CD 08240

Amateur Radio

Serving Amateur Radio Since 1945

CQ

August 1977
$1.25

CQ World Wide DX Contest Phone Results
. . . see page 20

Who's got the 20½ Million Dollars?

An open letter to President Carter concerning the Future of Amateur Radio.
. . . see page 16

"It's Not Just Hot Air" W7KW installs beam via Balloon
. . . see page 40

mateur's Journal

TR-7500

There are a number of good 2 meter FM transceivers on the market. You may already own one. But, even if you do, we suggest that you put your radio to this test. And, if you're thinking of buying one, this test should be a helpful guide.

	NO	YES
Is it PLL synthesized?	☐	☐
Does it have 100 channels (88 pre-programmed)?	☐	☐
Does it have 12 extra diode programmable channels?	☐	☐
Does it have single knob channel selection?	☐	☐
Does it have a LED digital frequency display?	☐	☐
Dos it have a powered tone pad connection?	☐	☐
Does the receiver have helical resonators?	☐	☐

If your answer is NO to any of these, the TR-7500 is the radio that you should own. And, in addition to these important features, you get proven Kenwood quality, value and service.

TR-7500 *Specifications*

Semiconductors: Transistors 41
FETs 8
ICs 7
Diodes 35

Frequency Range: 146.01 to 147.99 MHz
Mode: FM
No. of Channels: 100
Operating Temperature: —20 to +50 degrees C
Power Voltage: 11.5 to 16.0V DC (13.8V DC nominal)
Grounding Polarity: Negative ground
Antenna Impedance: 50 Ohms
Current drain: Less than 0.5A in receive with no input signal
Less than 3A in transmit (HI) Less than 1.5A in transmit (LOW) (at 13.8V DC)
Dimensions: 172 mm (6—3/4") wide
250 mm (9—7/8") deep
75 mm (2—15/16") high
Weight: Approximately 2.2 kg (4.8 lbs.)

TRANSMIT SECTION

RF Output Power: High: 10 Watts
Low: 1 Watt (approximately)
Modulation: Variable reactance frequency shift
Frequency Deviation: ±5 KHz
Spurious Radiation: Better than —60dB
Tone Pad Input Impedance: 600 Ohms
Microphone: Dynamic microphone with PTT switch, 500 Ohms

RECEIVE SECTION

Receive System: Double conversion superheterodyne
Intermediate Frequency: 1st IF: 10.7 MHz
2nd IF: 455 kHz
Sensitivity: Better than 0.4 uV for 20dB quieting Better than 1 uV for 30dB S/N
Squelch Sensitivity: Better than 0.25 uV
Selectivity: 12kHz at —6dB down
40 kHz at —70dB down
Image Rejection: Better than —70dB
Spurious Interference: Better than —60dB
Audio Output: More than 1.5 watts across 8 Ohms load 10% distortion
Intermodulation: Better than 66dB

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

KENWOOD
...pacesetter in amateur radio

This NEW MFJ Super Antenna Tuner . . .

matches <u>everything</u> from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF <u>OUTPUT</u>. Built-in balun, too!

$69.95

With the NEW MFJ Super Antenna Tuner you can run your full transceiver power output — up to 200 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.

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 5x2x6 inches fits easily in a small corner of your suitcase.

The secret of this tiny, powerful tuner is a wide range 12 position variable inductor made from two stacked toroid cores and high quality capacitors manufactured especially for MFJ. For balanced lines a 1:4 (unbalanced to balanced) balun is built-in. Made in U.S.A. by MFJ Enterprises.

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).

Try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This tuner is unconditionally guaranteed for one year.

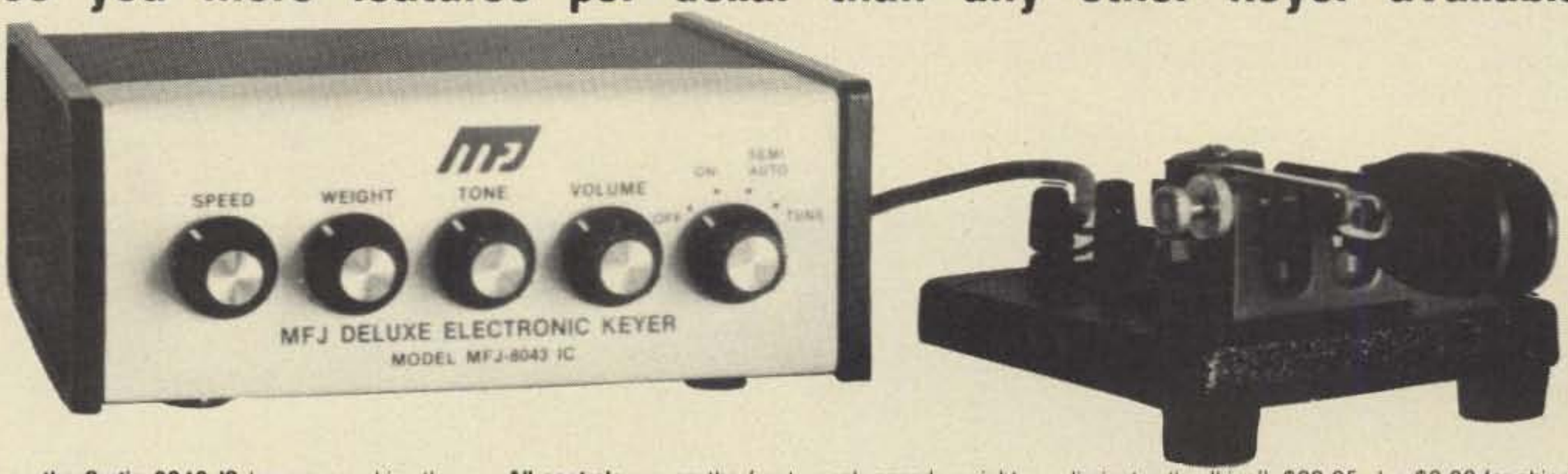
To order, simply call us **toll-free 800-647-8660** and charge it on your BankAmericard or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-16010ST Super Antenna Tuner.

Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order today.

MFJ ENTERPRISES
P. O. BOX 494
MISSISSIPPI STATE, MS. 39762
CALL TOLL FREE . . 800-647-8660

This NEW MFJ Deluxe Keyer at $69.95 . . .

gives you more features per dollar than any other keyer available.



Based on the Curtis 8043 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatique-free sending.

Semi-automatic "bug" operation provides automatic dots and manual dashes. Use a manual straight key to safely key your transmitter or to improve your fist.

Dot memory, self-completing dots and dashes, jam-proof spacing and instant start for accurate and precise CW.

Totally RF proof. No problems, whatever.

Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, —300V max., 10 ma, max.; cathode and solid state transmitters + 300V max., 200 ma, max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot dash space ratio; makes your signal distinctive to penetrate thru heavy QRM for solid DX contacts.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys xmtr for tuning.

Completely portable. Take it anywhere. Operates up to a year on 4 C-cells. Miniature phone jack for external power (3 to 15 VDC).

Beautiful Ten Tec enclosure. Eggshell white, walnut sides. Compact 6x6x2 inches.

Three conductor quarter-inch phone jack for key, phono jacks for keying outputs.

Optional squeeze key. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

Try it—no obligation. If not delighted, return it within 30 days for a refund (less shipping). This keyer is unconditionally guaranteed for one year.

To order, simply call us **toll-free 800-647-8660** and charge it on your BankAmericard or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-8043 keyer and/or $29.95 plus $2.00 shipping/handling for the squeeze key.

Don't wait any longer to enjoy the pleasures of the new MFJ Deluxe Keyer. Order today.

MFJ ENTERPRISES
P. O. BOX 494
MISSISSIPPI STATE, MS. 39762
CALL TOLL FREE . . 800-647-8660

TS-820S

We told you that the TS-820 would be the best. In little more than a year our promise has become a fact. Now, in response to hundreds of requests from amateurs, Kenwood offers the TS-820S* . . . the same superb transceiver, but with the digital readout factory installed. The worldwide demand for the TS-820 far exceeded our initial production plans. However, production capacity has been substantially increased and our objective is to make the TS-820S more readily available to you. As an owner of this beautiful rig, you will have at your fingertips the combination of controls and features that even under the toughest operating conditions make the *TS-820S the Pacesetter that it is*.

Features

Following are a few of the TS-820S' many exciting features.

SPEECH PROCESSOR • An RF circuit provides quick time constant compression using a true RF compressor as opposed to an AF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

IF SHIFT • The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820S a pacesetter.

TV-506 TV-502 VFO-820 TS-820S SP-520

PLL • The TS-820S employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

DIGITAL READOUT • The digital counter display is employed as an integral part of the VFO readout system. Counter mixes the carrier, VFO, and first heterodyne frequencies to give *exact* frequency. Figures the frequency down to 10 Hz and digital display reads out to 100 Hz. Both receive and transmit frequencies are displayed in easy to read, Kenwood Blue digits.

Specifications

FREQUENCY RANGE: 1.8-29.7 MHz (160 - 10 meters)
MODES: USB, LSB, CW, FSK
INPUT POWER: 200W PEP on SSB
160 W DC on CW
100 W DC on FSK
ANTENNA IMPEDANCE: 50-75 ohms, unbalanced
CARRIER SUPPRESSION: Better than -40 dB
SIDEBAND SUPPRESSION: Better than -50 dB
SPURIOUS RADIATION: Greater than -60 dB (Harmonics more than -40 dB)
RECEIVER SENSITIVITY: Better than 0.25uV
RECEIVER SELECTIVITY
SSB 2.4 kHz (-6 dB)
4.4 kHz (-60 dB)
CW* 0.5 kHz (-6 dB)
1.8 kHz (-60 dB)
*(with optional CW filter installed)
IMAGE RATIO: 160-15 meters: Better than 60 dB 10 meters: Better than 50 dB
IF REJECTION: Better than 80 dB
POWER REQUIREMENTS: 120/220 VAC, 50/60 Hz, 13.8 VDC (with optional DS-1A DC-DC converter)
POWER CONSUMPTION: Transmit: 280 Watts Receive: 26 Watts (heaters off)
DIMENSIONS: 13-1/8" W x 6" H x 13-3/16" D
WEIGHT: 35.2 lbs (16 kg)

VFO-820
Function switch provides any combination of transmit/receive/transceive with the TS-820S. Both are equipped with VFO indicators showing which VFO is in use.

SP-520
Although the TS-820S has a built-in speaker, the addition of the SP-520 provides improved tonal quality. A perfect match in both design and performance.

TV-502
The TV-502 transverter puts you on 2-meters the easy way. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz option. Completely compatible with the TS-820S, the TS-520S and most any HF transceiver.

TV-506
Similar to the TV-502 except that it opens up the 6-meter band (50.0-54.0 MHz) to your HF rig.

*The TS-820S and DG-1 are still available separately.

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

KENWOOD
. . . pacesetter in amateur radio

AUGUST, 1977 **VOL. 33, NO. 8**

The Radio Amateur's Journal

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Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200

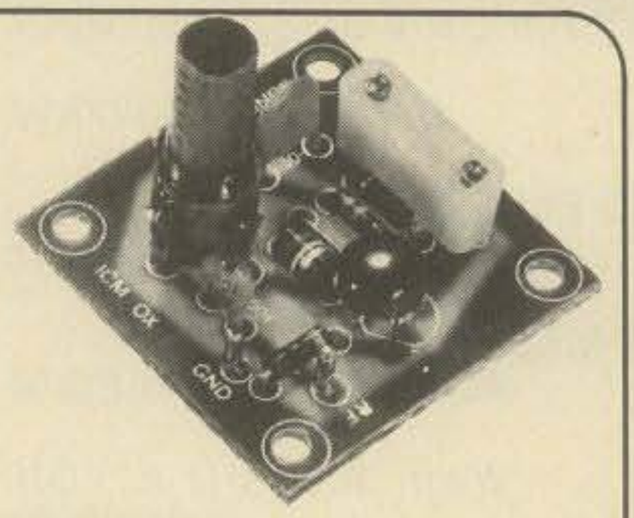
CQ (Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second Class Postage paid at Port Washington, N.Y. and other points. Subscription Prices one year, $7.50; two years $13.00. Entire contents copyrighted Cowan Publishing Corp. 1977. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.

Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

for the experimenter!

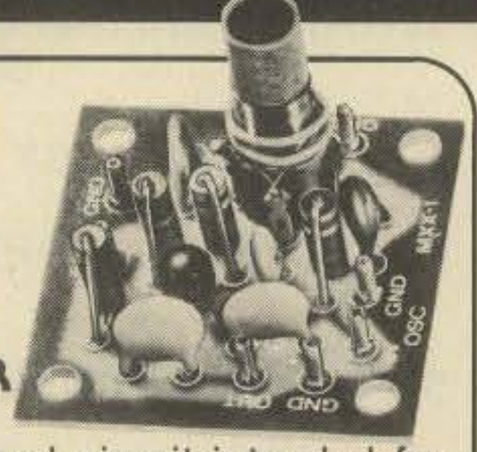
INTERNATIONAL CRYSTALS & KITS

OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



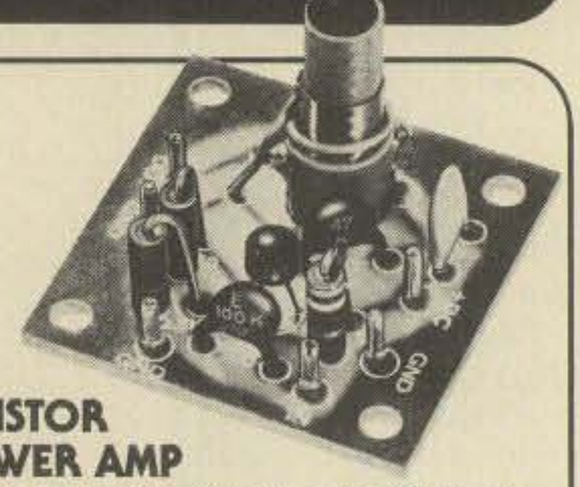
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.

$3.95 ea.



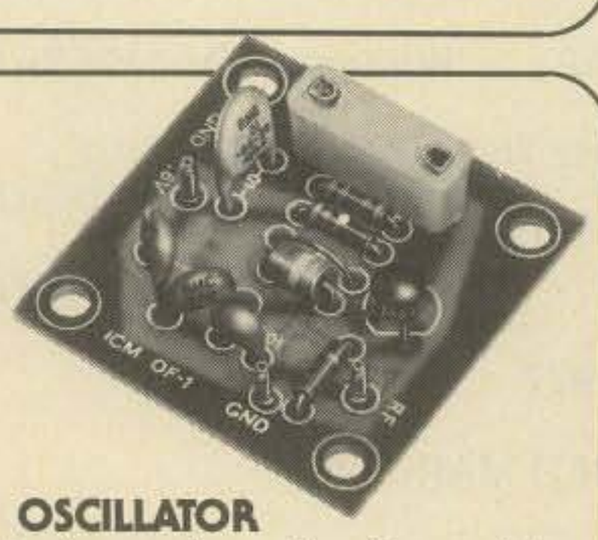
MXX-1 TRANSISTOR RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.

$4.50 ea.



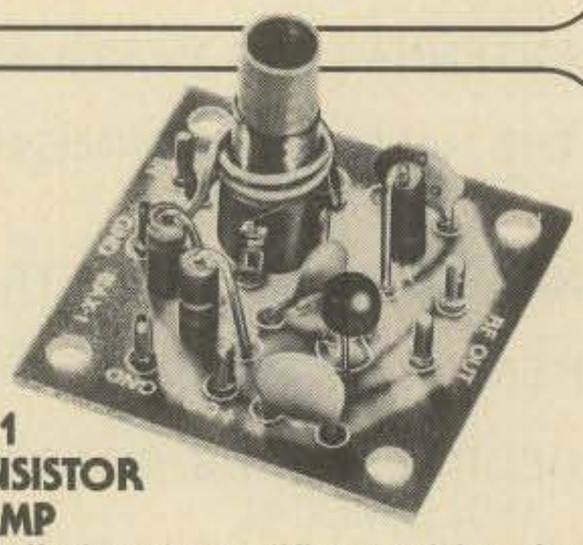
PAX-1 TRANSISTOR RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.

$4.75 ea.



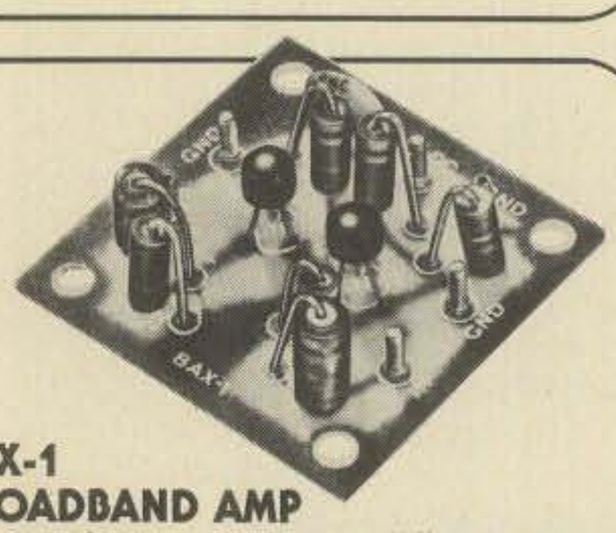
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.

$3.25 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.

$4.50 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

$4.75 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	$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi	
	Specify when ordering	$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC	
	Specify when ordering	$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC	
	Specify when ordering.	$4.25 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.

ICM

International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

Zero Bias

an editorial

Our cover shot this month is one of the most dramatic photos depicting amateur radio in action ever taken. What you're seeing is part of the installation of a 6 element, 15 meter yagi plus tower section and rotor mechanism being (hot) air lifted to the top of one of Bill Guimont, W7KW's five 175' towers. It's hard to believe, but it's true, and you can read all about it in this issue. Bill is a rugged individualist who is quite a contester and expert on hydroponic farming, all proof positive to the power of positive thinking. Bill will also be supplying us at a future date with a series of articles on a one man approach to putting together a contest station on a low budget, including technical approaches to large array curtains for 75 and 160 meters.

Speaking of low budgets, take the time to read my "Open Letter To The President" which goes into the financial and bureaucratic crunch facing the FCC. It's a problem that affects everyone requesting licensing services from the FCC; from amateur to CBer. Perhaps, this problem could best be solved by allowing the licensing anarchy alluded to take place. If the President, the Congress, the Senate and the Office of Management and Budget can't get together among themselves to work out a solution, then let them ponder on what would happen if for example millions of CB applicants started a hue and cry over not being able to get a license in a reasonable amount of time. It's something to think about.

It is with sorrow that I report the sudden passing away of Herb Brier, W9AD, long time Novice Editor for CQ. Herb was typically a writer's writer. His columns were always in early and he was noticeably puntual in all of his endeavors . . . he could be counted on. Herb had supplied us with enough Novice Columns to go until September, again marking his professional attitude. He will be missed not only by Novices, but by all of us who had the pleasure of knowing him and reading his material.

On a much happier note, I want to announce that Ted Henry, W6UOU, of Henry Radio will be joining the staff of CQ Magazine in a cooperative DX event celebrating the arrival of Cycle 21 in the modern series of sunspot cycles. In Ted's own words: "Having been an amateur for 40 years, I nourish an abiding fascination with the 'mystery' of long distance radio communication. During the months of August and September, my wife Meredith, W6WNE, and I will be travelling around the world with the most modern and efficient amateur communications equipment. We will be ON THE AIR from a number of exotic locations and hope to say 'hello' to you and to our thousands of radio friends throughout the world. In the September issue, we will tell you in detail of our plans and cordially invite you to join us in this 'Odessey '77' ".

This should be an exciting trip for Ted and Meredith and for many of you DXers out there. This is a good chance for all fledgling DXers to work a few of the rare ones too.

This month we bring you the results of the CQ WW DX Phone Contest and as per usual, the number of entrees this year is larger than last year. We hope to have the C.W. results next month and they too should be larger than last year. In fact, Bernie Welch, W8IMZ, says that the WPX contest this year is substantially larger than last year. So all in all, it's been a really good year for CQ Contests. Thanks to all of you out there who take the time to enter and support amateur radio's biggest and best contests.

73, Alan, K2EEK

Ted Henry, W6UOU

KENWOOD'S NEW TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY

A NEW STANDARD IN ECONOMY TRANSCEIVERS

The NEW TS-520S combines all of the fine, field-proven characteristics of the original TS-520 together with many of the ideas, comments, and suggestions for improvement from amateurs worldwide. Kenwood's ultimate objectives . . . to make quality equipment available at reasonable prices.

FULL COVERAGE TRANSCEIVER

The new TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-502 and TV-506 transverters, your TS-520S can cover 160 meters to 2 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

The new Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The new TS-520S incorporates a 3SK-35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

A new audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

VERNIER TUNING FOR FINAL PLATE CONTROL

A new vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

FINAL AMPLIFIER

The new TS-520S is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built-in to the TS-520S.

RF ATTENUATOR

The new TS-520S has a built-in 20 dB attentuator that can be activated by a push button switch conveniently located on the front panel.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO has been designed to match the styling of the TS-520S and provide maximum operating flexibility on the band selected on your TS-520S.

AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (option) allows for mobile operation of the TS-520S.

EASY CONNECTION PHONE PATCH

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

CW-520 — CW FILTER (OPTION)

The CW-520 500 Hz filter can be easily installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.

Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ±1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
Tubes ..... 3 (S2001A x 2, 12BY7A)
Transistors 52
FETs 19
Diodes 101
Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension: 333(13⅛) W x 153 (6-0) H x 335(13-(13-3/16) D mm(inch)
Weight: 16.0 kg(35.2 lbs)

TRANSMITTER
RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression: Better than -40 dB
Sideband Suppression: Better than -50 dB
Spurious Radiation: Better than -40 dB
Microphone Impedance: 50k Ohms
AF Response: 400 to 2,600 Hz

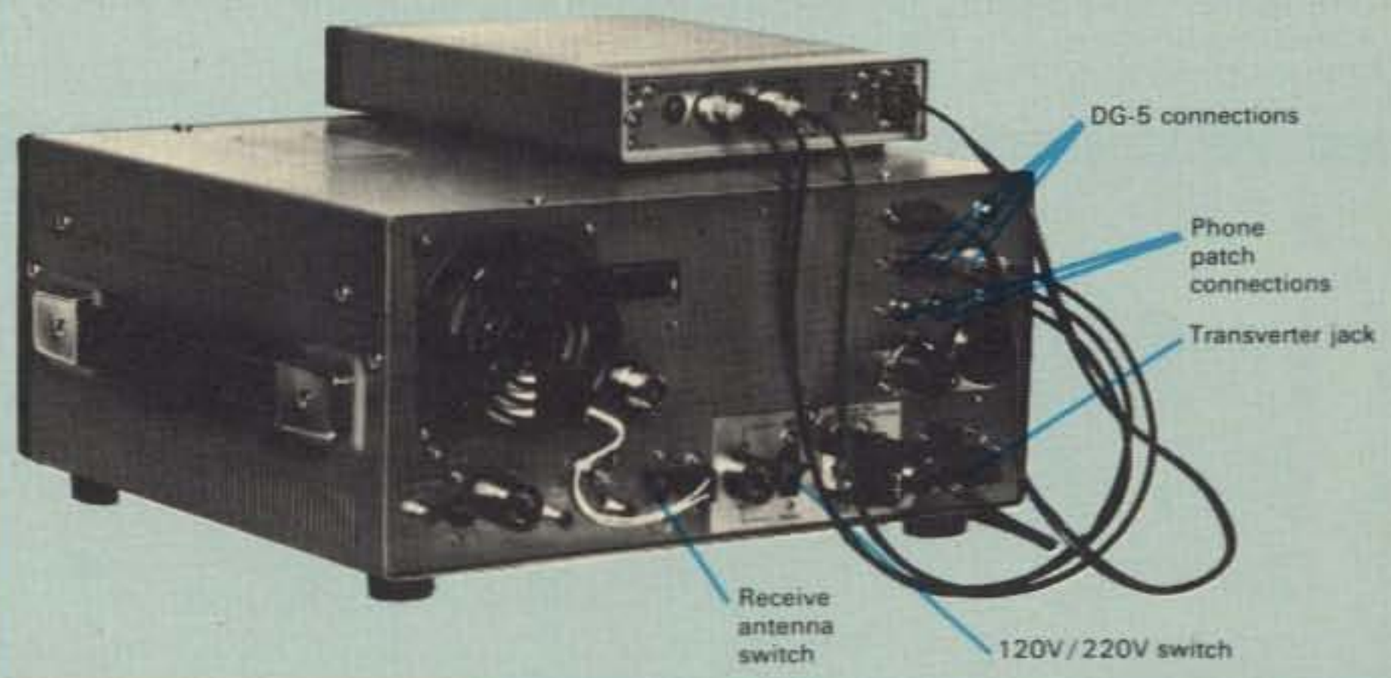
RECEIVER
Sensitivity: 0.25 uV for 10 dB (S+N)/N
Selectivity: SSB:2.4 kHz/-6 dB, 4.4 kHz/-60 dB
Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
Image Ratio: Better than 50 dB
IF Rejection: Better than 50 dB
AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
AF Output Impedance: 4 to 16 Ohms

DG-5

SPECIFICATIONS
Measuring Range: 100 Hz to 40 MHz
Input Impedance: 5 k Ohms
Gate Time: 0.1 Sec.
Input Sensitivity: 100 Hz to 40 MHz ... 200 mV rms or over, 10 kHz to 10 MHz .. 50 mV or over
Measuring Accuracy: Internal time base accuracy ±0.1 count
Time Base: 10 MHz
Operating Temperature: -10° to 50° C/14° 122° F
Power Requirement: Supplied from TS-520S or 12 to 16 VDC (nominal 13.8 VDC)
Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)
Weight: 1.3 kg(2.9 lbs)

DG-5
(optional)

The luxury of digital readout is available on the TS-520S by connecting the new DG-5 readout (option). More than just the average readout circuit, this counter mixes the carrier, VFO, and heterodyne frequencies to give you your exact frequency. This handsomely-styled accessory can be set almost anyplace in your shack for easy to read operation . . . or set it on the dashboard during mobile operation for safety and convenience. Six bold digits display your operating frequency while you transmit and receive. Complete with DH (display hold) switch for frequency memory and 2 position intensity selector. The DG-5 can also be used as a normal frequency counter up to 40 MHz at the touch of a switch. (Input cable provided.)
NOTE: TS-520 owners can use the DG-5 with a DK-520 adapter kit.



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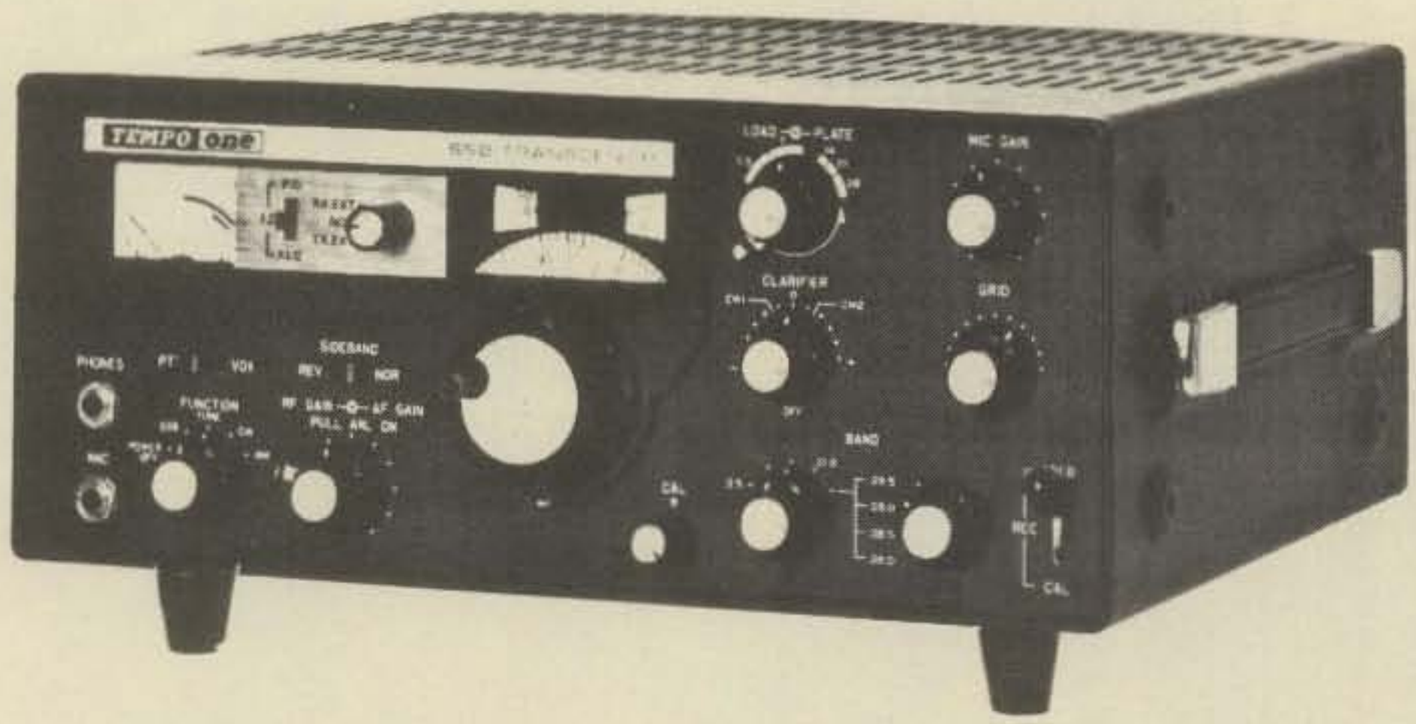

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Our Readers Say

Well Done!

Editor, CQ:

On April 2, Mr. Bob Cox, K3EST, of the CQ Contest Committee was the invited guest of the Texas Association of Contest Operators (TACO) at the First Annual Contesters Roundup held in Houston, Texas. Bob came to the convention to moderate the CQ contest forum and to present trophies to W5WZQ and W5MYA (VP2G). This correspondence is to notify CQ and CQ readers of the outstanding job that Bob did in presenting topical information and chairing questions on the various CQ contests. We feel that the interchange of information gave the Texas contesters an insight into CQ and gave Bob some idea of the problems and needs that are unique to this part of the country.

We hope this meeting opened a new channel of communication with CQ and that the ideas presented will be to our mutual benefit.

Tom Taormina, K5RC/WA5LES
Houston, TX

Read Your Policy!

Editor, CQ:

I bring to your attention the letter from Joe Harper, WA7GSM, and the reprinted letter from his insurance company, which appeared in the April 1977 issue of "Our Readers Say", regarding insurance coverage for ham gear in automobiles.

While Joe Harper's insurance company has advised him that he does have coverage for his ham equipment, I hasten to point out to you all other radio amateurs to study the "CB Exclusion" endorsement of their individual policies.

As an Independent Insurance Agent, licensed in the State of Georgia, I must advise you that the companies I represtent exclude not only CB radios, but scanners, antennas, and amateur equipment. The exclusion reads as follows: "This insurance does not apply to loss of, or damage to any sound receiving or sound receiving and transmitting equipment designed for use as a citizen's band radio, two-way mobile radio or telephone, scanning monitor receiver, including any accessories and antennas." There is no way that I can see for this exclusion to be interpreted as not having an effect on amateur radio equipment. Our fellow hams should not be misled by the opinion of one individual representative of a single insurance company.

Eugene Kelly, Jr., WB4UAM
Monroe, GA

Used C.B. Anyone?

Editor, CQ:

I have just finished your "Zero Bias" column and I would like to thank you for chewing out the FCC. I believe there is a need for novice, although I plan on going for my general as my first ticket in July or August. I am presently a licensed CBer but some of the corneyness of most of the operators and the commercialization of CBs are driving me to ham radio. Just the mention of the fact that I am a CBer, brings a rash of "Hey Good Buddies" to me. I hope nothing like this happens to ham radio because it churns my stomach.

Eric Sjogrew

P.S. Anyone want to buy a used CB?

April Foolishness

Editor, CQ:

The letter from K7BD in the April issue should certainly rank (?) with the best of the April foolishness in recent years. Perhaps, the solution is to leave off the address and then Uncle Wayne can pick up the 20 cent tab in Peterboro where all dead letters and 160 meter afficianados must one day go. Understand W4BRB is planning a DXpedition there to commemorate the up coming anniversary of the Postal Union and will sign W4BRB/PU on 1802 kHz. Look for Gene down five.

George Werner, W4ORT
Jacksonville, FL

Lloyd & Iris

Editor, CQ:

We were recently honored to receive a fine trophy presented by CQ Magazine in connection with the ceremonies inducting us into the CQ DX Hall of Fame.

The ceremonies took place at the joint meeting of the Northern California and Southern California DX Clubs at Fresno, California.

The trophy, which is in the form of a plaque, occupies a special place in our operating room. We hold many other awards but consider this award the number one of all of them.

We want to thank you for this honor and ask you to please convey our thanks to all other members of the CQ staff who are involved in making this award possible.

Lloyd (W6KG) and Iris (W6QL) Colvin
Castro Valley, CA

Announcing

• **Plain City, OH** — The Union County Amateur Radio Club proudly presents "Hamfest '77" on Sunday August 14th at the Plain City fairgrounds (near Columbus, OH on St. Rt. 42, 4 miles south of 33). Admission is $1.50 in advance and $2.00 at the gate. Talk-in on 146.16/76. Check in (for prizes) on 146.52. For further info, contact the Union County Amateur Radio Club, 13613 U.S. 36, Marysville, OH 43040, attention to Mr. Gene Kirby, W8BJN.

• **Montreal, Canada** — The Montreal 1977 Hamfest will be held on August 6th and 7th at the St. Lambert Arena. There will be seminars, a large flea-market, code competition awards, prizes, and many other programs. For further info, contact Henry Kradepohl, General Chairman, VE2EGZ, 1350 Rocheleau St., St. Hubert, Quebec.

• **Desoto, IL** — The Sara Hamfest will be held on August 22nd. There will be prizes, food, and an auction. No charge for flea merchants. For further info, contact Nick Koeningstein, 2009 Gray Dr., Carbondale, IL 62901.

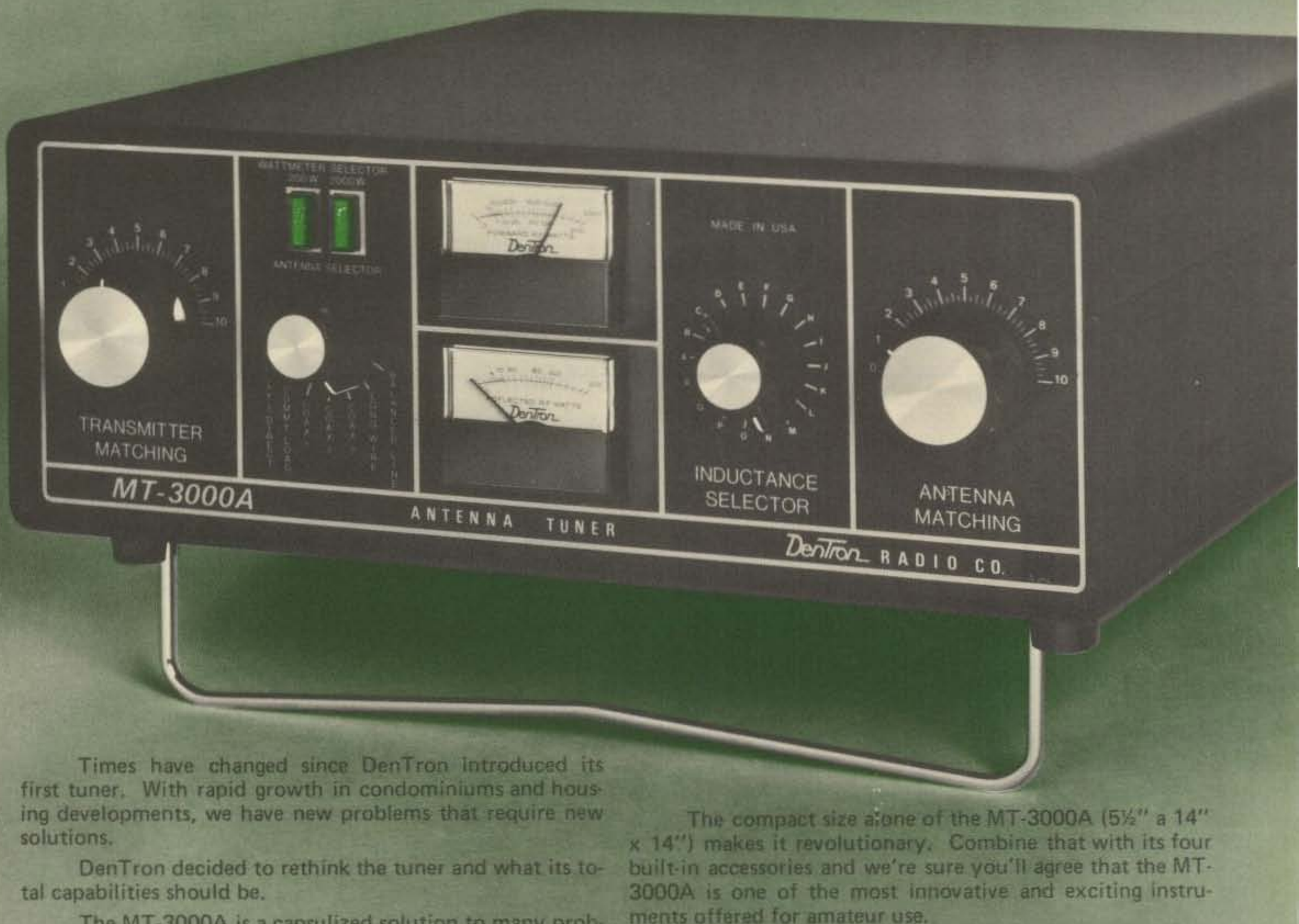
• **Decatur, AL** — The North Alabama Hamfest will be held on Sunday, August 21st at the Calhoun Community College. For further info, contact the North Alabama Hamfest Association, P.O. Box 9, Decatur, AL 35602.

• **Dutzow, MO** — The Zero-Beater ARC will hold their annual Hamfest on Sunday, August 7th at the Washington, MO city park. Free parking and bingo for the XYLs. No admission fee. For further info and/or tickets, contact Marvin Holdmeyer, WB0VPF, or Zero-Beaters ARC, WA0FYA, Box 24, Dutzow, MO 63342.

• **Des Moines, IA** — The 1977 Hawkeye Ham and Computerfest will be held on August 20th and 21st under the sponsorship of the Des Moines Amateur Radio Association. It will be held at Camp Dodge (in the suburb of Johnston on Des Moines' northern border). Donation for attendees will be $2 and 2 pieces of equipment will be offered as door prizes. Talk-in on 75 meters and 2 meters—146.34-.94, .22-.82 and .07-.67.

• **St. Cloud, MN** — The Saint Cloud Radio Club will hold it's annual Hamfest on August 14th from 10:00 AM until closing. Location is the Sauk Rapids Municipal Park. Swapfest and Ham gear sale. Talk-in on 34/94 and 3925. For further info, contact Bill Zins, WA0OTO, R.R. no. 4, St. Cloud, MN 56301.

Look closely at the new MT-3000A. You've never seen anything like it.



Times have changed since DenTron introduced its first tuner. With rapid growth in condominiums and housing developments, we have new problems that require new solutions.

DenTron decided to rethink the tuner and what its total capabilities should be.

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Second, the MT-3000A has built-in dual watt meters.

Third, it has a built-in 50 ohm dummy load for proper exciter adjustment.

Fourth, the antenna selector switch; (a) enables you to by-pass the tuner direct; (b) select the dummy load or 5 other antenna systems, including random wire or balanced feed.

The compact size alone of the MT-3000A (5½" a 14" x 14") makes it revolutionary. Combine that with its four built-in accessories and we're sure you'll agree that the MT-3000A is one of the most innovative and exciting instruments offered for amateur use.

At **$349.50** the MT-3000A is not inexpensive. But it is less than you'd expect to pay for each of these accessories separately.

As unique as this tuner is, there are many things it shares with all DenTron products. It is built with the same meticulous attention to detail and American craftsmanship that is synonymous with DenTron.

After seeing the outstanding MT-3000A, wouldn't you rather have your problems solved by DenTron?

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• **El Paso, TX** — On Saturday and Sunday, August 20th and 21st, the El Paso Hamfest and Swapmeet will be held at the Mesa Inn Motel (take interstate 10 to executive center exit). There will be a door prize as well as a pre-registration prize. Registration fees are: Hamfest/Swapmeet only - $8.00/head, $14.00/couple; Swapmeet only - $2.00/head; Total package (Hamfest, Banquet, Swapmeet) $15.00/head, $25.00/couple. No registration necessary for children under 15. For further info, write El Paso Hamfest, P.O. Box 4573, El Paso, TX 79914.

• **Steuben, IN** — The Steuben County Radio Amateurs present it's 19th annual F.M. Picnic and Hamfest on Sunday, August 7th at the Steuben County 4-H Park, approximately 2 miles west and 2 miles north of Angola, IN. There will be inside tables for exhibitors and vendors and overnite camping. Tickets are $1.00 by donation, advanced registration not necessary. Talk-in on 52.525, 146.52, 223.5 and 446.0.

• **Macs Inn, ID** — The 45th annual WIMU Hamfest is scheduled to be held on August 5, 6 and 7th just 25 miles south of West Yellowstone. This is one of the Rocky Mountains largest hamfest. Advance registration is $6.00. $7.00 at the hamfest. For further info contact: WIMU Hamfest, P.O. Box 30756, Billings, MT 59107, c/o Ronald Conley, General Chariman.

• **Newburgh, NY** — The Mt. Beacon Amateur Radio Club will hold it's annual hamfest Saturday, August 6th, 9 AM to 5 PM at Stewart Field, inside the Hanger. Flea Market & Auction. Talk-in on 37/97 and 16/76. Rain or shine. Plenty of free parking. Admission is $1; Tailgating is $1; and under 12 free.

• **LaPorte, IN** — The LaPorte County Summer Electronic Swapfest will be held on Sunday, August 28th, at the County Fairgrounds, which is located 50 miles south-east of Chicago. Booths available at no charge. Talk-in on 37/97, 01/61 or 52 simplex. Tickets are $2.00 at the gate. Info from P.O. Box 30, LaPorte, IN 46350.

• **Lexington, KY** — The Bluegrass Hamfest will be held on August 14th, at the Lexington International Guard Armory adjacent to the Bluegrass Field on Airport Road. There will be an indoor/outdoor Flea Market; Talk in on 146.16/76. Admission is $2.50 in advance, $3. at the door (includes grand prize stub). Doors open at 8 AM. For more info contact: Bluegrass Hamfest, Box 4411, Lexington, KY 40504.

