	228
K8XX	537,251	700	88	201
WD8JLM	52,920	167	46	80
WB8ZUW	43,670	148	37	73
WB8VOT	33,495	206	43	62
K8HLJ	22,725	108	41	60
WD8LIU	1,749	28	5	5
W9RX	**649,368**	**706**	**103**	**245**
W9YH	238,134	394	88	170
WB9TXO	149,650	297	64	141
W9CAF	37,962	172	43	71
W0FG	**1,566,416**	**1452**	**117**	**259**
N0XX	327,104	441	97	172
N0DX	255,852	359	89	187
WA0DCB	75,384	212	58	96
WD0AXT	126	116	4	5
	ALASKA			
KL7RW	**831,992**	**1787**	**77**	**102**
KL7HR	389,697	1096	59	88
KL7IRT	295,916	975	50	66
	CANADA			
CY1NN	**1,055,361**	**1829**	**65**	**172**
CY1UNB	926,250	1333	88	197
CY3KZ	**3,433,560**	**3380**	**111**	**292**
VE3AKG	2,575,722	2633	109	284
VE1BU/3	185,866	413	70	129
VC9UM	**1,015,740**	**2337**	**72**	**137**
VE4EW	776,160	1322	85	167
VE6HN	**667,480**	**2048**	**57**	**91**

CANAL ZONE

KZ0DX	**2,437,728**	**2796**	**102**	**277**

MARTINIQUE

FM0FC	**6,382,004**	**5739**	**128**	**380**

MEXICO

XE2MX	**1,627,817**	**3197**	**85**	**142**

MONTSERRAT

VP2MSA	**2,946,680**	**2881**	**107**	**407**

SAINT MARTIN

FG0DWT/FS	**396,011**	**1350**	**51**	**88**

AFRICA

EGYPT

VE3HYU/SU	**357,520**	**742**	**43**	**121**

SENEGAL

6W8MM	**4,942,160**	**4371**	**99**	**280**

SOUTH AFRICA

ZS6YS	**3,165,029**	**2797**	**113**	**266**

ASIA

ASIATIC RUSSIA

UK9ABA	2,035,364	2110	89	254
UK0AAB	1,467,230	2233	95	215
UK9HAC	459,888	1065	59	142
UK0FAA	394,416	1279	69	97
UK0AAO	371,008	909	54	128
UK9QAA	253,287	616	44	115
UK9HAP	74,529	327	28	63
UK9JAA	7,223	86	8	23

GEORGIA

4L6M	**5,993,520**	**3938**	**117**	**403**
UK6VAF	155,375	498	27	86

INDIA

VU2IIT	**222,019**	**565**	**63**	**134**

JAPAN

JH1YMC	**1,626,352**	**1553**	**123**	**234**
JA7YCQ	396,990	837	62	103
JA2YKA	358,970	604	80	133
JA6YBR	270,270	530	76	106
JA6YFT	243,566	455	75	118
JA7YFB	197,750	345	70	105
JA0YAK	78,020	325	34	49

EUROPE

ALAND ISLANDS

OH0AC	**1,051,200**	**1533**	**94**	**266**

BELGIUM

ON6MP	**881,488**	**1348**	**69**	**227**

BYELO RUSSIA

UK2AAB	**163,194**	**701**	**52**	**125**
UK2AAG	52,796	242	40	94
UK2OAA	45,234	182	37	89

CZECHOSLAVAKIA

OK1KSO	**1,502,616**	**1657**	**101**	**309**
OK3KAP	548,900	1028	67	208
OK1KPU	308,490	817	52	143
OK3VSZ	271,714	685	56	150
OK1KSL	234,493	637	56	185
OK1KUR	111,600	446	42	113
OK1KCI	102,070	428	45	128
OK1KIR	51,435	326	26	101
OK3KJJ	13,912	138	18	56
OK1KRY/P	13,840	160	16	64
OK1ONC	13,585	220	10	55
OK1KYS	558	11	9	9

ENGLAND

G6UW	**1,912,292**	**2179**	**96**	**286**
G8JC	1,181,534	1626	86	237
G3VPW	1,170,246	1513	90	268
G3KMI	835,780	1374	73	217
G3RCV	497,776	1041		