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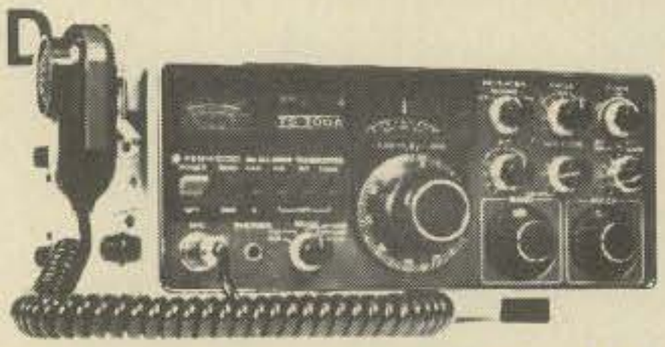
KENWOOD TS-700A



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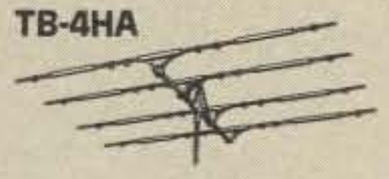
TB-4HA



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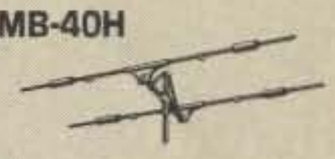

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TB-3HA	16' x 1.5"	28'-2"	16'	100 mph	110 lbs.	4 sq.ft.	44 lbs.
TB-2A	6.5' x 1.5"	27'-8"	14'-3"	80 mph	60 lbs.	1.8 sq.ft.	18 lbs.
MB-40H	15.75' x 1.5"	30'-4"	17'-6"	100 mph	80 lbs.	2.5 sq.ft.	40 lbs.

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DON'T LOSE IT HERE.

This is an open letter to President Carter concerning the crisis facing amateur radio and the entire Personal Radio Division of the FCC at Gettysburg

Who's Got The 20.5 Million Dollars?

We Sure As Hell Don't!

Dear Mr. President:

On May 17, I attended a conference at the Facilities Branch of the FCC's Personal Radio Division in Gettysburg Pennsylvania where some very disturbing information was presented concerning the possible fate of the amateur radio service. The Gettysburg office is a license-processing facility serving five areas of license authorizations, the two largest areas being Citizens Band and Amateur Radio. Currently there are 79 people working there, 31 of which are on a temporary basis. These 31 workers are scheduled to be laid off on June 10, leaving the balance to absorb their work load and possibly more, in a situation where they are already understaffed and short of funds.

The 31 are classified as temporary employees some of whom have been there for over two years. The cutback is in the form of getting rid of temporary employees. The **budget** could actually pay for these people but what is in dispute is the word **temporary.** The FCC is only allocated so many full time positions (not enough to do the job effectively) and so they used temporary help. Temporary is now being taken literally with total disregard to the job that has to be done. The FCC is being forced to uphold the word temporary and to let these valued employees go. They work extremely hard and there is evidently more work than they can handle now so perhaps you can explain to them and their families why they have to go. It's good **economics** to keep within a budget I know, and I'm sure you want to run a tight ship but there's a little more at stake here than just meeting a budget.

During the past few years we have all witnessed the tremendous growth in C.B. and its effect on the life style of the average American. Our economy has prospered as a result of this boom. This phenomenon perhaps has overshadowed the slow but steady growth in amateur radio, but it has always been the amateur radio service that has provided the bulwark of new technology, communications in times of disaster and international ties of friendship when political ties were strained. Well all of this growth is coming back to haunt the makers of the **budget**.

Perhaps the makers of the **budget** counted on a small number of applicants for licenses, or a relatively small growth in the demands for personal communications on the FCC, to cover-up what appears to be a swindle and misappropriation of funds earmarked for a specific purpose. As long as the demand was low, the FCC could get by on a smaller budget and people wouldn't suspect that they were being ripped off. After all if the demand increased on the FCC for services that were being **paid for,** they would bear the brunt of telephone calls and letters from irate applicants.

Prior to January everyone who desired a license sent in their money (fee), requested a particular service and generally in a reasonable amount of time that service was granted. It was nice and neat. People used the system or so they thought to get what they asked for. Then things started to break down to a point where if this cutback goes through in personnel, a form of licensing anarchy will surely emerge.

It was in January that the fee system for licenses was abolished and one might simply say that there was no money to provide these services anymore. The amateur who requests a service from the FCC is tempted to say that the CBer is taking the lions share. Both are falacious arguements when one does look at the **budget.** Regardless of the licensing demands, and there are many, the money for these services was there **all** the time.

First let me say that the requirements for an amateur license are far more stringent than that for a C.B. license. There are far more requirements and demonstrations of capability needed due to the highly technical nature of the service, international agreements and what the amateur is authorized to do as opposed to the requirements set up for a C.B. license and its function. The two are distinct and different and cannot fairly be compared. Both services have demands on the FCC and both these demands are valid.

All of us who attended the meeting sought ways to streamline licensing procedures to lessen the demand on the FCC and to try to work out a solution to a very strange problem. As amateurs we

The Facilities Branch of the FCC's Personal Radio Division, Gettysburg, Pennsylvania receives and processes all amateur radio and CB license applications along with those falling in the marine, aviation and restricted permits (public safety) categories. Each application is checked before being turned over for computer issuance of the new, modified or renewed license. Up-to-date information on licensees is kept on microfiche for quick reference. The May 17th meeting was held in the facility's computer contractor's office where amateur and CB chief John Johnston, W3BE, explained the Personal Radio Division's developing personnel and budgetery problems to members of the amateur press and other media representatives.

could see the very real threat to the amateur radio service, due to this cutback and ensuing **budget** reshuffle of money. We could all feel for the FCC but in turn we were being asked in a way to ease our own demise. We were working out a solution as to how the 8 people out of the 26 (previously alloted for amateur radio) could do the job. We were trying to reconsile how with a strong push in Congress by Congressman Joe Fisher of Virginia, the C.B. end might get more funds and hold up. If he can do it fine, amateurs would benefit in the long run slightly by having a few employees work on amateur licenses during slack periods. We were trying to make what appeared to be an efficient organization more efficient. Well no matter how efficient we could make it, it couldn't be efficient enough.

The trouble Mr. President lies not in the efficiency of the FCC or any of its actions whatsoever. It doesn't lie with how complex the licensing structure is for amateur radio or the demands of applicants. It doesn't lie with requests for C.B. licenses or their demands. It really doesn't lie with the

final **budget** the FCC has to work with. Sir, as leader of our country, the final responsibility lies with you.

Last year the FCC asked for 7 million dollars in order to perform the tasks assigned to it. It is only a regulatory body which estimated that it could perform its job with the said 7 million dollars. This would have also increased their staff to 97 employees, enough to handle all demands for services. Remember when this request for a **budget** went in, license fees were still in effect. At a hearing on the **budget,** Senator Pastore asked simply if there was enough revenue coming in to pay for the services and the answer was yes. No one asked exactly **how much** money was coming in only if there was enough. Well the end result was that the FCC didn't get its 7 million dollars it got half — 3½ million dollars to run the licensing department. That still seems like a lot of money, but its not enough. We still are faced with "asking" for more out of Congress to pay for what we need. The situation with the workers at Gettysburg may be resolved by the deadline or it may not. This is being written in late May for an August issue of our magazine and I don't know what the final result will be with regard to the 31 people. It really doesn't matter since there appears to be a much bigger issue at hand.

Last year while this talk of a **budget** went on, over **24 million hard earned dollars** were sent in by amateurs and CBers as **specific fees** to the FCC to actually pay for these services. These weren't general taxes, levees, or anything that could possibly be misconstrued to pay for something else. These were required, requested and paid for **LICENSE FEES.** Every year money flowed into the FCC to pay for what was being asked. People had faith in the system, followed the rules, and believed everything was being taken care of. What was actually happening was that we all were being raped by the system all the time.

All the money collected went right into the General Fund, the FCC as required turned over every last penny. As a matter of fact, employees who could have been working on license applications instead spent their time accounting for the money. The money that all of us sent in for all of those years never went to where it was supposed to go. All of this went on during the previous administration and I guess you inherited a good part of it, but your austerity methods are just adding to the insulting nature of the situation.

I'm suggesting to all the people who read this, and especially to you sir, to do a little simple arithmetic. 3½ million dollars from 24 million dollars is 20½ million dollars that's not accounted for. It's my money and their money that was taken and spent on who knows what. I'm saying it was STOLEN. It was ripped off, embezzeled, misappropriated or whatever else you want to call it but its still gone. I'd like the Office of Management and Budget to explain where the money went. I'd like an explanation for all of us who made the mistake of trusting the system. I wonder what would have happened if Senator Pastore asked the further question of **how much** money came in.

After my visit with the FCC, I can only hope that most of our agencies and commisions are as efficient in handling their affairs. What I want now is an accounting of what happened to our money. I would like to hear from all of those people with prestigious titles earning prestigious salaries at the Office of Management and Budget (OMB) just **why** this was done and **where** did it go.

I would like all of those people who read this to also ask the same questions. I would like them all to write you and the OMB to find out what is happpening there in Washington. I would like you to also explain to the countless numbers of license applicants both C.B. and amateur why they have to wait so long to get what is due them. Don't try to tell them the reason is "no money". . . I don't think that'll work anymore.

Mr. President and Honored Members of the Hallowed OMB please don't pass these letters on to the FCC to handle as they have quite enough to do already. Congressmen and Senators already have the monopoly on "passing the buck" with mail. The FCC is busy enough thanks to you, they don't need the aggravation or to waste their precious time in answering **your** mail.

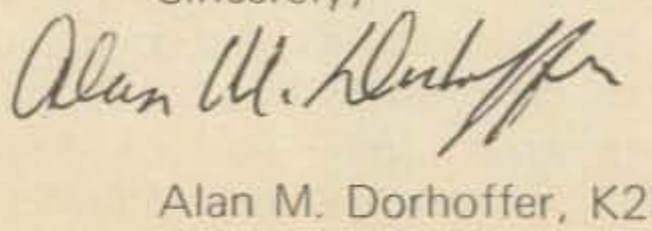
I shall also endeavor to compile and print a list of all of those who do pass on these letters for the OMB to answer so that when election time comes around the millions of CBers and hundreds of thousands of amateurs get to see who is actually serving their constituancy, and who sloughs off their responsibility.

This is the finest example of the traditional edict of "Taxation without Representation" in modern times. I hope that you Mr. President can find a way to support the FCC and to give credence back to the system. I urge you to querie the OMB as I urge all who read this to demand from the OMB a full accounting of their actions. I request some form of action from both the Senate and Congress to expedite monies for the FCC.

The bottom line is MONEY. Money that doesn't have to be raised by new taxes, money that should not have to be voted on, money that doesn't have to be borrowed, money that we shouldn't have to beg for . . . **we want the money that was sent in by all of us back,** in the form of the services for which it was intended.

Mr. President, please don't go down in history as the President who killed amateur radio.

Sincerely,



Alan M. Dorhoffer, K2EEK
Editor, CQ

Office of Management and Budget

Below is a list of all the members of the Office of Management and Budget (OMB). If you are concerned as to the whereabouts of the 20.5 million dollars and the future of the FCC write to them requesting an answer. Don't let them pass the buck.

Director, Bert Lance, 3107 Dumbarton Ave., Washington, DC 20007.

Assistant to Director, Richard C. Coleman, 3705 Corey Place, Washington, DC 20016.

Deputy Director, James T. McIntyre, Jr.

Special Assistant to Director, Mary W. Beazley, 1515 S. Jefferson, Davis Hwy., Arlington, VA 22202.

Special Assistant to Deputy Director, Denise M. Larr, 1600 37th St., Washington, DC 20007.

White House Fellow, Donald H. Haider, 1718 35th St., Washington, DC 20002.

Administration for Federal Procurement Policy, (vacant)

General Counsel, William M. Nichols, 8756 Lewinville Rd., McLean, VA 22101.

Assistant Director for Legislative Reference, James M. Frey, 3101 Crafford Dr., No. 325, Oxon Hill, MD 20022.

Executive Associate Director for Reorganization and Management, W. Harrison Wellford, 5054 Millwood Lane, Washington, DC 20016.

Deputy Associate Director for Evaluation and Program Implementation, Toney Head (acting), 5202 Pegasus Lane, Reston, VA 22091.

Deputy Associate Director for Information Systems, Walter W. Haase, 9310 Coronado Terrace, Fairfax, VA 22030.

Deputy Associate Director for Intergovernmental Relations and Regional Operations, Vincent Puritano, 4211 Cordell St., Annandale, VA 22003.

Deputy Associate Director for Organization and Special Studies, James O. Garrison, 9318 Sibelius Dr., Vienna, VA 22180.

Deputy Associate Director for Statistical Policy, Joseph W. Duncan, 4064 41st St., N. Arlington, VA 22207.

Executive Associate Director for Budget, W. Bowman Cutter, Box 165 Watterford, VA 22190.

Associate Director for National Security and International Affairs, (vacant).

Deputy Associate Director for National Security, David Sitrin, 4203 Webster Ct., Annandale, VA 22003.

Deputy Associate Director for International Affairs, Edward G. Sanders, 2510 N. 24th St., Arlington, VA 22207.

Deputy Associate Director for Management, Daniel H. Taft, 5922 Autumn Dr., McLean, VA 22101.

Associate Director for Human and Communication Affairs, Suzanne H. Woolsey, 6808 Florida St., Chevy Chase, MD 20015.

Deputy Associate Director for Human Resources, Donald A. Durman, 1884 Columbia Rd., Washington, DC 20009.

Associate Director for Economics and Government, Dennis O. Green, 1250 4th St. S.W., Washington, DC 20024.

Deputy Associate Director for Economics and Government, Joyce J. Walker, 950 25th St., Washington, DC 20037.

Deputy Associate Director for Economic Policy, (vacant).

Deputy Assocaite Director for Management, Stan E. Morris, 3014 Dent Pl., Washington, DC 20007.

Associate Director for Natural Resources, Energy and Science, (vacant).

Deputy Associate Director for Natural Resources, Donald E. Crabill, 6304 Fallstaff Rd., Arlington, VA 22207.

Deputy Associate Director for Energy and Food, Kenneth G. Glozer, 1236 Meyer Ct., McLean, VA 22101.

Deputy Associate Director for Science and Energy Technology, Hugh F. Loweth, 3416 25th Ave. S.E., Hillcrest Hgts., MD 20031.

Assistant to the Director for Congressional Relations, Hubert L. Harris, Jr., 4833 Upton St., Washington, DC 20016.

Assistant to the Director for Public Affairs, (vacant).

Assistant to the Director for Administration, Velma N. Baldwin, 2234 49th St., Washington, DC 20007.

Personal Officer, John L. Heiss, 3418 Carpenter St., Washington, DC 20020.

Budget and Management Officer, Phillip D. Laren, 4509 N. 20th St., Arlington, VA 22207.

Assistant Director for Budget Review, Dale R. McOmber, 3821 King Arthur Rd., Annandale, VA 22003.

Assistant Director for Executive Development and Labor Relations, Edward F. Preston, 3004 Doeg Indian Ct., Alexandria, VA 22309.

Deputy Associate Director for Housing, Veterans, and Labor, William Hamm, 6671 32nd St., Washington, DC 20015.

Deputy Associate Director for Management, Barbara S. Selfridge, 1870 Wyoming Ave., No. 601, Washington, DC 20009.

Here's the one you've all been waiting for, writing in about and calling the CQ offices to try to get the lowdown on how you did. It was the biggest contest ever and things look even better for the next one.

1976 CQ World-Wide DX Contest Phone Results

BY BOB COX*, K3EST, AND LARRY BROCKMAN†, N6AR, (ex-W6ECQ)

The 1976 phone contest was a huge success! It was interesting to note that the contest occurred at the latest possible date. The bands during the month of October have often produced some of the most spectacular and interesting openings heard throughout the year, and this year was no exception.

A total of 1950 phone logs produced an increase of 5% over last year. An increase of 5% at the supposed sunspot minimum is quite gratifying. With the new sunspot cycle on the upturn, the 1977 phone contest, October 29 and 30, should prove to be a must event.

Top all band honors went to PJ9CG operated by WA1JLD. Clarke made good use of his Curacao location to run up 5.2 million points. In a hot battle for second place, CT4AT edged out KC4AAC. Don sure had a dream location, right on the ocean. The only view he saw however was his rig in setting a new European Phone record. As we all know KC4AAC sure put the frozen continent on the map.

Top USA all band honors went to W1ZM operated by WA2CLQ. Jeff overcame W7JSTs JA advantage with European multipliers. W1ZM and W7JST finished within 7 QSO's of each other. Quite interesting considering they are 3000 miles apart!

In the Multi-Operator Single-Xmtr section, VP2G operated by W5MYA and WB5IZN had fun racking up 5.8 million points for a new North American phone record. 4J9B was second with their usual immaculate log. The Boys from Italy and Sicily traveled over to Lampedusa Is. to hand out zone 33 to grateful contest participants.

Unless you had rig trouble, you probably worked VP5M. This fine effort by the North Florida DX association and friends set a new North American Multi-Multi record. They logged over 7000 QSO's.

11 New Records Were Set

In addition to the records mentioned above, the following stations set new records: KV4FZ, World 1.8 MHz record; FY7AK (Opr. F5QQ), World 14 MHz record; K2IZN/4X, Asian 14 MHz record; HK4EB, South American 1.8 MHz record; EA8CR, African 3.8 MHz record; CX4CR, South American 7 MHz record; VR3AH, Oceania 7 MHz record; and 4J9B, Asian Multi-Single record.

It was interesting to note the number of multipliers appearing on 28 MHz. The East USA had an opening to Southern Europe and the West USA had an opening to JA. UI8, UH8, YB, VS6, 9M2 and many other exotic calls were active on ten. It sure is going to be fun when ten opens solid again.

Rule Changes

The CQ Contest Committee has voted the following rule changes:

1) Spotting nets (such as two meter nets) may not be used by single operator stations.
2) A 3 to 1 QSO penalty will be assessed for unremoved duplicate Contacts.
3) A station making over 200 QSO's on a band must submit a checksheet for that band.
4) A portable designator will be required for USA

CQ DX Contest Co-Directors

*RFD 1, Box 700, Accokeek, MD 20607, †7164 Rock Ridge Terrace, Canoga Park, CA 91307.