ESTONIA

UK2RBA	**924,704**	**1703**	**69**	**215**
UK2RAQ	9,350	127	17	43

EUROPEAN RUSSIA

UK6LAZ	**2,071,380**	**1914**	**123**	**351**
UK3ABB	2,028,262	2319	97	285
UK3AAO	1,722,174	1786	104	290
UK4WAR	1,148,511	1645	82	191
UK3XAA	1,106,336	1480	94	258
UK3SAB	823,072	1386	77	195
UK1CAA	821,168	1424	72	200
UK3AAC	625,314	1157	79	188
UK3DAH	444,960	934	60	180
UK6AJA	402,405	997	56	137
UK3MAX	381,472	942	53	129
UK4LAC	377,337	911	55	164
UK3TBF	96,876	317	47	115

FEDERAL REPUBLIC OF GERMANY

DL0WU	**3,682,462**	**2727**	**117**	**401**
DK0TU	1,584,508	1891	96	262
DL0UE	1,247,750	1541	91	259
DL8DC	873,280	1159	85	235
DL1MD	636,650	967	86	264
DL0RCA	413,466	853	66	208
DK0KU	404,940	757	69	186
DF3QG	189,070	468	58	127

FINLAND

OH3EW	**857,310**	**1470**	**72**	**183**
OH8OS	846,612	2688	37	97
OH1PS/2	551,131	957	76	225
OF2AA	514,800	940	81	249
OF4RH	465,744	944	73	175
OF3AD	160,979	550	60	143
OH2IO	68,761	288	37	96

GERMAN DEMOCRATIC REPUBLIC

DM2DUK	**2,528,706**	**2820**	**98**	**303**
DM2AYC	491,970	1000	61	169
DM4ZA	14,100	293	8	39

HUNGARY

HA9KOB	**998,688**	**1818**	**77**	**226**
HA7KLG	944,240	1661	74	216
HA5KFN/5	553,254	1171	65	181
HA5KKC/2	349,758	887	61	193
HA4KYH	295,218	721	65	166
HA5KKO/2	196,176	683	44	157
HA6KVB	183,400	835	40	135
HA6KNI	136,125	650	41	124
HA2KRL	4,000	55	18	32

ITALY

I1KN	**2,071,148**	**2038**	**105**	**349**
I1GUB	2,064,742	2309	59	308
I0GPP	1,247,428	1742	92	272

JERSEY

GJ4BTY/A	**34,882**	**246**	**28**	**80**

KALININGRAD

UK2FAD	**70,035**	**397**	**28**	**87**

LATVIA

UK2GKW	**1,111,500**	**1532**	**87**	**225**
UK2GDZ	241,557	615	60	159
UK2GAX	80,652	447	39	93

LICHTENSTEIN

HB0BHA	**2,579,600**	**2867**	**97**	**303**

LITHUANIA

UK2BBK	**1,385,552**	**1928**	**91**	**265**
UK2BAS	780,885	1176	83	252
UK2PCR	695,412	1558	71	211
UK2PAP	688,731	1335	73	208
UK2BAG	371,358	921	60	174
UK2PAO	242,305	740	51	164

LUXEMBOURG

LX1ML/P	**61,425**	**288**	**35**	**100**

MONACO

3A0JF	**301,476**	**1197**	**50**	**172**

NETHERLANDS

PI1KMA	**3,969**	**38**	**20**	**29**

NORWAY

LA5X	**878,178**	**1393**	**77**	**217**
LA2D	7,296	90	18	39

POLAND

SP6PZB	**322,235**	**613**	**62**	**161**
SP5PWK	279,445	609	69	176
SP3PGX	16,720	149	27	61

ROMANIA

YO5KAU	**1,184,820**	**796**	**49**	**147**

SWEDEN

SK2KW	**2,654,428**	**2858**	**113**	**293**
SM5AOE	1,222,680	1635	87	258
SK3AH	722,850	1034	85	220
SK0CC	124,488	481	40	112
SK6HA	9,088	99	23	41

UKRAINE

UK5MAF	**2,093,236**	**2260**	**109**	**327**
UK5IAZ	936,662	1416	80	234
UK5MAG	607,383	1222	75	204
UK5WAA	463,456	1158	61	163
UK5QBE	438,213	988	66	191
UK5LAA	333,808	782	73	175
UK5IBB	292,600	755	59	161
UK5HAA	218,504	802	49	142
UK5QAV	205,471	865	37	112
UK5VAA	204,616	720	48	156
UK5IAN	176,808	597	53	159
UK5JAO	149,896	616	46	118
UK5ZAK	145,070	479	46	132
UK5MBU	59,625	345	31	94
UK5EDB	54,876	392	26	76
UK5LAS	46,500	339	24	76
UK5MCP	38,300	191	26	74

VATICAN CITY

HV3SJ	**386,965**	**1151**	**48**	**145**

YUGOSLAVIA

YU2CDS	**2,480,205**	**2282**	**117**	**366**
YU1ELM	1,722,174	1786	104	290

OCEANIA

AUSTRALIA

VK60R	**189,666**	**781**	**31**	**51**

GUAM

KG6FAE	**953,168**	**2024**	**66**	**98**

HAWAII

KH6JMK	**888,855**	**1837**	**71**	**94**

WESTERN SAMOA

5W1AZ	**5,452,302**	**5154**	**125**	**241**

SOUTH AMERICA

ANTARCTICA

KC4AAA	**521,796**	**1323**	**42**	**90**

Multi-Op. Multi-Xmtr

NORTH AMERICA

U.S.A.

W2PV	**7,302,350**	**4391**	**141**	**464**
K1OX	**4,982,796**	**3219**	**127**	**440**
K2GM	4,453,120	2876	143	425
W1ZM	4,424,046	2831	135	426
W4BVV	3,213,540	2146	138	402
K3WW	3,051,640	2093	131	404
W5BJA	2,808,060	1988	129	381
K0RF	2,608,944	2016	134	347
W4WS	2,564,316	1897	126	363
W3MM	2,378,687	1694	125	378
W3FA	2,287,200	1740	119	361
N6RO	1,861,200	1876	118	242
K8LX	1,651,947	1399	121	322
K6RR	1,611,970	1834	107	224
K4CG	1,430,004	1276	116	327
W3GM	1,310,256	997	125	361
W9YT	1,075,204	1050	113	290
N3RB	1,027,260	976	99	291
W3MA	1,022,976	953	106	278
LU1BAR/W3	977,769	889	112	299
N6AV	682,758	971	85	164
K6SMF	541,800	930	67	143
K3GM	369,337	490	72	197
K3II	284,580	398	78	192
W8NGO	185,383	325	73	136
W3YFV	156,492	303	57	132
K8OT	70,755	190	58	101

Bermuda

VP9DX	**6,604,551**	**6364**	**121**	**338**

Canada

CY6JA	**623,364**	**1578**	**56**	**108**

Cayman Is.

ZF2AP	**1,074,665**	**2831**	**60**	**125**

Dominican Republic

HI8RCD	**6,024,042**	**7197**	**112**	**275**

Haiti

HH5HR	**9,979,355**	**8443**	**129**	**406**

AFRICA

Canary Islands

EA8CR	**21,351,898**	**10290**	**153**	**544**

ASIA

Japan

JA3YKC	**2,232,624**	**2022**	**126**	**260**
JH1YDT	1,733,864	1862	114	209
JA7YRR	1,346,720	1632	112	192
JA3YBF	1,165,100	1283	111	194
JA1YXP	1,064,148	1302	105	179
JA7YAA	569,652	900	85	137
JA6YDH	461,506	753	84	134
JA8YAU	354,240	684	79	113
JA2YEF	284,130	524	84	114
JA4YBU	118,188	322	59	75
JA2YCN	117,502	423	38	60

Asiatic Russia

4J9B	**5,895,680**	**4853**	**136**	**376**

EUROPE

Czechoslovakia

OK3KFO	**9,656**	**105**	**21**	**47**

Finland

OH1AA	**4,628,727**	**4010**	**129**	**402**
OH2AW	3,719,940	3413	130	380

Germany (FRG)

DK0KX	**6,696,680**	**4859**	**130**	**450**

Norway

LA9K	**467,723**	**1275**	**59**	**180**

Switzerland

HB9H	**3,614,688**	**3857**	**130**	**398**

Yugoslavia

YU1BCD	**4,684,068**	**3902**	**132**	**417**
YU1INO	337,080	886	67	198

OCEANIA

Kermadec I.

ZL1AAK	**3,192,150**	**3558**	**115**	**210**

Midway I.