EA8CR

HC5EE

VP2G (W5MYA left, WB5IZN right)

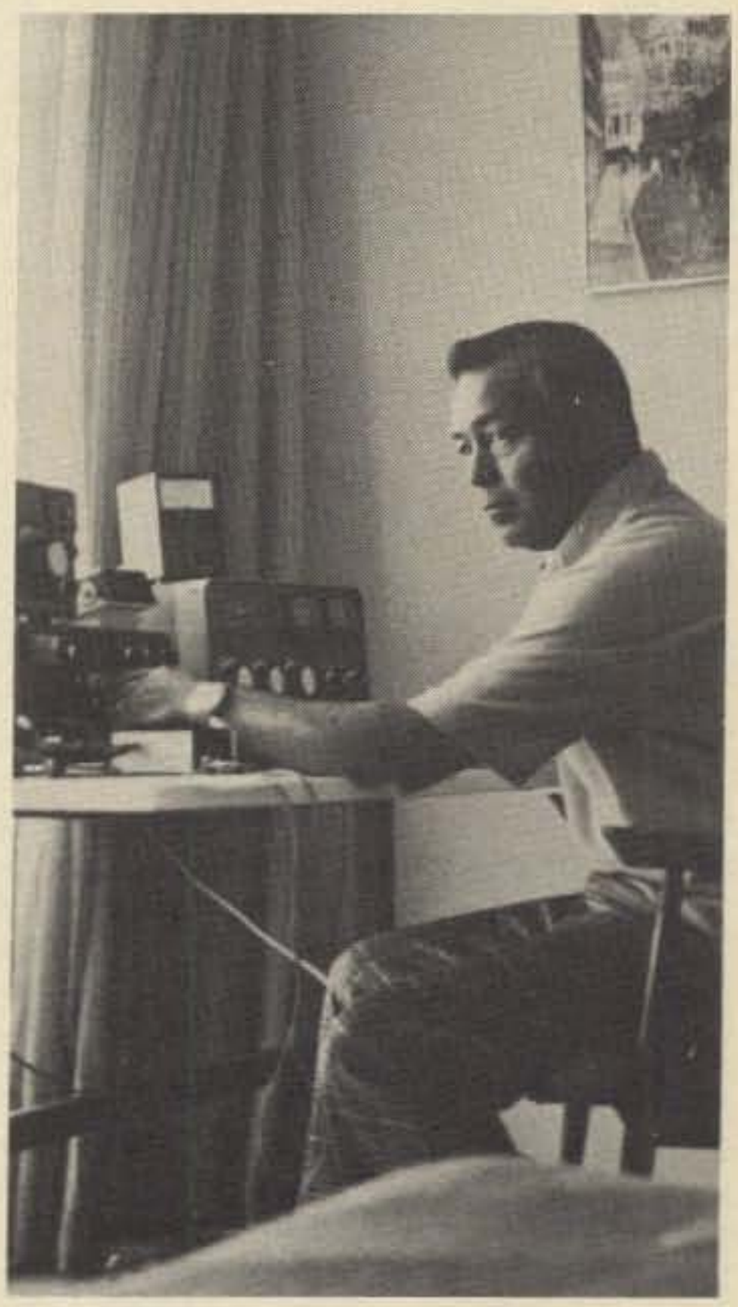
OZ4RP

8P6AH opr. of 8P0A

PA9TOM

I4ZSQ

CX2AQ



CW3BR

K5LWL

FG0CXV/FS (W4PRO operating)

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		421/14/34	590/20/60	1243/26/78	1555/23/68	867/18/37
CT4AT		157/13/45	628/21/71	995/29/79	578/22/77	388/24/84
KC4AAC		17/10/9	130/15/18	1860/35/117	1147/22/52	278/11/20
6W8A		79/ 9 /21	240/17/48	771/33/92	881/26/80	428/19/58
UB5WE		479/12/62	301/20/59	628/32/95	779/31/90	116/14/48
HC1BU		10/ 6 /8	77/ 9 /15	1123/27/100	728/18/42	684/14/30
KP4EAJ	41/ 5 /8	190/ 7 /27	146/ 6 /13	551/23/69	1072/22/74	957/19/44
HK4DF		211/13/27	103/10/29	881/28/84	775/22/55	301/13/21
LU1BR			203/17/24	962/32/84	661/20/47	585/14/45
W1ZM		186/17/66	125/20/62	540/31/93	552/23/88	67/15/35

WORLD TOP MULTI-OPERATOR—SINGLE TRANSMITTER

VP2G	26/ 5 /14	474/12/43	688/20/68	1265/29/99	1705/24/98	1154/21/67
4J9B		557/22/70	590/33/82	1289/35/126	697/29/96	140/16/37
IG9PLN		480/11/45	310/17/49	746/25/72	1153/27/90	496/19/81
UK6APA		99/10/45	68/16/54	1380/35/99	1350/29/89	108/18/57
FG0MM	24/ 7 /18	439/12/41	438/18/55	694/25/75	1859/21/76	282/12/19
DL0WU	11/ 2 /11	294/ 9 /51	351/23/75	968/32/106	666/33/107	63/14/41

WORLD TOP MULTI-OPERATOR—MULTI-TRANSMITTER

VP5M	261/10/28	761/17/60	1134/24/82	2683/33/117	2190/31/124	754/21/51
PJ0A	2/ 2 /2	629/15/44	614/13/35	1650/30/101	1933/24/80	1208/20/47
DK0ZZ	59/ 2 /9	797/18/64	845/23/87	1684/38/135	1073/34/126	172/21/74
DL0PG	102/ 3 /14	896/19/75	593/20/69	1634/37/140	824/35/124	102/14/43
W7RM	27/10/16	487/24/58	603/27/70	1535/38/138	876/24/67	74/14/21
W3AU	37/ 8 /17	383/22/72	317/27/81	896/35/124	712/31/126	180/18/64

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
W1ZM		186/17/66	125/20/62	540/31/93	552/23/88	67/15/35
W7JST	3/ 1 /1	61/18/33	164/23/48	540/29/84	627/28/75	68/17/44
W3GRF	6/ 3 /4	120/14/53	118/19/59	475/30/107	315/23/96	65/15/40
W3LPL	11/ 5 /7	93/16/57	103/21/67	485/30/97	319/24/91	61/14/43
W2GXD	9/ 3 /5	94/13/48	72/19/50	611/29/95	348/20/77	55/16/36
W2HMH		94/14/46	105/22/59	579/31/102	211/24/83	80/17/45
K5LWL						
W4QCW	12/ 4 /8	99/14/44	108/21/52	448/27/97	267/23/80	60/13/35
W3BGN	1/ 1 /1	101/12/45	91/21/56	467/27/89	253/20/83	67/17/40
W4YWX	15/ 6 /12	70/14/44	94/20/53	345/30/93	325/25/79	90/17/45

USA TOP MULTI-OPERATOR—SINGLE TRANSMITTER

W6ONV	5/ 4 /3	80/18/42	355/22/41	677/35/105	812/27/79	66/14/31
WA8ZDF	14/ 8 /13	148/19/60	116/22/66	663/35/111	280/24/105	81/17/52
W5BJA	17/ 5 /12	79/21/51	142/21/57	232/30/105	559/29/102	131/19/59
W1ZA	12/ 3 /8	143/17/64	76/19/46	533/27/94	421/23/89	87/15/41
K1VBL	15/ 5 /9	135/16/47	58/15/40	583/32/102	308/22/90	65/13/40
WA1-NRF/1	7/ 3 /5	141/16/48	53/15/43	628/31/103	260/21/95	38/12/31

USA TOP MULTI-OPERATOR—MULTI-TRANSMITTER

W7RM	27/10/16	487/24/58	603/27/70	1535/38/138	876/24/67	74/14/21
W3AU	37/ 8 /17	383/22/72	317/27/81	896/35/124	712/31/126	180/18/64
W2PV	77/ 8 /14	472/21/75	318/24/79	1202/32/126	734/27/114	75/13/37
W3WJD	48/10/20	410/20/76	231/23/76	922/38/128	692/28/119	143/18/57
K2GM	68/ 8 /14	312/17/65	279/26/76	1285/35/130	581/27/109	141/16/51
W4BVV	47/10/22	422/24/78	307/27/86	923/35/123	574/27/113	144/18/54

stations operating in a call area other than the one indicated by their call sign.

CQ Contest Committee

The following people provided the expertise necessary to carefully check each log and summarize the logs for which they were responsible: Chairman, Frank Anzalone, W1WY; and members K3ZO, Fred Laun; K6NA, Glenn Rattman; N2AA, Gene Walsh; N4MM, John Kanode; N6ZZ, Phil Goetz; N6CW, Terry Baxter; W3GRF, Len Chertok; W3ZZ, Gene Zimmerman; W6BHY, Jim Neiger; W6JPH, Larry Weaver; W6PVB, Fred Morris and WB2SQN, Dave Donnelly.

Coming up next month, the C.W. results. Congratulations to all of the certificate winners.

73, Bob, K3EST and Larry, N6AR

USA QRM

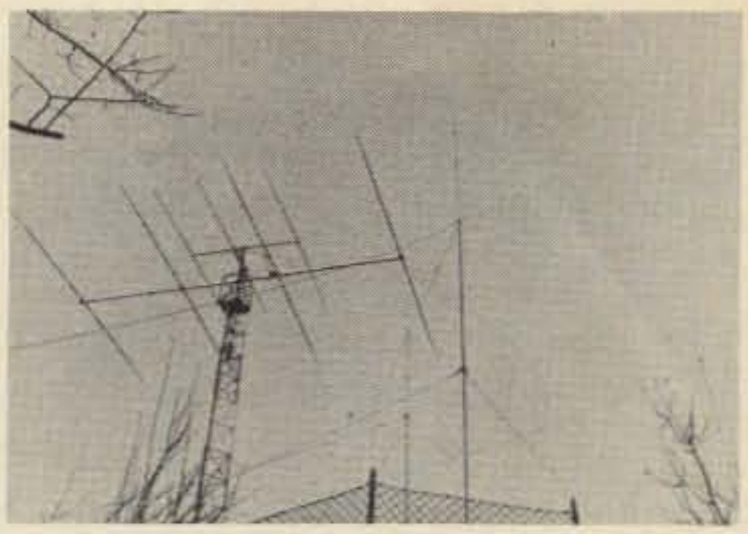
"Gave my telephone number (5903) instead of the proper exchange several times . . . *K1RQE.* Have separate KW hour meter for the shack. Used 9½ KW hours. Cost me about ½ a buck for juice . . . *AC1CNU.* Planned to operate 40 meters but two hours before the contest started a wire broke on the quad . . . *W1FXD.* Low power is rough against the big guns but I didn't give up . . . *WA1FCN.* Excellent operators, fierce competition, great conditions—a super weekend . . . *K1KDP.* First time on ten meters, really surprised me, but the neighbors weren't surprised . . . *WA2ZBW.* Countdown's begun for the next one already! A fun contest . . . *WB2FUN.* Raise the M.U.F. Kick out the old spots—bring in the new . . .*K3AWZ.* First test from W3 (ex W7AWH)—large oaks blocked the antenna, could not rotate to Asia! After the contest the XYL agreed to cut down a tree so the antenna can rotate . . . *W3IGQ.* Blew 30 diodes out of the power supply Saturday and 25 Sunday. A big flash from the amp. at 0200 hr really wakes you up . . . *K4JPD.* Too many hours for too many months getting ready and I was too tired to compete after the first night . . . *W5TMN.* Frustration is having ten meters open and not knowing a word of Spanish. Frustration is trying to find a hole in the twenty meter band. Frustration is having a DX station come back to both you and someone else, telling you to stand by, and forgetting he ever heard you . . . *WA1STN.* First contest in 16 years, had a ball . . . *K5TSQ.* We still need one or two more good phone ops to help us c.w. men . . . *W3WJD.* We had the right call, the correct equipment, but needed more operators as we seemed to enjoy our sleep . . . *K2USA.* The 15 meter beam blew down the first day, 3 operators never showed up, and one rig was reclaimed by its owner Saturday morning; Murphy was in command! . . . *AB2YKG/2.* Ten meters was the best we've seen in a long time...*K2GXT.* Great fun—everything seemed to go right except when the linear blew up and we had to go to the backup . . . *WA3YGH.* We tried the phonetics K4-Big-Green-Frog and some guy kept coming on our frequency saying "Rivit, Rivit". . . *K4BGF.* Was slowed down by a 4-hour power failure, and finally shut down when the rotor caught fire . . . *W5RU.* Wish there was more activity from Africa and South America . . . *W5RRR.* Both ops really enjoyed getting into the contest for the first time . . . *WB5MXS.* Our cars got egged two nights *before* Halloween—RFI? . . . *W6OKK.* No equipment failures and lots of fun . . . *K6HIH.* Received General Class ticket only 3 days before the Phone Test so the whole thing was a thrill . . . *WA6JUD.* This started out as a Single Op entry but WA6GSN got the flu Saturday night so I had to take over . . . *W6MUR.* We were frantically trying to install a rotor on the 15 meter beam while the band was wide open—prepare better next time . . . *WA8MOA.* Lost the beam 2 hours before the contest so we used only wire antennas . . . *W9YH.*"

DX QRM

"First time in this fine contest for all three ops . . . *ZS6BNX.* Unfortunately the contest fell on the same day as our University Festival . . . *JA7YAA.* Those pile-ups, wow! . . . *5W1AU.* Thunderstorm QRN made the low bands rough . . . *AY2DNC.* There was great enthusiasm in all the world—congratulations to CQ . . . *LU1D.* A thrill to have *VR1AA* break through a pile of Americans on 15 meters . . . *VE1UNB.* Perhaps Antarctica could be considered a separate continent in future contests? I planned on one hour of sleep but my alarm didn't wake me . . . I figure I lost about 800,000 points in the extra hours of sleep . . . *WB6KIL* (op. at *KC4AAC*). I decided to operate the contest one hour before it started and arrived at my vacation home only ten minutes before it began. After several hours of operating, my beam stuck pointed at Europe so I had to finish the contest in that position. The contest was fantastic...*HK4DF.* Fué un muy buen concurso, Tuvimos un poco de malas condiciones durante el segundo dia de operación . . . *LU1BR.* What a difference in using our special 4M prefix and a short call . . . *YV5EED* (op. of 4M1RV). An unknown "friendly" neighbor cut my feed line, maybe *TVI*? Who knows? . . . *YV4CB.* I enclose this mini-log for the benefit of the few stations who worked me in order that they may not lose their points . . . *OA4PQ/YV5* (Ed. note: While we are always glad to get logs, it is not necessary for you to

II4FGM – I4VEQ, I4LEC

WB4SJG/6YS



I3PRK

FOØGC – WB6EXW

JH1ECG

W7JST

VE7BC (VE7LB opr.)

UB5WE –VIC
UB5WF–ULAD

DM3EA

I5FCK

CE6EZ

VP5M

USA TOP SCORES

	W1ZM	1,885,050	W2HMH	1,323,241
	W7JST	1,678,586	K5LWL	1,178,284
Single-Op	W3GRF	1,412,150	W4QCW	1,161,204
All Band	W3LPL	1,405,144	W3BGN	1,133,412
	W2GXD	1,382,193	W4YWX	1,116,462
	28 MHz		**7 MHz**	
	AB5HIH	22,952	AA6EPQ	74,100
	WA1HFN	21,243	W9ZRX	50,490
	K9EGA/2	21,170	K4APL	27,880
	W6HX	20,150	WB4OGW	25,415
	WB9KLB	19,074	WB4SIJ	19,762
	WBØQHV/Ø	16,409	W9NZM	17,908
	21 MHz		**3.8 MHz**	
	K4YYL	303,170	W7KW	70,550
	WA6EKL	261,388	W1CF	69,608
Single-Op	W6PLH	238,640	K8INX	68,456
Single Band	AA4OSM	227,360	KØRF	54,096
	AA6DNM	218,295	K2RR	28,981
	W2HBT	191,252	K6EBH	21,783
	14 MHz		**1.8 MHz**	
	WBØLLR	258,335	K1PBW	7,280
	WA1RHA	255,505	W5USM	2,400
	WB9LHI	253,260	WB4QZT	2,160
	W3CRE	249,832	WA4NFF/4	1,200
	W8JGW	225,568	W4BAA	1,058
	WA2WMT/0	223,245	K9UWA	817
	W6ONV	2,420,750	W1ZA	1,572,596
Multi-Op	WA8ZDF	1,925,308	K1BVL	1,393,423
Single Xmtr	W5BJA	1,620,381	WA1NRF/1	1,316,376
Multi-Op	W7RM	5,137,431	W3WJD	4,159,205
Multi Xmtr	W3AU	4,375,000	K2GM	4,144,280
	W2PV	4,276,140	W4BVV	4,065,413

submit your log for the other fellow to get credit). Little harder to work the contest here than *VS6DD*. Also the 10 character callsign doesn't help...*WA5UKR/YV5*. Beaming Europe in heavy pile-up I was called by YB0 and ZS, 60 or 90° off heading. FB conditions...*SM4CGA/YV5*. Good conditions on 40 meters the first day, 2nd day storms and QRN. Good job with 2-el Quad ...*CX4CR*. Only 194 duplicates HI HI. Where were the multipliers?...*CW3BR*. 363 days—10 meters closed; two contest days: 10 meters is alive! Once again thank you for the only

WORLD TOP SCORES

	PJ9CG	5,214,510	HC1BU	2,096,586
Single-Op	CT4AT	3,077,930	KP4EAJ	2,040,212
All Band	KC4AAC	3,066,516	HK4DF	2,015,246
	6W8A	2,769,819	LU1BR	2,009,583
	UB5WE	2,166,246	W1ZM	1,885,050
	28 MHz		**7 MHz**	
	CE6EZ	356,312	CX4CR	363,110
	CX3BH	251,416	VR3AH	308,750
	LU8FEU	224,328	FP8AA	229,908
	D2AFW	219,345	ZL1AMO	147,654
	CE4EM	130,824	VE3EDC	133,496
	PY2ELV	122,060	OH1IG	125,712
	21 MHz		**3.8 MHz**	
	CW3BR	1,094,767	EA8CR	200,850
Single-Op	YV2AMM	838,448	I3MAU	90,321
Single Band	PY1ZBJ	806,108	VE7IG	72,660
	EA8JJ	608,076	W7KW	70,550
	HC2YL	505,336	W1CF	69,608
	CX4BD	449,412	K8INX	68,456
	14 MHz		**1.8 MHz**	
	FY7AK	1,415,329	KV4FZ	37,584
	PY4OD	1,022,028	VE3BMV	29,750
	8PØA	890,320	K1PBW	7,280
	K2IZN/4X	829,962	VE3BBN	4,884
	YU2CDS	765,061	HK4EB	3,672
	CX7BV	754,588	G3UBR	2,976
Multi-Op	VP2G	5,886,500	UK6APA	3,348,150
Single Xmtr	4J9B	4,697,238	FGØMM	3,104,768
	IG9PLN	4,016,432	DLØWU	3,056,760
Multi-Op	VP5M	10,533,172	DLØPG	5,406,381
Multi Xmtr	PJØA	7,346,444	W7RM	5,137,431
	DKØZZ	6,658,943	W3AU	4,375,000

really FB World Wide Contest. I've been a contester in this event since 1949—who is older?...*CX3BH*. Great event—maybe monobanders and more height for next year...9Z4NP. Glad to join again, after so many years of QRT...*PZ1AH*. 1300Z Oct. 30th generator failed at our jungle center for 4 hours. *O335Z* Oct. 31st wife had a baby girl!!!...*OA8CG*. In June 1976 I had taken all the antennas and towers down and was getting ready to leave FY land for good. I had the TH-6 up four days before the contest and decided to go single-band twenty on the contest, thinking it would be a less tiring experience than the last two WW phone contests I had entered on all bands. It was not...*SY7AK* This will be my last contest from HC-land as we will be leaving Ecuador permanently the 1st of March or thereabouts and moving to Hot Springs, Ark., on or about the 1st of May...*HC2YL*. Am pleased with my effort which represents 18 hours and 18 minutes of operation—Sat. and Sun. Was surprised when *EP2SV* called me. Had a very good time...*CEØAE*. Worked a 9Z4 station—to me that's an unknown prefix...*CE4EM*. As usual enjoyed working hundreds of W-stations in the pile-ups with their well known discipline. This way I worked an average of four per minute during more than an hour at the peak of conditions around 1800Z. This contest was great fun again, see you next year...*CE6EZ*. Curious: worked four calls (*DKØZZ*, *DLØWW*, *DLØII*, *DL1EE*) all in Germany with double final letters, in two minutes only...*PY7YS*. We had very bad weather during the two days, and although the band conditions were real fine, the shortage of electrical power, due to the rain was the big problem...*ZY2JB*. It isn't easy to work with low power and dipole during the contest. Called *WA6EGL/VQ9* for 20 minutes without any station on frequency!...*PY7AZQ*. Happy to be back in the game after being off the air for five years...*PY2ZCL*. Many new prefixes to work in this contest. Enjoyed the contest, hope to do better in the next one...*LU7MAL*. Static from local downpour, 50 m.p.h. winds, lost the 75A-4 to a lightning hit, terrible QRN...*KV4FZ*. Better than last year's score, but still a long way to go. Hope to better my operating skills...*LU2DC/W4* (op. of *KV4JV*). Many hours of CQing with few responses. Going gets rough when you're north of 45 degrees...*FP8AA*. The log periodic was only up for the second evening. Next year we shall see...*VP2KF*. I had planned for a 1,000,000 point operation but the linear blew up after only 3 hours. Will be there next year...*KP4BDL*. Guess which weekend I had to work both Saturday and Sunday? Missed the 10 meter opening to Europe ...*KP4DKX*. Must compliment W-K and VE operators compared to others on combination of quality receivers and self discipline. Unlike other areas they courteously stood by for exchanges... YN1RWG. Will sure not sleep 12 hours in a contest anymore... *FG7AS*. I am living close to *OX3JUL*...*OX3AB* (Ed. Note: Arne's only contacts were 5 QSO's with neighbor *OX3JUL* on 5 different bands. Therefore his score is zero). Getting my feet wet, will be ready for next year. Lots of fun...*HI8MOG*. The band was completely dead from Oct. 31st. Not a single contact... *VE8NS*. Tnx to my boss *VE7DUG* who looked after an out-of-town job for me during the contest week-end and to my *XYL VE7DTO* for letting me use the station for the full 48 hours... *VE7AV*. Very bad conditions all through the contest due to severe northern lights. Skies were lit up all night and day. Too bad...*VE7DSR*. Here's hoping we did better this year. The 20 meter band conditions on the second day were very poor ...*VE7BC*, operated by *VE7LB*. After trying for some time to pull my call through on 160m, *VP5M* offered to try again on Saturday night. Needless to say, he wasn't to be heard Saturday night. Rats!...*VE7AZG*. Had S9 power line noise level most of contest. Poor skip into Europe...*VE6MP*. Biggest thrill: being called by *JTØOAQ*. VE4's must be in a black hole...*VE4MP*. Frustrating to hear east, west, south USA, Caribbean, S. America working Europe on Sunday. Band was completely out for VE4 to Europe...*VE4XJ*. Nice to smash my old record, but I think *KV4FZ* walked all over me. At least he had to take it more seriously. Must be nice to be in the middle of the Multiplier city. Missed number of them—TG, KL7, VP1, etc. Beverages really help. Too bad that W beverages were pulled off by friendly neighbor. Greatest contest, keep it that way!...*VE3BMV*. Best catch ZL1. Many new ones worked on this band 80 meters... *VE3ECP*. Hello again for another year. This time it is 40 meters where I found you have got to work for the QSOs in the daytime

(Continued on page 95)

Number groups after call letters denotes following: Band, (A-all) Final Score, Number of QST's, Zones and Countries. Certificate winners are listed Bold Face.