KM6FC	**510,408**	**1280**	**62**	**77**

SOUTH AMERICA

Chile

CE2AA	**1,111,682**	**1361**	**102**	**197**

Ecuador

HD1DX	**4,042,194**	**3692**	**113**	**264**

CHECK LOGS

Our deepest thanks to the following stations who sent in Check Logs:

CW0A, CX9CO, DF4BO, DL9HP, DM2AIC, DM2BBC, DM2BBN, DM2BDG, DM2BFK, DM2BJD, DM2BPF, DM2CTB, DM2CTF, DM2ERH, DM2FGN, DM3OML, DM3MDJ, DM3VUH, DM3VWI, DM3VXM, DM3WB, DM3XM, DM3ZC, DM4VEB, DM4YK, DM4ZOM, DM5XIG, DM6PAF, FE1778, FE3060, FE6625/P, FE22725, G3DOG, GM3AKM, HC1RE, I1-15855, I2-58844, I2-66420, I5-67597, K1YHK, K5GOE/I, KV4FZ, LA2IE, LA5UB, LA5YV, OH2BAC, OH5YX, OH8OA, OK1AVE, OK1FDB, OK1TA, OK2BNK, OK2KTE, OK3CAW, OK3EW, OZ1LO, PA0ATY, PA0RWS, PA0TV, PJ2ARI, PY2BZD, PY2GWF, RB5FBB, SK1AQ, SM2COR, SM5AKP, SM5CLE, SM5CVC, SM6DFL, SM7ASN, SP1CTN, SP3AGE, SP3EPK, SP3HTZ, SP4AS, SP5CBA, SP5FVI, SP5IYV, SP54136, SP6FJ, SP6GF, SP7JLH, SP8EXJ, SP9JCH, SP9PDF, UA1AWO, UA1CAS, UA3AAK, UA3AGG, UA3DDC, UA3PAZ, UA3PBY, UA3RFU, UA3TAM, UA3VCP, UA3VFI, UA4FCA, UA6LXZ, UA9ADF, UA9CBO, UA9FBC, UA9FDN, UA9MK, UA9OS, UA9UTF, UA0AAK, UA0JU, UB5DAG, UB5HBT, UB5JCA, UB5JFX, UB5LCN, UB5ML, UB5UAL, UB5UCH, UB5VAA, UI8ACU, UK5GAB, UK5WAG, UK6LKK, UK6YAB, UK9FAA, UK9WBD, UK0AAC, UL7AAC, UL7PAT, UL7YP, UM8MBT, UQ2IL, UR2JI, UV3DN, UW1AX, UW3UG, UW3WZ, UW6AJ, UW6CD, UY5ZT, VE1ALJ, VE7AJ, VE7DEW, VK2NV, VU2GO, W1SK, W3CV, W4UG, W6KPJ, W7EYR, WA9VPR, WB4UUE, WB9WHT, SM0AGD/YI, YU1ONO, ZS6PI, 4AAL, 4J6AM

DISQUALIFICATIONS

The following entrants have been disqualified for the reasons stated:
CE6EZ: Excessive duplicates
JA1YAC: Creative logging
TI2CF: Excessive duplicates

Thirty years ago this month, CQ announced the first World Wide DX Contest. We were able to print both the Phone and C.W. Results in a few pages the following June. Over 100 prefixes turned up the first year and the high c.w. multi-score, turned in by Frank Robb, GI6TK, was an astounding 452,454 points, a record that was thought to be impossible to top. The ensuing years have brought us to this stage of growth and the best is yet to come. Send in early for your logs and help make the 30th Anniversary of the CQ WW DX Contest the biggest and best ever.
— K2EEK

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.

COMPLETELY DIFFERENT QSL CARDS! Nothing even close to it on the market! The "Cadillac" of QSLs! Samples: $1.00-(Refundable with order.) W5YI Print; Box No. 1171-E Garland, Texas 75040.

"RADIO-HOBBYIST NEWSLETTER"-Stay-up-to-date! Issued every 2 weeks. Only $5.00 year! Send SASE for free sample copy! W5YI; Box No. 1171E; Garland, Texas 75040.

SOUND SWITCH: Trigger circuits by clapping hands, whistling, etc., Control lamps, appliances, or use as effective burglar alarm. Completely assembled, with microphone; Only $5.00; two for $9.50 - sent Air Mail; performance guaranteed; personal cheques accepted. Michael Wagner, POB 3382-Q, Station B, Calgary T2M 4M1, Canada.

YOUR PICTURE ON YOUR CALL CARD: 128 copies of any size photo reduced to 1" x 3/4" to fit call card. ONLY $5.00; two photos processed for $9.50; originals returned send Air Mail; personal cheques accepted. Michael Wagner, POB 3382-Q, Station B, Calgary T2M 4M1, Canada.

HAMMARLUND HQ180A Gen. Coverage Rec. Excellent Cond. $250.00 Firm! Chuck LaMont, 1533 Ashwood Dr., Modesto, CA 95350

EZ DOES IT BEST. Deals, that is, on Yaesu, ICOM, Drake, Swan, CushCraft, Larsen, KLM, Dentron, VHF Engineering, and Wilson. For new or used gear, call, see or write, W0EZ, Bob Smith Electronics, RFD No. 3, Hwy 169 & 7, Fort Dodge, Iowa 50501 - 515/576-3886.

FREQUENCY ALLOCATION CHART. See how the entire radio spectrum is used. 2 Khz to 200 Ghz. Send $2.00. Collins Chart Co., Box 1067, Coronado, CA. 92118

RECEIVE LISTS REGULARLY $5/yr. Surplus Parts, P.O. Box 7057, Norfolk, Virginia 23509.

COLLECTORS ITEM: Set of Original Rider Perpetual Trouble shooters Manuals, Volumes 1 through 15, Hard Bound, very good condition. This is a once in a lifetime chance for any serious collector of Antique Radios. Make an offer, high bid gets all. Joe Losito, 3391 Bighorn Ct., Cincinnati, Ohio, 45211. (513) 481-7338.

BYTE, Drink and be merry at the Tidewater Hamfest, Flea Market and Computer Show, Norfolk, Virginia. September 23-24. Over 60,000 sq. ft. of exhibit and flea market space. All indoors. All airconditioned. Write TRCI, P.O. Box 9371, Norfolk, VA 23505.

CLUB CALL PINS 3 lines 1-1/4 x 3-1/4 $1.25 each. First name, call and club. Black, red or blue with white letters. (Catalogue) Arnold Linzner, 2041 Linden St., Ridgewood, NY 11227

QSL CARDS - 500/$10. 400 illustrations. Samples: Bowman Printing, Dept. CQ, 743 Harvard, St. Louis, Missouri 63130.

FREE CATALOG of new merchandise resistors, capacitors, IC's, semiconductors, and more. Send to: Key Electronics, Box 3506C, Schenectady, New York 12303.

SAVINGS, on scanners and most radio units. Example: save $60.00 on the Drake SSR-1. Call (707) 544-4388 anytime. Write for a Specific price quote. Free shipping. VISA/Master. McDonald Electronics, Box 7492(C), Santa Rosa, CA 95401.

RADIO MUSEUM NOW OPEN. Free admission, 15,000 pieces of equipment from 1850 telegraph instruments to amateur and commmercial transmitters of the 1920s. Amateur station W2AN. Write for information: Antique Wireless Association, Main St., Holcomb NY 14469.

MOBILE IGNITION SHIELDING provides more range with no noise. Available most USA engines, some imports. Free literature. Bonding straps on sale now. Estes Engineering 930 Marine Drive, Port Angeles, WA 98362.

FREE FULL COLOR QSL CARD CATALOG Cards, Inc., Drawer P, Lexington, NC 27292.

QSLs WITH CLASS! Unbeatable quality, reasonable price. Samples: 50 cents refundable. QSLs Unlimited, 1472 SW 13th Street, Boca Raton, FL 33432.

B&K TEST EQUIPMENT. Free Catalog. Free shipping. Dinosaur discounts. Spacetron-EH, 948 Prospect, Elmhurst, IL 60126.

REPLACE RUSTED ANTENNA BOLTS with stainless steel bolts. Small quantities, free catalog. Elwick, Dept. 278, 230 Woods Lane, Somerdale, NJ 08083.

LINEAR POWER SUPPLY 2000V 500ma 750ma - int. Nine take offs 200V Steps 60ma or 1000V 500ma 750ma int. Nine take offs 100V Steps 40ma $149.00. Mirco Electronics, 1514 S. Oates, Detham, AL 36301. 205-792-9240.

FOR SALE: 10 channel, card program scanner SBE OPTI-SCAN $225.00. John Dandurand, Old Albany Road, Greenfield, MA 01301.

DRAKE OWNERS: Double your voice power! No Linear, Compressor, amplified mic, tube or circuit changes needed. Details $2 SASE. WB2IWH, 213 Dayton Ave., Clifton, NJ 07011

LINEAR POWER SUPPLY 2000v 500 ma 750 ma - int. Nine take offs 200v steps 60 ma or 1000v 500 ma - 750 ma int. Nine take offs 100v steps 40 ma $149. Mirco Electronics, 1514 S. Oates, Dothan, AL 36301.