PHONE RESULTS
SINGLE OPERATOR
NORTH AMERICA
United States

W1ZM	**A**	**1,885,050**	**1470**	**106**	**344**
		(Opr. WA2CLQ)			
WA1STN	"	990,717	899	89	310
K1RQE	"	531,786	562	85	252
W1YG	"	336,996	584	67	207
WA1UAD	"	304,500	407	78	212
K1KNQ	"	197,010	358	47	151
WA1JZC	"	142,506	273	46	136
W1WY	"	114,995	230	64	147
AC1HWM	"	104,192	224	50	126
W1HCO/1					
	"	100,100	200	49	133
K1GSK	"	99,456	258	42	106
AC1GPK	"	94,688	208	45	131
W1LQQ	"	77,953	216	37	100
K1HMO	"	76,987	179	44	123
W1BIH	"	70,700	160	51	124
W1HX	"	70,308	146	60	126
AA1FBX	"	48,125	151	31	94
W1SD	"	34,440	151	23	61
W1JAA	"	32,472	99	36	87
W1YZL	"	21,150	97	27	67
WA1QNF	"	16,095	77	28	59
K5GOE/1	"	14,022	66	27	55
W1PLJ	"	3,800	37	12	26
WA1HFN	**28**	**21,243**	**114**	**19**	**54**
WA1JMP	"	5,984	58	12	32
W1FXD	**21**	**158,796**	**427**	**26**	**106**
W1YN	"	145,672	394	25	106
WA1SKV	"	44,175	174	20	73
WA1UZH	"	25,872	122	16	61
WA1RHA	**14**	**255,505**	**652**	**29**	**108**
K1KDP	"	172,323	484	26	97
WA1NKK	"	57,288	237	19	65
K1CSJ	"	38,850	135	22	83
W1OR	"	15,008	85	17	50
W1YRC	"	10,335	70	12	41
WA1HXH	"	3,416	41	7	21
W1CF	**3.8**	**69,608**	**305**	**21**	**67**
		(Opr. W1GQD)			
K1PBW	**1.8**	**7,280**	**100**	**10**	**30**
W1BB	"	42	4	3	4
W2GXD					
	A	**1,382,193**	**1189**	**100**	**311**
W2HMH					
	"	**1,323,241**	**1069**	**108**	**335**
K2FL	"	536,400	568	90	270
W2EHB	"	348,138	455	78	229
W2LYL	"	289,344	412	69	195
WB2SZO	"	289,179	424	72	181
WB2JJN	"	261,468	370	67	202
W2FZJ	"	233,000	343	81	169
WB2CKO	"	205,410	331	61	185
K2GI	"	190,491	349	50	143
WB2HZH	"	147,600	312	44	136
K2TD	"	122,008	242	54	148
W2LEJ	"	118,336	253	45	127
WA2AEJ	"	110,396	224	55	138
W1GKA/2					
	"	105,693	264	37	110
AC2MB	"	83,028	205	39	109
WB2RKK	"	82,440	248	32	88
WB2LOF	"	61,457	171	45	106
WA2VYA	"	60,137	179	33	88
W2SGK	"	43,200	120	43	107
W2GKZ	"	38,794	129	30	89
AA2ZWH	"	38,600	138	25	75
AA2LJM	"	27,900	118	27	63
WB22BW	"	10,164	66	22	44
AC2FGY	"	9,000	55	28	44
WB2WCE	"	3,154	30	11	27
W2MNK	"	1,536	23	13	19
K9EGA/2					
	28	**21,170**	**121**	**17**	**53**
AA2LJM	"	192	18	6	12
W2HBT	**21**	**191,252**	**494**	**29**	**108**
WB2FUN	"	80,736	256	25	91
AB2ZGI	"	78,698	259	22	87
WA2PAT	"	7,938	55	16	38
K2IGW	**14**	**185,166**	**510**	**29**	**98**
W2BA	"	84,240	290	22	82
W2CKR	"	33,046	144	17	65
W2PFQ	"	9,861	64	17	40
K2RR	**3.8**	**28,981**	**157**	**16**	**57**
AA2AUB	"	5,550	64	8	29
W3GRF					
	A	**1,412,150**	**1099**	**104**	**359**
		(Opr. K0DQ1)			
W3LPL					
	"	**1,405,144**	**1072**	**110**	**362**
		(Opr. WA3HRV)			
W3BGN					
	"	**1,133,412**	**980**	**98**	**314**
W3KWB	"	396,603	445	92	241
AC3USS	"	380,250	466	85	240
AA3ATX	"	379,056	471	77	221
WA3VQP	"	365,250	556	68	182
WA3TZT	"	304,448	396	75	209
K3AWZ	"	302,700	391	79	221
WA3WRD	"	250,838	362	68	198
W3HXK	"	226,320	341	63	183
K3TGM	"	212,796	312	68	189
W3GID	"	206,793	319	60	183
W3GRS	"	204,424	304	63	190
W3KFQ	"	177,424	314	52	156
W3GZQ	"	175,380	298	66	171
W3KHB	"	153,463	239	48	148
W3AZ	"	141,276	274	48	145
WA3SZI	"	134,756	230	55	181
K3WOK	"	126,498	264	47	127
W3KV	"	93,886	227	42	115
W3ZPO	"	87,756	223	40	102
WB2HWH/3					
	"	86,286	218	37	109
W3ALB	"	83,790	233	33	93
W3YFV	"	80,311	204	39	110
W3KT	"	76,304	197	38	114
WB2JYM/3					
	"	75,835	169	50	121
W3OV	"	73,941	186	41	106
W3GU	"	63,600	162	48	102
K3AV	"	55,728	155	39	105
W3HVM	"	50,716	152	39	85
W3EVW	"	37,236	125	32	84
W3BB	"	36,480	134	27	68
W3KH	"	35,305	124	31	84
WB3BKD	"	23,822	119	23	63
W3GL	"	19,320	87	28	64
WA3DMH	"	14,364	84	21	42
W3KA	"	12,210	62	27	47
W3ETB	"	10,206	59	20	43
W3JPT	"	9,639	64	22	41
AA3UXP	"	9,522	53	21	48
W3ML	"	8,550	58	19	38
W1FLM/3	"	6,912	51	16	32
K2PFL/3	"	6,336	50	15	33
WB3EAG	"	4,329	37	12	27
K3LWM	**21**	**117,132**	**327**	**26**	**103**
W3ZNH	"	62,040	204	24	86
K3AIG	"	59,220	204	22	83
K3GYD	"	28,336	110	21	67
W3CRE	**14**	**249,832**	**632**	**31**	**105**
K3MBF	"	180,348	541	29	85
K3RS	"	102,660	311	28	88
W3IGQ	"	64,768	253	22	66
WA3VJU	"	59,168	234	22	64
W3GCQ/3					
	"	2,464	34	7	21
K3ZDL	7	825	19	4	11
WA3SWF					
	3.8	**10,927**	**94**	**11**	**38**
AC3KMV	"	10,360	74	15	41
W3MSN	1.8	84	17	3	4
W4QCW					
	A	**1,161,204**	**994**	**102**	**316**
		(Opr. WA82DT)			
W4YWX	"	**1,116,462**	**939**	**112**	**326**
K4VX	"	**1,010,100**	**826**	**107**	**337**
K4YFQ	"	930,015	791	102	313
AC4WSF	"	746,242	772	86	267
W9MIJ/4	"	724,150	756	85	265
K5CIT/4	"	576,800	619	90	260
WA4TLB	"	574,620	591	89	277
WA4HPF	"	511,101	579	85	242
K4JWD	"	483,849	546	87	246
K4TBN	"	470,691	510	92	259
K4LRO	"	448,663	489	95	258
K4DJC	"	430,818	465	97	257
K4PQL	"	426,930	521	74	211
WB4DHO	"	401,380	488	82	223
K4SMX	"	363,216	407	95	241
WB4OSS	"	336,856	411	83	245
K4JPD	"	329,460	442	82	207
WA4GQJ	"	302,157	406	81	198
W4USN	"	297,960	427	63	197
		(Opr. WA3FUV)			
W4LVM	"	275,652	380	76	203
K4EZ	"	272,084	386	71	200
K4DTD	"	223,000	334	64	186
K4KZP	"	213,600	343	66	174
WA4JWT	"	204,092	355	65	194
W4DM	"	202,710	330	59	174
W4MWT	"	196,695	313	65	170
AD4BAI	"	195,573	367	57	144
W4KNW	"	194,902	327	59	164
W4BV	"	172,938	284	64	182
WA4AZD	"	160,800	320	54	147
WB4KTR	"	159,094	266	56	155
W4ZSH	"	148,060	252	60	160
WB4LIB	"	147,260	279	58	127
W4PZV	"	143,990	250	74	168
K4WSB	"	143,736	264	67	145
AA4SHL	"	130,698	295	38	121
K4PHE	"	127,764	269	47	135
AB5QDW/4					
	"	108,864	226	55	134
K4UEE	"	108,273	211	62	131
WA4QMQ	"	102,718	240	41	120
WB4FSO	"	98,384	205	55	117
AB4FOT	"	89,784	199	51	121
W4WEG	"	79,180	194	44	104
WB4HNC	"	78,336	200	40	113
K4IZE	"	73,743	204	41	100
AB4OXD	"	71,557	168	47	116
W4GTS	"	64,800	163	46	104
W4IQ	"	53,568	147	37	107
WA4CGX	"	48,635	144	39	98
AA4TZM	"	48,510	147	30	96
WA4WFQ	"	46,252	140	34	90
WA4CWU	"	42,012	145	27	81
K4KKJ	"	32,445	118	30	75
W4BTZ	"	30,318	90	31	62
W4JVN	"	30,245	111	35	80
K4CDB	"	29,666	107	29	62
AC2GHK/4					
	"	28,997	106	31	76
W4KMS	"	27,642	104	35	67
W4DS	"	25,248	90	32	64
WA4BDE	"	23,460	97	28	64
W4TMN	"	20,358	101	20	58
AD4ZA	"	19,872	81	32	60
WA4GAB	"	17,910	73	32	58
W4YZC	"	15,260	80	17	53
K4OV	"	12,012	58	29	49
W4JHE	"	11,730	63	22	47
WA4NOX	"	9,792	52	28	44
AA4WCG	"	7,918	50	29	45
W4GF	"	6,608	46	18	38
WB4GHU	"	5,562	39	24	30
WA4MSX	"	5,406	46	16	35
AC4GKI	"	4,617	37	24	33
AB4WHE	"	2,255	29	18	23
WA0DGL/4					
	"	1,890	26	12	23
W4NT	"	1,350	18	12	15
WA4BDD	"	756	15	8	13
W4UPJ	**28**	**12,006**	**83**	**15**	**43**
AC4OZF	"	9,604	74	15	34
WA4EWX	"	8,802	66	13	41
K4YYL	**21**	**303,170**	**738**	**30**	**112**
AA4OSM	"	227,360	570	29	111
W8FAW/4					
	"	166,725	442	29	106
K4KJN	"	160,072	419	30	106
W4FDA	"	157,593	420	28	103
W4MII	"	141,830	389	28	102
		(Opr. WB4PIP)			
K6SVL/4	"	109,616	314	24	100
K4SGL	"	87,040	244	26	102
W4WHK	"	37,344	145	24	72
K4OLQ	"	8,967	57	17	44
W4LBP	**14**	**197,238**	**498**	**30**	**112**
W4BFB	"	89,152	288	21	91
		(Opr. WA4LBJ)			
W4NQD	"	52,756	175	24	85
W4ZTW	"	46,683	199	20	71
K4WLS/4	"	17,812	92	14	59
WA4JDI	"	16,247	89	19	58
AA4CFI	"	7,155	56	10	35
WA4NHP	"	5,808	51	13	31
K4GCR	"	36	3	2	3
K4APL	**7**	**27,880**	**143**	**21**	**61**
WB4OGW	"	25,415	116	22	63
WB4SIJ	"	19,762	94	23	59
WA4APG	"	10,260	69	17	43
AC4WRY					
	3.8	**11,407**	**80**	**15**	**46**
W0YVA/4					
	"	7,830	75	10	35
WB4QZT					
	1.8	**2,160**	**60**	**9**	**18**
WA4NFF/4					
	"	1,200	29	7	17
W4BAA	"	1,058	30	7	16
K5LWL					
	A	**1,178,284**	**1063**	**113**	**315**
W5MTN	"	526,523	623	89	222
K5DX	"	396,270	498	88	218
K5KLA	"	261,660	370	72	195
K5EWJ	"	207,010	335	77	177
K5OOU	"	146,142	281	76	131
W5SBX	"	143,440	266	64	156
AB5LFY	"	108,153	229	54	129
AC5OSJ	"	107,912	239	62	126
K5GL	"	107,541	222	60	129
K5TSQ	"	107,055	230	59	124
W5RKR	"	100,700	201	54	136
K5EJP	"	91,525	197	55	120
W5OB	"	77,952	188	52	122
W5KTA	"	75,980	192	44	101
AA5WMC	"	64,890	176	38	90
W5VIW	"	55,890	142	58	104
WA5CVQ	"	54,567	152	50	91
W5HEZ	"	49,560	167	33	85
W5ORX	"	39,894	137	32	77
W5KKZ	"	31,977	123	31	68
W5UO	"	22,359	96	25	62
WA5WEY	"	16,212	77	28	56
W5FXQ	"	11,857	68	27	44
K5DEC	"	6,102	44	22	32
W5SOD	"	4,998	47	17	25
W5ULN	"	3,182	32	18	25
W5JC	"	3,168	28	19	25
K5FVA	"	1,881	26	13	20
W5SNU	"	1,813	33	17	20
W5CMC	"	713	13	10	13
AB5HIH	**28**	**22,952**	**137**	**21**	**55**
WB5OAS	"	8,160	68	13	35
AB5DDI	**21**	**52,920**	**196**	**24**	**74**
K5ETJ	"	51,475	267	20	51
WB5KXA	"	4,532	41	14	30
W5ZWQ	"	864	14	10	14
W5NA	**14**	**129,176**	**366**	**31**	**103**
WA5VDH	"	119,930	350	30	104
K5BZU	"	64,272	237	26	78
W5QKR	"	29,670	130	24	62
WA5IHS	7	10,152	71	19	35
W5USM	**1.8**	**2,400**	**36**	**10**	**22**
AA6PGB					
	A	**1,033,550**	**1061**	**107**	**243**
K6CQF	"	**873,488**	**998**	**99**	**209**
W6DGH	"	**867,232**	**951**	**104**	**224**
W6BA	"	615,060	845	85	170
W6CCP	"	397,242	550	89	172
W6EYY	"	378,210	649	77	133
W6CF	"	330,372	616	71	118
W6KNC	"	287,073	548	76	115
WB6NHF	"	258,780	509	76	114
K6AO	"	253,044	458	69	129
W6RR	"	233,820	468	53	127
W6RCD	"	211,185	330	80	167
K6NA	"	209,364	361	80	139
K6RU	"	193,596	436	60	96
K6ITL	"	191,808	526	54	108
W6OAU	"	158,339	313	69	122
AA6MQS	"	156,123	349	61	110

TROPHY WINNERS

Single-Operator All Band

PJ9CG (Opr. Clarke Greene, WA1JLD)
World Phone Trophy
Donor: Bill Leonard, W2SKE

W1ZM (Opr. Jeffrey Briggs, WA2CLQ)
USA Phone Trophy
Donor: Potomac Valley Radio Club

G. H. Krehbiel, VE7KB
Canadian Phone Trophy
Donor: Jack Baldwin, VE3BS

Donald Reibhoff, CT4AT
European Phone Trophy
Donor: W4BVV Operators

Edward Kinkelaar, Jr. KP4EKI
Carib./C.A. Phone Trophy
Donor: Don Wallace, W6AM

Charles Jones, 6W8A
African Phone Trophy
Donor: Gordon Marshall, W6RR

4Z4HF, (Opr. Yossi Cohen, 4Z4LF)
Asian Phone Trophy
Donor: Japan CQ Magazine

Joel Chalmers, AG6JFY
Oceania Phone Trophy
Donor: Northern California DX Club

Single-Operator Single Band

FY7AK (Opr. Ron Delcourt, F5QQ) (14 MHz)
World Phone Trophy
Donor: K2HLB Memorial Trophy (NJDXA)

VE7BC (Opr. R. T. Kaye, VE7LB) (14 MHz)
Canadian Phone Trophy
Donor: Gene Krehbiel, VE7KB

8PØA (Opr. Alan Otway, 8P6AH) (14 MHz)
Carib./C.A. Phone Trophy
Donor: Pedro Piza, Jr., KP4AST

Talma D. Angelo Drumond, PY4OD
South American Phone Trophy
Donor: Brasil DXers

Arthur H. Balz, K4YYL
USA Phone Trophy
Donor: Southern California DX Club

Multi-Operator Single Transmitter

VP2G (W5MYA, WB5IZN)
World Phone Trophy
Donor: John Knight, W6YY

VE3AKG (VE4AKG, VE3BVD)
Canadian Phone Trophy
Donor: Calgary A.R.A.

Multi-Operator Multi-Transmitter

VP5M (K4UTE, W4ZR, WA4DRU, WA4EYR, W8IMZ, W4ORT, WA4SGF, WB4QKE, W4GDG, WB4EYX, WB4DIU)
World Phone Trophy
Donor: Radio Club Venezolano

Expedition Trophy

VP5M (K4UTE, W4ZR, WA4DRU, WA4EYR, W8IMZ, W4ORT, WA4SGF, WB4QKE, W4GDG, WB4EYX, WB4DIU)
Donor: Stuart Meyer, W2GHK

Special CQ Plaque

IG9PLN, (I6FLD, I6PLN, IØIJ, IT9PUG, IT9SKO, IT9ZGY)

Coming next month:
Complete Rules
For the 1977 W.W.
DX Contest

W7CB/6	"	150,348	404	52	80
K6BR	"	143,055	333	55	98
W6SC	"	141,303	275	75	126
WB6RIU	"	140,624	296	71	105
K6AHV	"	138,853	346	44	99
W6ZYC	"	127,072	298	50	102
W6HXW	"	109,824	250	55	101
W6ZUM	"	106,020	240	68	112
WA6WUI	"	105,138	326	50	68
W6BJB	"	103,056	314	41	73
WB6ZHD	"	102,664	246	58	106
AA6GLD	"	92,742	270	42	81
K6CN	"	87,910	225	60	89
W6YVK	"	81,789	224	50	87
AC6YKS	"	80,569	285	45	68
K6OC	"	80,364	192	57	91
W6AB	"	74,841	273	42	59
(Opr. WA6LRE)					
W6PRP	"	68,018	174	52	90
W6BZE	"	62,225	157	41	90
WB6UDM	"	59,717	172	50	83
K6DC	"	58,050	167	45	84
W6IA	"	51,291	159	42	81
K6RK	"	44,850	138	54	76
W6ZWK	"	43,500	142	39	77
K6LLE	"	40,770	135	49	86
W6POZ	"	38,760	132	47	73
WA6TLA	"	34,561	126	41	66
WA6EUM	"	34,085	153	32	53
K6BMX	"	31,209	116	40	61
W6FOJ	"	23,660	93	33	58
K6DYQ	"	21,600	96	36	44
AA6UFY	"	17,182	91	29	42
W6CQ	"	16,748	79	29	50
AD6QPH	"	16,269	78	38	49
WB6CQY	"	13,578	66	40	53
W6CLM	'	13,504	84	31	33
AA6TKT	"	11,704	77	25	31
K6IXS	"	11,480	66	29	41
W6VG	"	11,316	64	34	35
WA6KXN	"	10,584	77	23	31
W6NKR	"	9,222	57	24	34
AC6KYA	"	6,920	44	24	34
WB6RMG	"	5,658	52	17	24
WB6CUA	"	3,354	31	17	26
WB6BKN	"	3,230	35	15	19
W6SUJ	"	1,450	21	11	14
K6YFZ	"	1,350	23	12	13
W6OAT	"	1,260	14	14	16
W6EJA	"	819	21	6	7
K6TXA	"	484	11	8	8
WB6CBY	"	290	12	5	5
WA6UAV	"	182	9	8	6
W6HX	28	20,150	129	16	46
WA6EKL	21	261,388	884	27	74
W6PLH	"	238,640	825	25	70
AA6DNM	"	218,295	800	27	72
WA6WZO	"	163,830	649	23	63
K6ELX	"	57,582	319	19	44
WA6ELX	"	13,878	96	17	37
WA6NRQ	"	9,625	99	14	21
WB6UDC	14	199,940	535	30	100
WB6FZC	"	131,312	399	29	87
W6OK	"	43,320	202	22	54
W6FF	"	24,360	111	23	61
W6EUF	"	18,827	100	25	42
AA6FIT	"	9,308	67	18	34
WB6IXC	"	3,510	34	16	23
W6QDE	"	496	13	8	8
AA6EPQ	7	74,100	355	25	50
WAØOOL/6					
	"	3,335	43	12	17
K6EBH	3.8	21,783	153	18	35
W7JST					
	A	1,678,586	1463	116	285
WA7WXY	"	978,117	1066	96	233
WA7NIN	"	743,256	918	99	197
W7VRO	"	574,584	776	87	182
K7DZ	"	458,136	845	71	118
W7LEL	"	419,237	583	87	184
W7WMY	"	276,858	605	63	99
AA7HRE	"	140,045	299	62	123
AA7JCB	"	133,311	416	41	70
W7BUN	"	115,740	445	30	60
AC7YBX	"	107,595	287	54	81
W7HAD	"	91,425	285	48	67
K7HBN/7	"	88,004	315	36	62
WA7URW	"	87,612	360	33	51
W7LZF	"	83,390	206	57	98
W7OF	"	64,904	201	46	76
W7BCT	"	62,975	221	31	65
WB4JBS/7					
	"	58,534	276	24	48
K7YDO	"	39,104	142	34	70
W7OTO	"	35,112	225	23	21
WA7QGI	"	33,852	168	36	43
W7MCU	"	25,481	112	29	54
WA7SCN	"	18,974	128	22	31
WA72TL	"	15,224	123	19	25
W7DAZ	"	13,552	109	21	23
W7NP	"	8,967	68	24	25
K7MOK	"	8,296	52	26	35
K7CVL	"	8,148	69	19	23
W7JUO	"	7,076	46	24	34
WB7DZE	"	2,394	46	10	9
AB7ALT	"	1,653	23	12	17
WA7OBH	"	464	10	8	8
W7AYY	28	6,080	61	11	29
WA7YRP	21	120,158	567	22	51
K7GEX	14	78,225	359	25	50
WA7YCZ	"	37,332	247	21	40
W7KAR	"	12,864	79	20	44
WB7AJR	"	6,464	78	14	18
W7APA	"	5,896	48	17	27
K7LET	"	780	21	6	6