CERTIFICATE FOR PROVEN Two-Way Radio Contacts with Amateurs in all ten (10) call areas. Award suitable to frame and proven achievements added on request. SASE brings TAD data sheet from W6LS, 2814 Empire Ave., Burbank, CA 91504.

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. (617) 233-1234.

LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952 but will consider conplete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write: Dick Cowan, WA2LRO, c/o CQ Magazine, or call (516) 883-6200.

FOR SALE: Spectra Physics 137P 2mw laser tube, brand new, never used, $80. G.R. 572B 1 kHz Hummer $15. Irwin Math, 320 Northern Blvd., Great Neck, NY 10021.

FOR SALE: Old issues of Ham Radio, CQ, 73, QST. Some complete runs. Send s.a.s.e. for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

BE FIRST TO KNOW precisely when and where to work all the choice DX. Bi-weekly LI DXA DX Bulletin Has: Hot DX News, Time and Frequency of each goodie, QSL Info, Propagation Forecast, and more. Send business size SASE for free sample copy or $8 for 1-year domestic subscription. Long Island DX Association, DX Bulletin, PO Box 173, Huntington, NY 11743.

CQ AND QST 1950-1975 ISSUES FOR SALE. Send SASE if ordering 73, Ham Radio, or other CQ and QST issues. One dollar minimum order and all issues cost 25 cents each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

HW-202 w/built-in Sandlin scanner, crystals; ITC Multi-2000; Bearcat 101 scanner. All good condition. Karl Thurber, W8FX/4, 233 Newcastle Lane, Montgomery, AL 36117.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eiamc, 301 Industrial Way, San Carlos, CA 94070.

SELL: 2 meter FM Sonar transceiver, AC P/S, mobile bracket $175. Heath HW-32A with sapre tubes $65. George Pataki, WB2AQC, 34-24 76th St., Jackson Hgts., NY 11372.

WANTED: Commercial type 50 ohm dummy load, 2 kw or greater. Rod, W7OM, 5632 47th Ave., SW, Seattle, WA 98136.

SALE: Sony ICF-5900W multi-band receiver designed for SWL's. Like new condition w/manuals. $100. Schultz, W4FA, Box "L", FPO New York 09544.

SB300 mint $200 or swap for HW101 with both supplies mint. Rodger Legg, 24 Tower Rd., Wayne, NJ 07470.

WANTED: Operation manuals for Geloso xmtr and rcvr, power supply. G4/225-214-226. Buy or borrow. J. P. Taillebois, 8651 Judith Jasmin, 109 Montreal H1J 2B6.

FOR SALE: Have few copies of K3CHP's DX QSL Guide with ham sentences in 54 languages for outgoing DX QSL cards, $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

WANTED: Rohn 40G tower sections will pickup in 500 mi. radius. Tom Martin, W8JWN, E. Breitung Ave., Kingsford, MI 49801.

MOTOROLA dispatch mike TU587 $20; Simplex Elect. time stamp $20; Heath Audio freq. meter AFI $10; Elmac PSA500 P/S 110v $15. K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

SEND stamp for list of parts, tubes, magazines. Special price on whole lot. You pick up. W9FOC, 1616 Campbell, Joliet, IL 60435.

QRP ACCU-Keyer PC board as per my January 1976 QST article. Drilled, $4.95 PPd. I/O Engineering, 9503 Gambels Quail, Austin, TX 78758 K5PA.

JOHNSON Thunderbolt 2 kw linear $195; 4385 W. Lake Rd., Canandaigua, NY 14424, E. Snow, W2UN, Phone (716) 394-1815.

WANTED: A Heath frequency display SB650, operating or not. About $100 or $125. VE2-EFF, Opp. Andre. P.O. Box 192, Kenogami, Quebec, Canada, G7X 7X7.

WILL give $100 for factory wired Atwater Kent "Breadboard" radio in restorable condition. WB1BVO, 22 Forest St., Branford, CT 05405.

SELL OR TRADE: Stereo 7" reel to reel tape recorder, Wollensak, model 5280, solid-state 10 watts on each channel. B. Nastoff, 320 W. 56th Pl., Merrill Ville, IN 46410.

WANTED: 811A tubes in any quantity, new used, pullouts, etc. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

Iguana *(from page 92)*

"I reckon he would head outside and when he came to the end of the wire, the antenna would be left outside, too," concluded Carl.

"You amaze me, Holmes!" Frank retorted. "Okay, you grab hold of Godzilla there and . . . "

"Why me?" objected Carl.