WA1KKM/7					
	7	6,750	127	7	11
W7KW	3.8	70,550	327	26	59
WB6NRK/7					
	"	15,080	114	18	40
W7YN	1.8	240	20	6	6
WA8PSD	A	557,004	604	90	259
K8IDE	"	461,538	543	85	248
W8TWA	"	398,136	475	77	241
K8YZW	"	363,768	494	76	200
K8ETO	"	221,760	320	70	194
W8KPS	"	96,161	239	49	120
K8TMK	"	62,785	165	41	104
WA8ASV	"	60,150	159	46	104
K4KWQ/8					
	"	55,125	126	61	114
AB8IJW	"	33,524	126	41	75
AC8SQ	"	29,044	113	35	71
K8EF	"	27,810	90	33	70
WA8KME	"	23,958	93	29	70
WB8RTY	"	14,578	74	26	48
W8CBA	"	12,450	64	25	50
WB8RQD	"	2,772	27	18	24
K8PYD	"	294	9	8	21
WA8KCX	21	68,804	244	21	82
W0SII/7	"	14,868	98	20	39
W8JGW	14	225,568	527	117	35
K8UNG	"	174,768	483	100	32
WA8DXG	"	148,200	410	31	99
AB8UKX	"	133,750	387	29	96
W8KEL	"	111,320	318	29	92
W8NWO	"	68,820	226	26	85
K8YQW	"	38,130	164	20	73
AD8JPF	"	260	8	7	6
K8UQA	7	2,926	32	13	25
K8INX	3.8	68,456	369	21	65
WB9BPG	A	882,601	812	107	294
WA9BWY	"	805,194	748	104	299
WA9NPM	"	378,371	495	79	204
K9KGA	"	288,120	444	68	177
WB9CEP	"	165,536	290	64	160
W9PJT	"	98,088	222	52	131
WB9IYO	"	95,790	203	58	128
AC9TZD	"	92,480	215	52	118
W9NA	"	84,296	201	51	113
AB9APC	"	81,949	201	50	111
AC9CGL	"	77,760	221	51	129
W9LQ	"	74,250	166	42	123
AC9NLR	"	73,698	195	38	104
K9EGH	"	72,720	193	37	105
W9NSM	"	66,924	194	35	97
WB9QPN	"	57,680	162	37	103
WB9KLW	"	48,528	151	46	98
AC9PWM	"	24,510	105	29	66
WB9KLB	28	19,074	119	17	49
WB9USW	"	8,955	81	11	34
W9CXD	"	6,512	61	10	34
AD9UKM	"	3,924	44	10	26
AB9HAD	21	136,750	395	24	101
WA9JCO	"	55,952	202	23	81
W9OHH	"	55,830	194	23	85
W9MAF	"	45,689	160	22	85
K9KWK	"	37,620	143	22	77
W9GIL	"	36,260	141	20	78
K9AB	"	16,434	96	17	49
K9DAF	"	2,380	24	13	21
WB9LHI	14	253,260	651	33	107
WA9PBK	"	219,312	538	32	112
K9DX	"	205,128	552	31	101
K9TZH/9	"	159,850	407	31	108
AD9WEH	"	98,197	279	25	88
K9JDV	"	67,580	220	23	86
WA9JDT	"	66,752	217	27	85
K9CLO	"	60,912	211	28	80
WB9LTY	"	38,804	158	23	66
AD9UQN	"	8,034	72	8	31
W9ZRX	7	50,490	196	25	74
W9NZM	"	17,908	100	19	55
K9OTB	3.8	20,874	121	17	54
AB9EBO	"	4,251	48	13	26
K9UWA	1.8	817	23	6	13
W2GUH/0	A	775,520	789	93	277
WBØNYY	"	515,214	718	78	183
WAØCPX	"	338,122	444	90	203
WØFHE	"	255,360	353	76	204
ACØIUB	"	165,256	292	66	161
KØCML	"	136,160	239	63	167
ACØQWS	"	57,772	165	43	100
AAØWCR	"	43,890	148	33	81
WØPUD	"	33,448	118	37	76
ABØLNF	"	30,345	99	37	82
WAØYJL	"	29,786	119	34	72
WAØFBQ	"	21,146	85	37	60
WBØIEL	"	16,200	80	27	54
WØBWJ	"	6,960	46	18	40
WAØGSG	"	4,464	35	20	28
ABØGXO	"	2,622	28	11	27
WBØQHV/0					
	28	16,409	110	16	45
WØPRY	"	6,144	50	14	34
WAØAGN	"	5,680	56	9	31
WBØHAI	21	26,406	122	20	61
WØAUB	"	7,809	52	14	43
WBØPZP	"	646	17	9	10
WAØYEF	"	252	7	7	7
WBØLLR	14	258,335	743	31	90
WA2WMT/0					
	"	223,245	626	31	92
KØFLY	"	125,520	375	29	91
WØSML	"	58,536	199	26	82
WØMJN	"	35,084	132	25	73
WAØJNF	7	4,551	58	11	30
KØUPV	"	3,990	39	15	27
KØRF	3.8	54,096	298	25	59

WBØFOR					
	1.8	760	30	7	12
Alaska					
KL7HCN	A	349,920	923	51	84
KL7IRN	14	59,201	414	18	35
KL7AF	3.8	25,270	300	15	23
Bahamas					
WB4ZNH/C6A					
	A	61,520	377	27	53
Barbados					
8PØA	14	890,320	2,432	33	122
(Opr. 8P6AH)					
Belize					
VP1MPW	A	807,312	1,601	82	160
VP1PTL	14	264,888	1,305	25	79
Bermuda					
W1HFB/VP9					
	A	1,808,576	2,069	90	277
W4EV/VP9					
	"	745,425	1,580	69	156
VP9AD	7	22,275	179	14	41
British Virgin Is.					
VP2VDH	A	840,320	2,613	47	113
(Opr. K6SDR)					
Canada					
VE1AI	A	156,400	337	46	124
VO1AW	"	109,200	240	45	130
VE1EK	"	1,848	26	10	23
VO1HH	14	421,722	1,366	25	101
VE1AIH					
	3.8	49,567	298	15	58
VE1AWV					
	"	11,970	173	10	25
VE2AYU	A	200,450	444	50	140
VE2MJ	"	2,550	28	11	23
VE2WA	"	273	9	6	7
VE3GCO	A	568,364	774	75	227
VE3IXE	"	67,767	212	45	102
VE3EJK	"	41,624	142	31	90
VE3FJE	"	11,765	68	17	48
VE3BIF	28	375	10	7	8
VE3KZ	14	339,720	824	33	119
CF3VM	"	209,408	680	29	99
(Opr. VE3F2W)					
VE3PG	"	102,120	328	27	93
VE3BSJ	"	74,865	237	26	89
VE3EDC	7	133,496	886	19	55
VE3DUS	"	1,064	29	7	12
VE3ECP	3.8	39,000	387	14	38
VE3BMV					
	1.8	29,750	449	11	23
VE3BBN	"	4,884	210	4	8
VE4RP	A	57,596	231	45	74
VE4VV	"	41,563	228	35	54
VE4EW	"	15,052	95	32	39
VE4XJ	14	75,210	300	27	82
VE4MP	"	38,070	177	27	67
VE4SK	"	28,875	172	25	50
VE4SN	"	2,691	30	14	25
VE4AA	"	24	2	2	2
VE5YA	A	63,036	225	36	67
VE5XV	14	156,220	528	28	79
VE6MP	A	305,844	974	42	90
VE6VM	"	47,042	212	37	49
VE6WX	14	296,715	857	34	97
VE6KW	"	261,744	958	28	86
VE6UX	"	221,865	859	27	78
VE6SP	"	77,760	393	26	54
VE6LB	7	18,450	225	16	25
VE7KB	A	365,220	893	66	114
VE7AZG	"	172,789	537	19	55
VE7BC	14	672,150	1,855	36	114
(Opr. VE7LB)					
VE7DSR	"	220,206	766	28	79
VE7AV	"	192,416	687	29	83
VE7DEW	"	100,254	396	27	66
VE7AJ	"	1,248	18	11	15
VE7IG	3.8	72,660	516	23	47
VE7CGY	"	36,162	348	17	32
VE8NS	21	4,860	56	15	20
VE8RO	14	4,100	77	13	12
Cayman Is.					
ZF1WW	A	1,078,365	2,580	66	135
ZF1AK	"	135,125	502	42	83
Dominican Republic					
HI8MOG					
	A	1,184,330	2,111	68	177
HI8EVA	28	1,250	250	3	2
Greenland					
OX3AB	A	0	5	5	5
XP1AA	14	2,310	110	6	15
(Opr. OX3WU)					
OX3EA	"	131,240	610	23	62
Guadeloupe					
FG7AS	A	675,467	1,299	64	169
Jamaica					
6Y5BF	A	1,290,415	2,576	73	172
(Opr. W6DQX)					
Mexico					
XE1DDP	A	674,128	1,461	67	141
XE1LLS	"	402,814	1,330	61	85
XEZMX	"	205,344	624	50	88
Nicaragua					
YN1RWG	A	546,995	1,593	53	102
YN1KG	21	2,320	54	11	9
Panama Canal Zone					
KZ5JM	A	1,233,150	1,852	92	208
KZ5FR	14	281,911	969	27	92
Puerto Rico					
KP4EAJ					
	A	2,040,212	2,957	82	235
KP4EKI					
	"	1,637,740	2,949	74	186
KP4DKX	"	252,776	777	50	102
KP4EGF	"	192,212	736	36	80
KP4BDL	14	14,022	159	14	27

St. Kitts					
VP2KAA	21	219,220	1,028	24	73
VP2KF	7	81,840	470	18	70
VP2KA	3.8	5,808	188	6	18
St. Pierre Et Miguelon					
FP8AA	7	229,908	1,015	18	80
U.S. Virgin Is.					
KV4JV	14	658,721	2,067	33	106
(Opr. LU2DC/W4)					
KV4FZ	1.8	37,584	380	11	37
AFRICA					
Angola					
D2AFW	28	219,345	714	25	80
D2ALB	21	11,308	87	14	30
Canary Islands					
EA8JJ	21	608,076	1,605	27	100
EA8CR	3.8	200,850	657	20	83
Chagos Island					
WB6EWH/VQ9					
	21	117,855	494	22	59
WA6EGL/VQ9					
	14	371,280	936	33	107
Ivory Coast					
TU2EF	A	386,304	687	51	141
Kenya					
5Z4QQ	A	124,432	375	31	81
5Z4LW	"	56,620	140	48	101
Liberia					
EL2T	A	1,413,600	1,589	87	215
Mauritania					
5T5CJ	A	51,870	194	38	53
Republic of Cape Verde					
D4CBC	A	738,285	1,054	74	175
Republic of South Africa					
ZS4MG	A	156,600	450	43	102
ZS6PI	28	32,330	180	17	44
Rhodesia					
ZE1BL	A	1,169,344	1,628	67	175
ZE8JD	"	288,900	547	60	120
ZE3JY	"	1,334	20	9	14
ZE2JE	14	353,860	933	36	94
Senegal Republic					
6W8A	A	2,769,819	2,399	104	299
Seychelles Islands					
VQ9P	21	118,560	446	30	66
ASIA					
Hong Kong					
VS6AF	14	12,474	122	20	34
India					
VU2ARC	A	108,600	450	45	75
VU2PM	21	19,178	179	14	29
Iran					
EP2SV	A	1,311,024	1,568	77	235
EP2OD	"	334,530	588	56	154
Israel					
4Z4HF	A	1,571,359	1,791	74	219
4Z4EC	"	385,730	800	44	126
4Z4RG	"	76,529	251	29	74
4Z4LG	21	328,227	1,340	32	79
K2IZN/4X					
	14	829,962	2,056	34	113
4X4NJ	"	629,343	1,572	35	108
4X4UR	3.8	11,220	117	8	25
Japan					
JAIKSO					
	A	1,409,100	1,352	113	253
JHIECG					
	"	1,395,056	1,390	119	234
JA2JW					
	"	1,192,182	1,287	106	220
JA2DOU					
	"	747,150	889	102	191
JA1ELY	"	576,288	776	98	163
JA6LLO	"	440,220	680	79	151
JE1SSE	"	362,025	562	84	141
JA4BKL	"	290,832	484	81	138
KA6YL	"	280,173	565	67	116
KA6DX	"	156,114	323	76	113
JA7DAH	"	92,352	293	43	68
JA1FBD	"	80,040	277	47	73
JG1CDM	"	63,063	240	41	58
JA1PUK	"	43,722	129	44	82
JA1CFJ	"	39,360	178	36	44
JA7GAX	"	38,352	132	42	60
JA5MOU	"	36,675	175	30	45
JA7CLM	"	31,220	164	30	40
JA9JBK	"	25,992	132	32	40
JA1HIE	"	23,716	89	41	57
JA2ZAP	"	19,671	94	37	42
JH7BRG	"	17,175	127	33	42
JA2BNN	"	14,874	80	29	38
JA2DLM	"	14,190	91	30	36
JA1AFF	"	12,750	92	21	30
JR2LRR	"	7,776	62	20	28
JA9MMA					
	"	7,488	73	15	21
JA3IBU	"	5,546	42	19	28
JA1YYB	"	3,811	38	17	20
JA9MYR	"	3,081	30	21	18
JA7FMZ	"	2,052	28	14	13
JA2HLX	"	672	14	12	9
JAØAVA	"	240	9	6	6
JAØTVA	"	240	9	6	6
JF3BDP	28	63,270	225	33	78
JA2DYI	"	14,905	104	22	33
JA3PJL	"	10,712	81	21	31
JA1MYW	"	7,826	69	18	25
JG1FJT	"	4,958	51	16	21
JR2RAV	"	4,180	46	16	22
JA2UYS	"	3,300	39	13	20
JA7CUK	"	1,464	24	11	13
JA9BOH	"	1,265	20	10	13
JH7EKS	"	420	13	7	8
JF1HOH	21	144,115	524	32	63
JE1BSD	"	107,180	407	32	60
JG1BUB	"	81,144	316	32	60
JA1JXU	"	77,406	292	32	65
JH2MYN	"	65,056	314	30	46

JR3PUG	"	54,600	259	26	49
JA3RRN	"	52,207	221	29	54
KA6JC	"	46,166	214	30	52
JG1ASX	"	43,875	214	27	48
JH4IFF	"	42,159	240	24	45
JR2MHJ	"	40,390	207	26	44
JA8FCG	"	39,168	199	25	47
JA1GSK	"	33,668	162	29	47
JH2WIC	"	32,802	180	23	43
JF1EEK	"	32,263	150	28	49
JH3GRE	"	31,624	193	20	39
JH3VED	"	31,360	159	29	41
JE2FTC	"	30,912	174	23	41
JH3UBF	"	28,740	172	25	35
JA6WSB	"	26,649	152	23	40
JH4JNG	"	26,564	163	21	37
JH2VNY	"	26,390	165	21	37
JF1XRB	"	25,599	175	19	34
JG1UMO	"	24,123	196	16	27
JH4BTX	"	23,972	159	19	33
JR2GMC	"	22,185	154	21	30
JA8UBV	"	21,228	137	21	37
JG1RKB	"	20,090	108	25	45
JH2HFD,	"	19,260	118	27	33
JH4MVB	"	18,786	117	23	39
JA7JND	"	17,556	149	16	26
JR1WHW	"	16,027	124	18	29
JE3AVS	"	13,728	104	20	28
JA3DK	"	13,455	110	20	25
JR2HVG	"	13,201	112	17	26
JH6CAW	"	12,716	100	15	29
JA5USL	"	12,455	98	16	31
JR3CVO	"	11,644	99	15	26
JA5REF	"	10,736	91	17	27
JAØUXG	"	7,680	87	12	18
JA1OHZ	"	6,552	78	14	22
JF1TAJ	"	4,590	90	7	10
JAØWPL	"	4,186	58	11	15
JA8BIH	"	3,410	55	9	13
JR3CVJ	"	3,388	42	11	17
JA9ISK	"	3,159	45	12	15
JH4DVV	"	2,712	44	11	13
JHØBOJ	"	2,040	36	10	10
JR2MKV	"	1,728	24	13	14
JHØBOX	"	1,725	29	9	14
JI1MPA	"	1,558	30	9	10
JE3UER	"	1,521	40	7	6
JA3BUB	"	1,452	46	5	6
JA8OBD	"	1,176	28	7	7
JE3UET	"	1,122	35	6	5
JH1OFL	"	1,083	19	6	13
JH2FHU	"	784	20	7	7
JA3YJO	"	198	11	3	3
JE3RFU	"	189	7	4	5
JA3CIR	"	170	9	5	5
JA3FLU	"	133	7	3	4
JH2GMK	"	84	7	2	2
JA6YVF	"	24	2	2	2
JH6FDI	"	6	1	1	1
JH1CNT	14	240.711	816	33	70
JA8SW	"	111,280	381	33	71
JA1SKE	"	98,888	377	30	64
JA1YAL	"	83,224	299	34	67
JA2JSF	"	60,552	255	32	55
JA9AIG	"	58,491	210	32	65
JA9SV	"	57,353	252	30	53
JA5TX	"	53,176	217	30	62
JA7DXD	"	45,280	195	29	51
JA6DTY	"	40,240	180	30	50
JF1INA	"	37,050	172	31	47
JA1FIJ	"	35,126	137	31	60
JA1CMD	"	34,748	184	26	42
JA1BUI	"	31,558	161	25	37
JA8BFV	"	31,220	160	25	45
JG1UNF	"	26,622	160	23	35
JA2INS	"	26,077	106	31	58
JA6UYF	"	25,806	137	24	45
JA4GXS	"	22,754	133	24	38
JA9AOE	"	21,560	113	26	44
JA1ALX	"	19,881	146	21	26
JA6G7R	"	19,053	103	26	47
JA1PX	"	18,944	90	28	46
JR1UTH	"	18,198	120	24	30
JA4MH	"	13,960	127	19	21
JA2CCA	"	13,140	109	23	22
JA1JLL	"	12,936	105	18	26
JA7BAL	"	12,798	84	25	29
JF1DYY	"	12,188	110	17	27
JA1HVS	"	11,058	107	16	22
JH1MTR	"	10,730	74	21	37
JA4ZU	"	10,290	77	23	26
JA3BX	"	10,200	70	23	28
JA5CEK/6					
	"	9,020	83	18	26
JA2IOJ	"	8,092	89	16	18
JA1AAT	"	7,446	78	17	17
JA5FDG	"	6,954	72	16	22
JA1FMX	"	6,716	50	21	25
JA6YY	"	5,809	57	17	20
JA1COT	"	4,896	72	12	12
JA2TKO	"	4,248	45	18	18
JA4FNY	"	4,066	42	18	20
JA5NAF	"	3,515	42	17	20
JA4DZ	"	2,880	42	10	14
JG1MTI	"	2,862	36	13	14
JH2OHK	"	2,856	31	15	19
JR2AOP	"	2,752	32	16	16
JA5AF	"	2,604	33	15	16
JA1DSI	"	2,475	35	13	12
JR1OML	"	2,349	34	14	13
JR2FYH	"	2,201	29	16	15
JA1FI	"	2,190	28	12	18
JA1OKI	"	1,239	27	10	11
JA0GZ	"	1,159	31	10	9
JA3CIP	"	1,122	25	11	11
JE1XRZ	"	1,000	16	11	14
JJ1EFW	"	486	14	8	10
JA9CWJ	"	456	14	6	6
JA4EE	"	228	7	6	6