"This is no time to be squeamish," soothed Frank. "Besides, you know you have a way with animals."

"Yeah, sure. Alright, you fix the antenna to the collar and I'll get him pointed in the right direction and ready to go. I can just see the headlines, now: 'Boys Saved From Mine Cave-in By Lizard' . . . no, even better: 'Reptile Rescues Researchers.' Wow, that's a tongue twister."

"Well," remarked Frank, "he got us into this mess and he's going to get us out."

In about ten minutes, the boys had the lizard harnessed and he headed for the light as planned, leaving the antenna just outside the mine entrance.

"Alright, Carl, you're the one with the perfect fist, as you constantly remind me . . . let her rip."

Carl sent slow, as it was tricky using the cut battery wire. He told Mr. Toler what had happened; and in forty-five minutes, the emergency team of the fire department had them safely out.

"Another day in the life of Tom Swift, boy genius," said Carl.

"Yeah, sure . . . we'd still be in there if it weren't for me !" said Frank. "What do ya say we go over to my house and make that QSO with Cygni?"

"Why not Procyon?" asked Carl.

"Are you kidding,man? Procyon is 11.4 light years away."

"Well, how far is Cygni?" cautiously questioned Carl.

"11.3," replied Frank.

"I should have known not to ask!"

SALE: 32 ASR w/stand, perfect condx, $300, Kenwood 520 w/xtal filter & matching external VFO., $600, Clegg 22 Mark 2, $125, Clegg 22, $65, Ameco 6 & 2 xmtr w/matching VFO, $125, Globe VFO, 160 to 6 meters, $50. Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355, (212) 461-5933.

FOR SALE: Tektonix 535 oscilloscope with dual trace and fast rise-time plug-ins. Very good condition. $425. Prefer local pick-up. Irwin Schwartz, K2VG, c/o CQ Magazine, 14 Vanderventer Ave., Port Washngton, NY 11050.

SELL: Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch, $16. UTC S-50 6kv c.t. 300 ma, new, pick-up only, $75. Small (2 kw) $20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

WANTED: Swan 1200W or Swan 1200X Linear working or not. Also SB200. Give condition and price. For Sale: National NC33, restored with manual $49. Covers braodcast-band and up to 300mc in 4 bands. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamind, CA 93560.

FOR SALE: Galaxy DC Power Supply, Never used. Best offer over $50. Dave, WA6ZBT, 1260 Orchard Ln., Chico, CA 95926.

NEW 8 Pole 250 Hz c.w. filter for TS-820 or TS-520. $40. Len Malone, K8AQ, 949 Havensport, Cincinnati, OH 45240.

NEED: CQ Jan. 1946 and 73 April 1977. Pay $2 each. Harold L. Hausbrouck, 1157 Palms Blvd., Venice, CA 90291.

SELL: Viking II w VFO $100. RCA PR66 comm receiver, $135. Regency HR-2B 2 mrt rig, $80. All good condx. WB6SLV, Box 2, Mojave, CA 93501.

SSTV AND PHOTOGRAPHERS—Make offer; 1 each, like new, Fujitar lenses-135 mm, f 4.5, Telephoto 35 mm, f. 3.5, wide angle. Cary Cowan, c/o CQ Magazine, or call (516) 883-6200.

FOR SALE: Heathkit IM-4100 frequency counter. $75 fully assembled and never used. Was bought by mistake. Rick Dittmer, 1635 Norton Ave., Grissom AFB, IN 46971.

CLEANING SHACK send stamped-addressed large envelope for 5 pages of "goodies" for sale or trade. W4API, 1420 S. Randolph St., Arlington, VA 22204.

NEW T.V. CAMERA FOR SALE: w/16 MM-FI. 1, 6 lens, only $199.95. Also new 10 in. monitor only $199.95. Mel Shlank, 553 Howell Rd., Orange, CT 06477.

WANTED: Tube cahrt for Mercury Model 1100 tube tester. Karl Zack, 4632 Washington St., Downers Grove, IL 60515.

WANTED: Manual or schematic for Collins 618S-1/mc s.s.b. xcvr. WA1RRL, 54 Mansfield St., Everett, MA 02149.

SELL: CQ Magazines complete. Reasonable offers, cash or trade. Nagle, 12330 Lawyers Rd., Herndon, VA 22070.

WANTED: Pre-war issues of Short Wave Craft Magazine. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Antique Glass-Looking for old milkglass-purple, slag, carmel, and greentown. Tell me what you have. I pay the highest prices. Write: Jack Schneider, c/o Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, NY 11050.

COLLINS KWM-2 and 516-F2, Wing Emblem. Waters, $800. CX7 CW (400Hz) filter, $100. 5-inch TV Monitors. Bob Sullivan, N$RS, P.O. Box 6216, Arlington, VA 22206. (703) 430-3155.

SALE: Heath IM-28 VTVM kit. New, perfect. Ordered by mistake. $40. Schultz, Box "L", FPO New York 09544.

The book "CQ YL" has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June 1976. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher Louisa Sando, 9412 Rio Grande Blvd., NW, Albuquerque, NM 87114. Please enclose $1.00 to cover the cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.50, postpaid.

WANTED: Instruction manuals for R-278/GRC-27 receiver; AN/GRT-3 xmitter; TRC-8 Set; and ARC-5 VHF sets. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

ADVERTISER'S INDEX

NEW READER SERVICE SYSTEM

To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 84 and 85, and circle the numbers on the card which correspond with the Reader Service numbers listed on the INDIVIDUAL ADS. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

YAESU'S NEWEST RECEIVER
THE FRG-7000

The FRG-7000—Yaesu's newest receiver features improved selectivity, wider frequency coverage, digital readout, with Yaesu's superb quality of construction.

—— SPECIFICATIONS ——

Frequency Range: 0.25-29.9 MHz
Modes of Operation: AM, SSB, CW
Stability: Less than ±500 Hz drift for any 30 minute period after warmup.
Sensitivity: SSB/CW-Better than 0.7uV for S/N 10dB AM-better than 2 uV for S/N 10dB (400 Hz 30% modulation)
Selectivity: SSB/CW ±1.5 KHz (−6dB), ±4 KHz (−50dB) AM ±3 KHz (−6dB), ±7 KHz (−50dB)
Power Requirements: 100/110/117/200/220/234 VAC, 50/60 Hz
Power Consumption: 25 VA
Size: 360 mm (W)×125 mm (H)×295 mm (D)
Weight: approximately 7 kg.

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YAESU ELECTRONICS CORP., Eastern Service Ctr., 613 Redna Ter., Cincinnati, OH 45215

CIRCLE 35 ON READER SERVICE CARD

NEW ON 2 FROM YAESU

THE MEMORIZER "PLUS"

Yaesu presents: The finest, compact, versatile transceiver designed for the active 2 meter enthusiast. The FT-225RD features all mode operation—SSB/FM/CW/AM—with repeater offset capability and a memory! Modular, computer-type construction offers reliability and ease of service. The FT-225RD provides the super selectivity and performance needed on today's active 2 meter band. Join the fun on FM, DX, or OSCAR, with the new FT-225RD transceiver—another winner from the world's leader in amateur communications equipment.

Features

■ Digital frequency display ■ Complete 144-148 MHz coverage in four 1 MHz band segments ■ ± 600 KHz or optional auxiliary repeater split ■ Built-in memory unit ■ Variable power output ■ Noise blanker ■ Selectable AGC ■ Three way metering: S meter, power output and FM discriminator ■ Built-in AC & DC power supplies and speaker ■ Built-in tone burst—adjustable 1500-2000 Hz ■ Front panel display/lamp dimmer ■ Twenty-five watts output.

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Price And Specifications Subject To Change Without Notice Or Obligation

YAESU

The radio.

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CIRCLE 36 ON READER SERVICE CARD

EIMAC tubes win a place in Rockwell-Collins' HF-80 systems.

Rockwell-Collins chooses EIMAC tubes again.

To power their new HF-80 family of 1 to 10 kW hf single sideband radio equipment, Rockwell-Collins needed tubes as well-constructed and reliable as the HF-80 system itself. That's why they went with EIMAC, the way they have for every hf system they've built since 1958.

The deciding factors—EIMAC's quality, backup, availability and customer acceptance.

The new HF-80 equipment ranges from operator-attended receivers and transmitters to fully automated, remotely located communications stations. The HF-80 is used worldwide in business, military and general government communications. So Rockwell-Collins needed tubes with worldwide availability and technical back-up. EIMAC's proven customer acceptance and well-established reliability were more pluses.

The HF-80 uses EIMAC's 4CX1500B at 1 kW, 4CX5000A at 3 kW, and 4CX15000A at 10 kW with EIMAC's 4CX350A as drivers.

For more information on what makes these and other EIMAC tubes so special, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

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CIRCLE 13 ON READER SERVICE CARD