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DKØBZ " 54,292 220 43 55
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Hungary
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Ireland
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Isle of Man
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Poland
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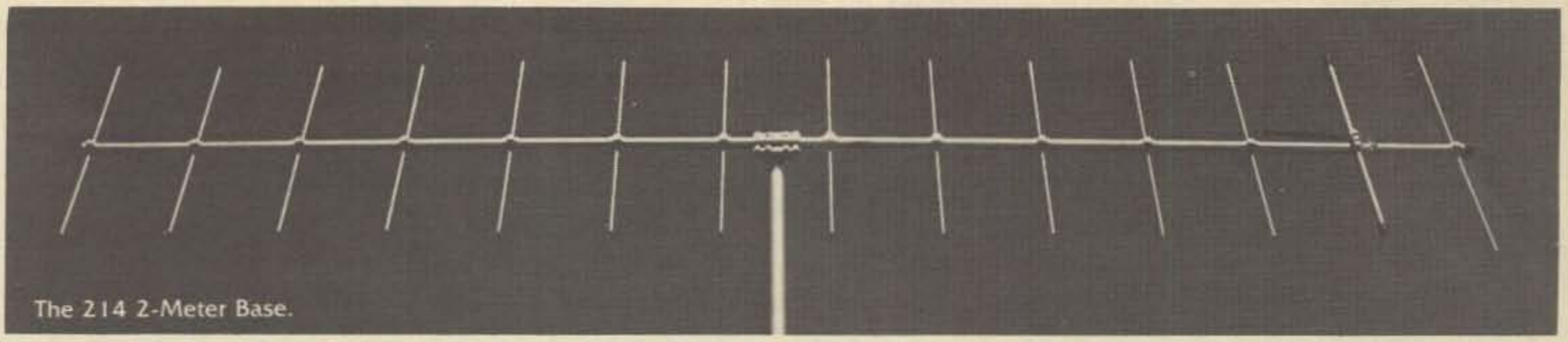
SP6IXF " 13,771 201 11 36
SP6ANY " 12,204 151 12 42
SP5ANQ " 10,602 109 16 41
SP9PEZ " 9,152 112 14 38
SP8AWP " 8,784 131 10 38
SP1FPG " 8,495 90 15 33
SP7BCA " 3,604 82 7 26
SP2ADW " 600 21 6 14
SP1II " 72 5 3 7
SP5XM 3.8 35,568 430 14 58
SP5KGT " 11,776 226 8 38
SP9BDO " 8,686 194 7 36
SP9AKD " 8.487 212 6 35
SP6DXG " 4,588 150 4 27
SP7BFC " 2,883 94 5 26
SP8RJ " 2,650 106 4 21
SP3AUZ " 2,088 74 5 24
SP7FBO " 1,950 75 4 22
SP9DSX " 1,820 65 5 23
SP8EMO " 1,127 49 5 18
SP6FIK " 168 16 3 9
Portugal
CT4AT
A 3.077.930 2,746 110 356
CT1OZ " 390.108 972 42 132
CT1UA " 85,404 448 29 37
CT1AV 14 6,820 67 11 44
CT4GO 3.8 7,626 171 7 34
Romania
YO6KEI A 280,440 840 44 164
(Opr. YO6AWR)
YO6KBM " 35,175 350 23 82
YO7NA " 25,179 155 31 78
YO6EX 21 8,062 80 17 41
YO6HQ 14 4,320 92 8 24
YO3AWY 7 14,600 263 10 40
YO9HT " 3,813 78 10 31
YO6AW " 3,596 108 6 23
YO3JU " 1,200 16 14 16
YO3JW 3.8 30,402 491 10 44
Sardinia
ISØMVE A 180,969 705 40 139
ISØELK 21 44,100 243 14 56
ISØPJP 14 103.788 601 23 70
Scotland
GM3BCL
14 41.738 266 21 61
Sicily
IT9MPR A 262,143 597 58 131
IT9HLO 28 71,791 392 27 76
IT9WGI " 37,341 196 18 63
IT9KZW 21 364,266 1,228 29 97
IT9TGO " 96,247 442 26 83
IT9LMK " 1,764 51 8 20
Spain
EA1PT A 491,588 967 62 174
EA7CP " 81,567 301 44 115
EA3NA 21 105,222 449 26 88
EA2IA 3.8 7,104 160 6 31
Svalbard Is.
JW7FD A 20,706 105 28 59
Sweden
SM5AOE A 435,656 917 67 217
SM3BIZ " 230,437 601 58 175
SM4DQE " 215,380 585 53 167
SM5EEP " 95,400 430 43 107
SM7BYP " 70,080 198 48 112
SM5TA " 66,129 285 44 97
SM0CCM " 44,750 264 42 83
SM0BSC " 43,228 225 28 79
SM7TV " 27,144 199 25 62
SM0BDS " 18,108 139 26 47
SM6GTF " 16,268 110 32 66
SM7AAQ " 12,045 147 18 55
SM5AAY " 3,554 87 18 34
SM5RE " 1,504 43 10 22
SM1CXE " 560 18 5 5

SM7DBA	"	546	13	8	6
SMØHTO	28	252	17	4	8
SM7HSP	"	240	11	6	9
SMØFO/Ø	21	71,912	364	22	79
SM5HPB	"	17,372	155	15	28
SM7FSV	"	4,840	50	15	29
SMØBYD	"	2,923	52	10	27
SM2HZQ	"	646	32	6	13
SM7DMN	14	125,116	527	32	92
SM3DSP	"	115,856	596	28	76
SM4AQD	"	97,337	521	27	82
SM5CMP	"	70,500	494	22	72
SM5WC	"	16,416	97	21	55
SM7AIO	"	12,308	107	20	48
SM7FYM	"	6,026	51	14	32
SM5GA	"	5,026	73	11	28
SM5FTH	"	5,092	66	12	26
SM5EOO	"	4,280	80	12	79
SMØBVO	"	1,113	31	7	14
SM4CAN	7	46,899	467	18	63
SMØAJU	"	46,200	401	18	66
SM5CSS	"	3,008	91	6	26
SM2DMU	3.8	19,264	252	15	49
Switzerland					
HB9ZE	A	262,200	592	53	175
HB9ALJ	"	57,105	182	45	96
HB9BGI	"	55,286	211	48	106
HB9AYZ	"	19,758	189	21	53
HB9DX	21	18,914	80	24	74
HB9UD	14	966	22	7	14
Vatican					
HV3SJ	A	58,421	344	35	78
Wales					
GW3SLA	A	74,947	377	34	115
GW3GHC	28	9,460	95	13	42
GW3MPB	21	9,151	77	20	41
Yugoslavia					
YU1GMN	A	186,813	456	51	136
YU3TJA	"	181,584	417	63	171
YU4JLM	"	26,320	250	16	78
YU1OIZ	"	9,198	88	22	41
YU3TPM	28	46,659	231	24	79
YU2RBY	21	442,898	1,181	34	108
YU4EXA	"	165,880	585	32	98
(Opr. YU1OIQ)					
YU1OBA	"	141,876	506	32	94
YU2CRS	"	101,430	395	27	87
YU5CYZ	"	32,688	275	20	52
(Opr. YU5XDX)					
YU2CHI	"	22,796	113	26	56
YU2CBK	"	17,040	87	23	57
YU1NW	"	13,050	118	17	41
YU2CDS	14	765,061	2,050	37	120
(Opr. YU2RNE)					
YU1ABF	"	329,465	1,413	34	97
YU1NYP	"	225,060	823	32	100
YU2CAW	7	32,361	362	14	55
YU3DRM	"	5,586	124	7	31
YU1EXY	3.8	47,500	483	17	59
YU2CBM	"	27,404	303	13	49
YU2OB	"	23,184	317	11	52
YU4VBR	"	16,848	308	10	42
YU1SF	"	840	40	4	17
USSR					
European Byelo Russia					
UC2ABT	A	204,240	659	53	177
UC2AF	"	1,131	23	11	18
Estonia					
UR2REN	A	294,872	796	61	171
UR2QD	"	218,685	642	46	137
UR2TAX	28	6,080	109	10	28
UR2JL	"	3,471	67	11	28
UR2REC	"	960	27	8	16
UR2RJ	21	19,176	143	16	52
UR2DW	"	14,136	148	16	46
UR2Q1	14	182,000	886	33	107
UR2QA	"	94,518	485	32	86
UR2FQ	"	88,920	375	33	97
UR2RCN	3.8	5,292	137	6	30
UR2CW	"	528	20	5	19
European Russia					
UA4NAA	A	423,231	900	59	154
UK6LEZ	"	359,040	547	83	247
UA3DFK	"	230,460	645	64	166
UV3DN	"	104,272	495	40	112
UA6HBU	"	97,340	378	35	89
UA3DDF	"	75,565	450	31	96
UA6JAD	"	41,625	205	40	85
UA6JWW	"	32,205	187	33	80
UA6AJG	"	29,532	191	32	75
UA6LXZ	"	26,325	320	21	54
UA3TN	"	24,881	115	40	99
VA3XAN	"	14,130	105	27	63
UV3CS	"	12,040	120	17	53
VA3AEW	"	10,422	156	15	39
UW1OP	"	10,248	102	20	36
UA4CO	"	9,782	91	18	49
UA4WPF	"	9,450	135	14	36
UA3AGG	"	8,544	89	12	36
UA4HEJ	"	8,400	126	13	37
UA4FAR	"	7,411	122	10	36
UA3ACZ	"	6,536	130	12	31
UW3RR	"	6,120	83	15	36
UA3TCH	"	5,304	73	16	36
UA6LEY	"	4,743	85	12	39
UA3HK	"	4,690	60	15	37
UA1CAS	"	1,350	35	9	21
UA3IAM	"	1,325	23	11	14
UA1JM	"	924	26	6	15
UA6LBC	28	18,467	183	15	44
RA3DFN	"	7,840	100	13	36
UA6WAL	"	7,448	142	11	27
UA4CBO	"	6,532	74	15	31
RA3AKX	"	5,588	77	13	31
RA3ALQ	"	5,304	89	12	27
UA3AIO	"	2,407	63	7	22
RA4HDE	"	2,240	39	11	21
UA6AGZ	"	2,160	31	15	25
UA3QBG	"	1,978	58	6	17
UA6AEH	"	1,612	40	8	23
RA1AKL	"	90	6	4	5
UA4RZ	21	376,515	1,137	31	104
UV3CE	"	217,398	904	28	86
UW6DR	"	89,910	656	19	55
UA6BV	"	29,889	232	22	59
UW1YY	"	10,428	203	12	32
UV3GZ	"	9,890	140	10	36
UA3EQ	"	6,357	90	11	28
UA6HGG	"	3,364	110	5	24
UW1AE	14	122,385	624	32	91
UA4ACG	"	115,254	588	31	83
UW4NP	"	100,741	567	30	80
UW3HV	"	80,478	644	24	78
UA1MU	"	76,900	440	28	72
UA4FAT	"	43,351	334	23	54
UA4CZ	"	28,950	311	20	55
UA3GBI	"	27,755	203	20	45
UK3DBA	"	5,217	41	20	27
UA3GM	"	2,838	47	12	21
UA4CAH	"	2,430	51	8	22
UW6CV	"	1,114	41	5	21
UW6CD	"	630	16	7	14
UV3FD	7	15,080	190	15	43
UA4ACD	"	1,475	43	6	19
UA3XAW	"	42	7	3	4
UA4PW	3.8	18,669	240	11	38
UA3PBZ	"	14,352	237	10	38
UA4UAZ	"	10,620	162	10	35
UA6CQ	"	8,600	166	8	32
UA4FAU	"	7,416	147	7	29
Kaliningrad					
UA2EC	A	62,976	238	45	119
UA2DM	"	38,280	185	34	98
UA2WJ	14	112,592	494	30	94
UA2FBZ	"	42,930	315	22	68
Karelo-Finnish Rep.					
UN1CC	A	32,542	215	29	77
Latvia					
UQ2GDQ	A	233,818	800	54	167
UQ2IL	"	29,925	219	27	78
UQ2DV	"	23,956	166	31	75
UQ2HO	21	12,222	107	16	47
UQ2MU	"	3,422	55	10	19
UQ2CR	14	7,140	129	8	34
UQ2GCN	7	20,208	389	8	40
UQ2GFN	3.8	7.752	220	5	29
Lithuania					
UP2SA	A	636.675	1,044	80	245
UP2OU	"	525.600	1,127	80	220
UP2BAR	"	345.840	873	70	194
UP2OM	"	159,367	611	44	125
UP2BAT	"	90,270	349	48	122
UP2AV	"	1,768	53	10	24
UP2FA	21	2,106	45	9	18
UP?PX	14	119,185	563	32	89
UP2BAZ	"	4	2	1	1
UP2BAO	7	224	16	4	10
UP2ER	3.8	25,896	440	9	43
UP2PBW	"	20.010	415	8	38
UP2BDH	"	6,528	207	5	27
UP2BBF	"	3.892	134	5	23
Moldavia					
UO5OGE	28	14,000	198	13	43
UO5GR	21	9,792	92	16	52
UO5DN	14	25,026	167	22	64
UO5ODX	3.8	7,688	240	6	25
Ukraine					
UB5WE	A	2,166,246	2,303	109	344
UB5MDI	"	446,050	1,253	70	205
UB5MCD	"	403,089	887	65	188
UY5DP	"	360,787	953	64	195
UB5EC	"	310,440	762	64	196
UB5AAF	"	204,624	446	76	185
UT5HP	"	105,846	404	47	130
UB5UBI	"	19,552	133	30	64
UB5UAL	"	10,720	62	26	54
UB5IBW	"	7,104	79	19	45
UB5MBY	"	4,949	80	12	37
UB5LAY	"	4,263	79	14	35
UB5VAZ	28	18,900	219	17	46
RB5CCK	"	13,965	169	13	44
RB5IOV	"	9,447	136	13	34
UB5VCD	"	8,772	109	14	37
UB5HBT	"	3,458	54	10	28
UB5ICP	"	2,310	44	8	27
UY5OO	21	34,043	223	17	42
UY5ZM	"	13,500	272	10	35
UT5XJ	"	741	37	3	16
UY5HV	14	157,014	678	35	108
UB5UAT	"	84,680	448	28	88
UB5MAR	"	54,591	395	25	68
UT5IK	"	21,638	240	13	49
UT5LY	"	9,741	129	16	35
UB5ABK	"	5,576	117	10	31
UB5OD	"	4,214	32	22	27
UB5IAA	7	4,214	74	21	22
UB5UCJ	3.8	20,299	324	12	41
UB5UBJ	"	19,584	329	9	39
UB5ZBT	"	14,696	280	8	36
UB5GBD	"	10,922	210	8	35
UB5CAY	"	2,552	84	5	24
UB5DAJ	"	1,518	66	4	19
OCEANIA					
Australia					
VK2XT	A	90,512	413	59	103
VK5MF	"	68,220	265	36	54
VK4UA	"	32,148	197	30	27
VK6MO	"	14,874	82	31	43
VK6NE	21	69,207	375	22	47
VK3SM	"	26,730	169	20	34
VK6CT	14	431,001	996	36	117
VK3BHN	"	251,199	745	34	79
VK5LU	"	12,000	69	25	35
VK5RX	"	1,218	29	14	23
French Polynesia					
FOØGC	A	267,424	779	50	72
Guam					
AG6JFY	A	1,212,822	1,966	84	129
KG6JEE	21	120,456	959	19	23
KG6JAR	14	128,484	516	28	55
KG6JHB	"	10,353	78	21	30
Hawaii					
KH6IJ	A	1,710,540	2,473	86	148
KH6ABF	"	366,366	1,004	54	68
AH6GQW	28	28,971	263	14	23
AH6BZF	21	279,180	1,413	21	45
KH6IJA	"	33,165	252	19	26
KH6GMP	14	429,900	1,464	23	67
KH6HGP	3.8	12,532	163	11	15
KH6CHC	1.8	324	15	5	4
Indonesia					
YBØACG	A	281,424	594	54	164
YBØACH	"	29,568	134	33	51
Johnston Is.					
KJ6DL	A	744.000	1,303	85	115
Line Islands					
VR3AK	14	11.288	70	27	41
VR3AH	7	308,750	1,111	30	65
Mariana Islands					
K6QHC/KG6	3.5	25,896	237	17	22
New Caledonia					
FK8AH	A	7,830	57	25	29
New Zealand					
ZL1BKX	A	984.274	1,195	94	189
ZL1TB	"	19,680	94	33	47
ZL2HE	28	5,620	101	11	9
ZL1AGO	21	119,070	573	20	50
ZL2AJB	14	22,388	147	25	33
ZL3BK	"	128,816	495	29	68
ZL1AMO	7	147,654	602	25	58
ZL1BIL	3.8	43.214	241	22	40
Papua-New Guinea					
P29RJ	14	123.696	628	23	49
Western Caroline Is.					
WB4ZKG/KC6	A	936.306	1,734	73	116
SOUTH AMERICA					
Antarctica					
KC4AAC	A	3,066,516	3,432	93	216
(Opr. WB6KIL)					
CE9BSA	14	5,662	96	9	10
Argentina					
LU1BR	A	2,009,583	2,411	83	200
LU6HDV	"	258,793	644	51	86
LU6DMZ	"	18,150	117	26	29
LU8FEU	28	224,328	989	21	57
LU6DWZ	"	5,481	68	13	16
LU6DIN	21	153,255	617	23	62
LU7MAL	14	410,688	1,015	34	104
Bolivia					
CP6EL	A	540,804	1,007	61	126
CP1AT	"	127,332	363	55	76
Brasil					
PY2GNR	A	279,972	524	62	136
PY2ZCL	"	92,664	357	38	50
PY2OB	"	45,291	167	34	59
PY1FI	"	34,317	139	36	57
PY7AZQ	"	26,864	103	28	64
ZY2JB	"	9,548	86	23	39
PY2SI	"	7,446	71	20	31
PY2ELV	28	122,060	510	23	62
PY7YS	"	57,684	290	18	51
PY2BKO	"	684	14	9	10
PY1ZBJ	21	806,108	2,017	27	110
PY4OD	14	1,022,028	2,495	35	103
PY8JO	"	700	13	10	10
PY2BFJ	"	6	1	1	1
PY2ELZ	7	21,660	141	18	39
PY2DOF	"	12,432	95	18	30
PY7VIB	"	1,425	25	5	14
Chile					
CE6EZ	28	356,312	1,370	24	64
CE4EM	"	130,824	648	20	49
CE3TZ	21	4,725	79	10	11
CE2MZ	14	64,678	412	23	50
Colombia					
HK4DF	A	2,015,246	2,271	86	216
HK4AOY	"	1,210,525	2,015	67	138
HK1CMX	14	236,421	732	24	85
HK6BRK	"	12,699	90	14	37
HK4EB	1.8	3,672	34	4	9
Easter Is.					
CEØAE	A	369,740	917	48	92
Ecuador					
HC1BU	A	2,096,586	2,642	74	195
HC2YL	21	505,336	1,582	23	90
French Guiana					
FY7AK	14	1,415,329	2,950	36	127
(Opr. F5QQ)					
Netherlands Antilles					
PJ9CG	A	5,214,510	4,676	101	277
Paraguay					
ZP5WO	A	224,025	545	56	89
Peru					
OA8V	A	302,750	604	59	116
OA4AFP	21	43,358	398	15	23
OA8CG	"	30,334	187	16	42
OA4AHA	14	622,790	1,382	36	119
OA4ALP	7	51,675	291	19	46
OA4VR	3.8	23,698	203	16	25
Surinam					
PZ1AH	A	37,318	121	39	55
Trinidad & Tobago					
9Z4NP	A	1,734,297	2,168	80	197
Uruguay					
CX3BH	28	251,416	973	21	67
CX5BC	"	108,927	657	18	39
CX2AQ	"	74,340	399	21	42
CX2CL	"	48,328	299	20	36
CW3BR	21	1,094,767	2,697	29	108
CX4BD	"	449,412	1,513	25	77
CX7BV	14	754,588	1,809	34	108
CX4CR	7	363,110	1,125	30	80
Venezuela					
SM5CGA/YV5	A	609,606	1,295	38	124
WA5URR/YV5	"	16,800	118	29	51
YV5EED/1	"	12,714	71	22	56
OA4PQ/YV5	"	800	22	10	15
YV4CB	28	155,312	800	20	48
4M1RV	"	112,896	658	20	36
YV2AMM	21	838,448	2,045	30	109
YV5CUZ	7	8,500	60	14	36
Multi-Operator					
Single Transmitter					
NORTH AMERICA					
United States					
W1ZA		1,572,596	1,272	104	342
K1VBL		1,393,423	1,164	103	328
WA1NRF/1		1,316,376	1,127	98	325
W5UDK/1		1,071,630	907	103	338
W1MX		695,976	681	86	290
K1RQF		375,915	493	70	215
AA1SQB		342,828	482	62	205
W1UQ		319,124	541	60	161
W1FMK		133,328	237	54	154
K2BMI		891,702	852	85	293
K2USA		378,880	597	69	187
AB2YKG/2		228,084	354	64	185
W2UI		169.330	314	51	154
K2GXT		45,368	158	32	74
WA3YGH		1,234,152	1,168	93	273
K3GJD		950.718	897	96	290
K3AVT		912,960	905	88	272
W9SZR/3		840,021	868	83	274
W3ABT		393,558	538	72	195
LU1BAR/W3		355,122	427	78	249
W3NX		327,968	413	81	215
K3BNS		72,645	193	36	109
W4MYA		742,950	718	98	292
AA4LZR		521,246	596	77	242
K4BGF		510,420	545	91	271
WA4YBV		433,908	524	80	225
AA4UFW		239,582	404	57	161
WA4PYF		212,400	339	63	177
K4EG		115,048	221	62	135
AA4AXT		17,808	85	41	43
W5BJA		1,620,381	1,160	125	386
WA5RTG		549,429	577	100	273
K5PFL		387,127	484	93	214
W5RU		328,328	410	91	217
WB5NQS/5		127,264	249	55	139
W5RRR		93,456	203	51	125
WB5MXS		91,143	225	50	121
W6ONV		2,420,750	1,995	120	301
W6BH		1,306,692	1,420	101	223
WA6NGG		1,216,552	1,300	101	227
W6OKK		926,640	1,018	103	221
K6HIH		823,531	1,165	92	159
K6ZM		689,040	911	89	181
K6RV		688,224	932	86	182
WA6WXP		502,500	876	65	136
W6VLD		492,795	762	74	159
WB6GFJ		472,005	655	81	174
WA6AHF		386,848	597	75	149
WA6JUD		302,881	763	51	88
W6MUR		263,015	457	74	131
K6OZ/6		220,020	362	74	154
W6BIP		216,910	389	75	124
K6MA		155,142	365	65	88
W6UA		137,860	257	84	160
WB6JOD		75,924	197	61	87
K7RSC		873,055	1,080	99	184
W7TML		850,130	998	91	211
W7PHO		519,726	930	69	125
W0SIP/7		336,990	524	81	158
W7JEG		56,870	200	44	66
WA7RVA		21,168	156	25	31
WA7VYJ		608	17	8	8
WA8ZDF		1,925,308	1,302	125	407
WA8MOA		429,080	495	82	258
WB8WHS		147,136	296	60	149
W9YH		390,334	464	96	247
WB9SOR		343,408	402	88	250
WB9TXO		321,043	467	73	204
WAØVPN		219,700	333	73	187
WAØDCB		81,506	202	49	117
Bahama Is.					
K4IIF/C6A		372,404	1,144	51	106
Canada					
VE3AKG		1,481,579	1,592	91	276
VE1UNB		300,897	622	55	146
WB0SMS/VO1		214,054	764	38	93
VE6AO		140,760	527	44	76
VE1BU/3		131,274	289	69	137
Cayman Is.					
ZF1RE		2,285,088	3,498	85	227
Greenland					
OX3JUL		61,985	376	28	49
Grenada					
VP2G		5,886,500	5,312	111	389
Guadeloupe					
FGØMM		3,104,768	3,736	95	284
Guatemala					
TGØAA		2,260,896	3,006	97	255
Honduras					
WBØQFB/HRZ		527,820	1,312	52	138
Jamaica					
WB4SJG/6Y5		2,541,300	4,107	85	215
Puerto Rico					
AJ4EAS		2,409,488	3,418	88	240
St. Martin (Fr.)					
FGØCXV/FS		2,780,783	3,396	98	263
St. Pierre Et Miquelon					
FP8DX		967,805	1,844	57	148
Virgin Is. (U.S.)					
W6KG/AJ3		881,748	1,603	72	180
AFRICA					
Rep. of South Africa					
ZS6BNX		2,071,770	2,203	89	229
ZS6BNH		601.112	1,745	29	87
ASIA					
Japan					
JA3YBF		170,500	485	53	72
JA6YDH		168,084	384	61	100
JA7YFB		52,955	212	39	50
JA2YFC		40,404	177	37	47
JA7YAA		40,320	179	38	46
JA1YYE		39,278	179	36	46
JE1YTF		10,701	95	20	21
JR3YDA		90	6	4	5
Asiatic Russia					
4J9B		4,697,238	3,272	135	411
4J3AM		2,804,560	2,874	107	333
UKØAAB		801,458	1,655	79	183
UK9OAA		465,940	757	59	165
UK9WAP		405,414	835	53	149
UKØFAA		387,467	1,332	61	92
UK9WBI		330,660	790	43	122
UKØSAJ		238,304	976	54	102
UKØSAR		135,078	945	30	64
UK9ACP		104,550	362	27	75
UKØCBE		84,760	673	21	46
UK9HAF		80,040	273	36	84
UKØIAJ		1,122	51	12	10
Georgia					
UK6FAC		165,257	461	27	90
UK6QAA		14.663	123	12	31
Kazakh					
UK7LAH		842,148	1,169	80	218
UK7AAF		141,154	421	30	92
UK7LAF		13,832	95	19	37
Turkoman					
UK8BAJ		129.396	596	24	58
EUROPE					
Aaland Is.					
OHØDX		24,570	205	25	80
Austria					
OE4SZW		1,002,251	1,390	97	276
Bulgaria					
LZ2KKZ		807.784	1,502	78	218
Czechoslovakia					
OK2KOS		1,134.572	1,572	82	271
OK1KSO		848,320	1,169	81	239
OK1KSL		140,679	562	57	146
OK1KCU		25,704	158	28	56
OK1KOK		2,970	64	10	35
OK3KJJ		2,482	73	6	28
OK1KYS		640	32	5	16
England					
G3LNS		2,270.032	2,281	101	320
G3RCV		766,656	1,033	91	272
G8JC		649.128	1,147	75	221
G3FVA		302,706	776	49	152
G2ASF		176,958	576	42	132
G3UNU		87,492	397	36	102
(Oprs.: G3UNU: G4BVY, G4DUA, G4CLA, G4ECY, G8KDO, G8KYE)					
Finland					
OH2AA		341,088	695	69	193
OH3EW		286,067	801	56	185
OH2BFJ		273,402	645	63	186
OH2AG		68,704	349	28	85
OH2TI		4.368	57	18	30
France					
F6KBU		13,904	141	24	64
Germany (DDR)					
DM2DUK		1,876,248	2,351	101	295
DM4CO		261,174	1,042	46	128
DM2BHC		189,435	645	57	162
DM4HJ		164,385	605	52	143
DM3MJ		163,072	593	54	154
DM3RF		45,450	319	23	87
DM6AJ		34,400	336	24	76

(Continued on page 95)



The 214 2-Meter Base.

The incomparable 3750 Amateur Transceiver.

The 3806 2-Meter Hand-Held.

The Ultra Long-Distance TH6DXX.

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THE AMATEUR PROFESSIONALS.

At Hy-Gain, we make our Amateur communications products the same way we make our renowned military, government and commercial equipment. With pride. Precision. And the state-of-the-art technology that has made Hy-Gain an industry leader for more than twenty years.

Our 3750 transceiver with optional remote VFO and matching speaker is unquestionably the finest Amateur radio available today. It's not inexpensive. But, the best never is.

For 2-meter Hams we make our 3806 hand-held. It delivers superb performance, without costing a lot. There's also a whole new generation of 2-meter base antennas, led by our 214 14-element beam. They're all stronger, lighter and more efficient.

For clear, crisp long-distance communication we make a complete line of ultra-DX antennas. Like our exceptional TH6DXX 6-element beam.

These are just a few of the professional quality Amateur antennas, transceivers and accessories we make. Every one simply the best there is.

All around the world we keep people talking. We're the Amateur Professionals.

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We keep people talking.

Hy-Gain Electronics Corporation
8601 Northeast Highway Six;
Lincoln, NE 68505

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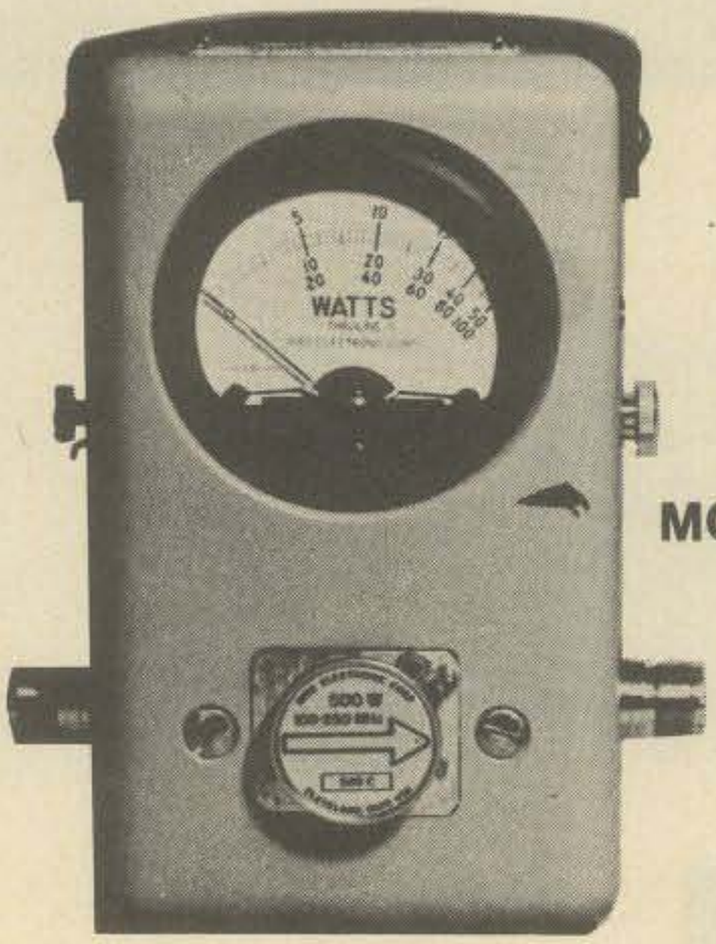
BIRD THRULINE® WATTMETER



MODEL 43

- **BUY ONLY THE ELEMENTS YOU NEED AND ADD EXTRA RANGES AT ANY TIME**
- **READ RF WATTS DIRECTLY**

Table 1
STANDARD ELEMENTS

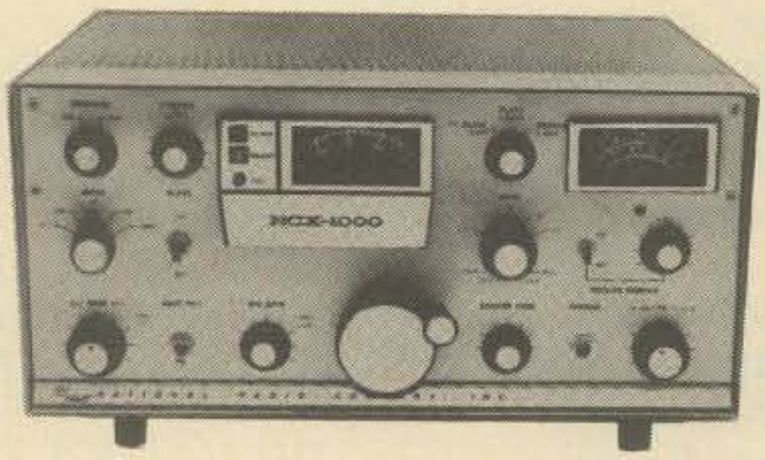
Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2
LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

WE HAVE A COMPLETE STOCK OF ALL BIRD WATTMETERS AND SLUGS

NATIONAL RADIO COMPANY, INC.
NRCI



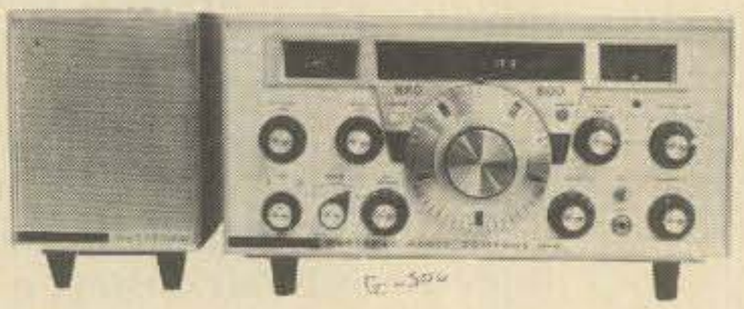
NCX-1000

The only 1000 watt, "single package" transceiver. Heavy duty design . . . results of 50 years of design leadership in amateur equipment. State of the art speech processing, linear amplifier, power supply, all in one package. Nothing extra to buy. Covers all amateur bands in the HF spectrum . . . AM, SS' CW' **$1,600**

NCL-2000

Linear Amplifier. A full 10 dB gain. 20 watts in 2000 watts out. Can be driven with one watt. Continuous duty design utilizes two 8122 ceramic tetrode output tubes, designed for both AM and SSB operation. The industry standard for 12 years. Thousands in use all over the world.

$1,200



HRO-500

The ultimate short wave receiver. This synthesized (phase lock loop) receiver incorporates all facilities for AM, Single Side Band (SSB), and CW receiption in all frequencies from the bottom of the very low frequency band (VLF) to the top of the high frequency band (HF). National's "dead accurate" dial means no searching for transmissions. Dial up the frequency and it's there: aeronautical, marine, CB, amateur, military, etc. Continuous coverage.

$3,000

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THE LOWEST POSSIBLE PRICES

ICOM

VHF/UHF AMATUER & MARINE EQUIPMENT

VHF/UHF AMATEUR & MARINE EQUIPMENT

IC-245. 146 MHz FM 10W XCVR. LSI synthesizer with 4 digit LED readout. Xmit & Rcv frequencies independently programmable. 60 dB spurious attenuation.
$499.00

IC-215. 2 METER FM PORTABLE. Three narrow filters for superb performance. 3W or 400 mW. 15 CH. capacity. MOS FET RF Amp & 5 tuned ckts. S-meter front panel.
$229.00

$249.00

IC-502. 6 METER SSB & CW PORTABLE. XCVR. Includes antenna & battery pack. 3W PEP & stable VFO for fun & FB QSO's. Covers first 800 KHz of 6M band, where most activity is.

IC-211. 4 MEG, MULTI-MODE 2M XCVR. 144-145 MHz on SSB & CW, plus 146-147 MHz on FM. Work AMAT OSCAR six or seven. LSI synthesizer with 7 digit LED. MOS FET RF Amp, 5 helical cavities, FET mixer & 3 I.F. filters.
$749.00

$299.00

IC-22S. 145 MHz FM 10W XCVR. CMOS synthesizer can be set to any 15 KHz ch. between 146 & 148 MHz by diode matrix board. Spurious attenuation far better than FCC spec. 10W or 1W. IDC modulation control.

IC-21A. 146 MHz FM 10W XCVR. MOS FET RF Amp & 5 helical resonator filter, plus 3 I.F. filters. IDC modulation control. Variable output pwr: 500 MW to 10W Front panel discriminator meter. SWR bridge. 117 VAC and 13.6 VDC pwr supplies.
$399.00

DV-21. DIGITAL VFO. Use with IC-21A to complete 2M band.
$299.00

IC-202. 2 METER SSB PORTABLE XCVR. Puts sideband in your hand! Internal C batteries or external 12 VDC. 3W PEP. True I.F. noise blanker. 144.0, 144.2 on two other 200 KHz bands, selectable. Hamtronics stocks 145.2 and 145.8 - 146.0 MHz for calling frequency & satellite band.
$259.00

IC-30A. 450 MHz FM LOW XCVR. 1W or 10W. Low noise MOS-FET RF Amp & 5 section helical filter. 22 CH. capacity. S-meter & relative power output meter. IDC modulation control.
$399.00

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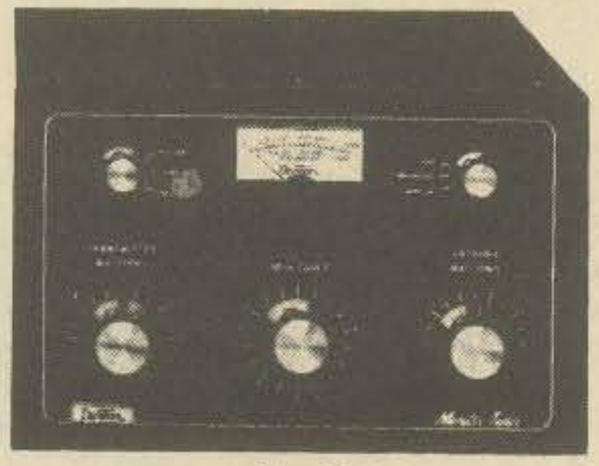
DenTron 3 Kilowatt Tuner Matches Everything From 160 to 10

160-10 MAT



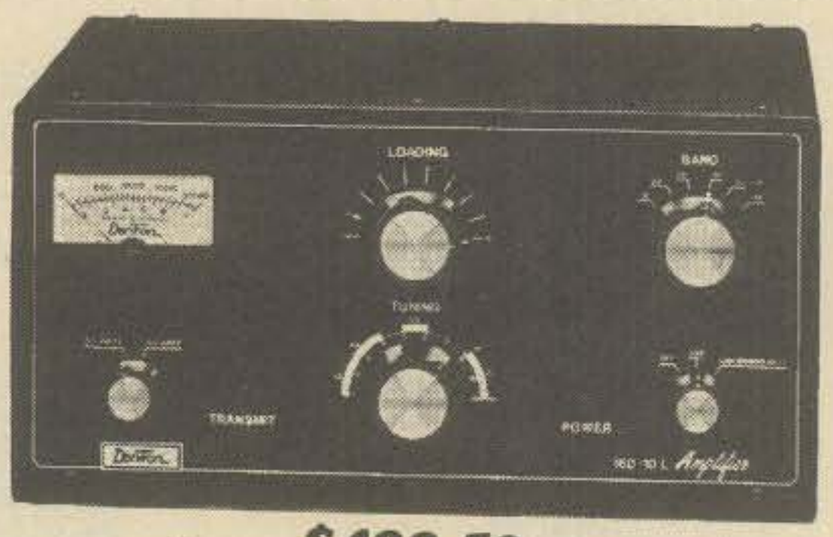
Built-In Wattmeter

Front Panel Antenna Selector for Coax, Balanced Line and Random Wire.

only $229.50

1000 to 1200 WATTS OUTPUT TO YOUR ANTENNA

DenTron SUPER AMP



$499.50

If the amplifier you're thinking of buying doesn't deliver at least 1000 to 1200 watts output, to the antenna, you're buying the wrong amplifier.†

Our New Super Amp is sweeping the country because hams have realized that the DenTron Amplifier will deliver to the antenna, (output power), what other manufacturers rate as input power.

The Super Amp runs a full 2000 watts P.E.P. input on SSB, and 1000 watts DC on CW, RTTY or SSTV 160-10 meters, the maximum legal power.

The Super Amp is compact, low profile, has a solid one-piece cabinet assuring maximum TVI sheilding.

The heart of our amplifier, the power supply, is a continuous duty, self-contained supply built for contest performance.

We mounted the 4 - 811 A's, industrial workhorse tubes, in a cooling chamber featuring the on-demand variable cooling system.

The hams at DenTron pride themselves on quality work, and we fight to keep prices down. That's why the dynamic DenTron Linear Amplifier beats them all at $499.50.

NOW AVAILABLE WITH 572 B's FOR **$574.50**

DenTron Super Tuner

160-10 Meters
Balanced Line,
Coax, Random
or Long Wire

Maximum Power Transfer, Xmitter to Antenna.

1 KW Model $129.50 **3 KW Model $229.50**

DenTron ANTENNAS

The Sky Openers

SKYMASTER

A fully developed and tested 27 foot vertical antenna covers entire 10, 15, 20, and 40 meter bands using only one cleverly applied wave trap. A full 1/4 wave antenna on 20 meters. Constructed of heavy seamless aluminum with a factory tuned and sealed HQ Trap, SKYMASTER is weatherproof and withstands winds up to 80 mph. Handles 2 KW power level and is for ground, roof or tower mounting. Radials included in our low price of

$84.50

Also 80 m resonator for top mounting on SKYMASTER.

$29.50

SKYCLAW

A tunable monoband high performance vertical antenna, designed for 40, 80, 160 meter operation. SKYCLAW gives you the following spectrum coverage:

BAND (Meters)	BANDWIDTH (kHz)
160	50
80	200
40	entire band

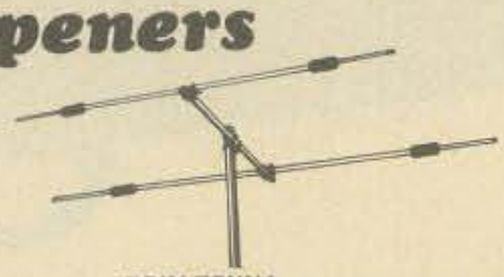
Tuning is easy and reliable. Rugged construction assures that this self-supporting unit is weatherproof and survives nicely in 100 mph winds.. Handles full legal power limit.

$79.50

EX-1

The DenTron EX-1 Vertical Antenna is designed for the performance minded antenna experimenter. The EX-1 is a full 40 meter, ¼ wave, 33', self-supporting vertical. The EX-1 is the ideal vertical for phasing.

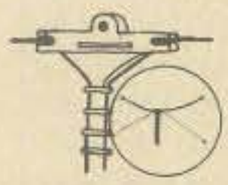
$59.50



TRIM-TENNA

The antenna your neighbors will love. The new DenTron Trim-Tenna with 20 meter beam is designed for the discriminating amateur who wants fantsatic performance in an environmentally appealing beam. It's really loaded! Up front there's a 13 foot 6 inch director with precision Hy-Q coils. And, 7 feet behind is a 16 foot driven element fed directly with 52 ohm coax. The Trim-Tenna mounts easily and what a difference in on-the-air performance between the Trim-Tenna and that dipole, long wire or inverted Vee you've been using. 4 & 6 Forward Gain Over Dipole.

$129.50



ALL BAND DOUBLET

This All Band Doublet or inverted Type Antenna covers 160 thru 10 meters. Has total length of 130 feet (14 ga. stranded copper) although it may be made shorter if necessary. This tuned Doublet is center fed through 100 feet of 450 ohm PVC covered balanced transmission line. The assembly is complete. Add rope to the ends and pull up into position. Tune with the DenTron Super Tuner and you're on 10 through 160 meters with one antenna! Now just for the DenTron All Band Doublet.

$24.50

DenTron ANTENNA TUNER

The 80-10 Skymatcher

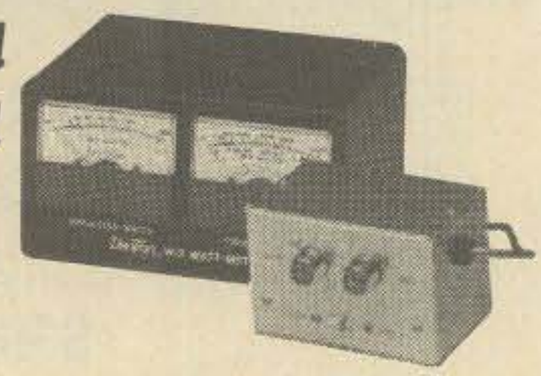
Here's an antenna tuner for 80 through 10 meters, handles 500 w P.E.P. and matches your 52 ohm transceiver to a random wire antenna.

- Continuous tuning 3.2 - 30 mc
- "L" network
- Ceramic 12 position rotary switch
- SO—239 receptional to transmitter
- Random wire tuner
- 3000 volt capacitor spacing
- Tapped inductor
- Ceramic antenna feed thru
- 7" W. 5" H. 8" D., Weight: 5 lbs.

$59.50

DenTron W-2 PAD INLINE WATTMASTER

Read forward and reflected watts at the same time



Tired of constant switching and guesswork?

Every serious ham knows he must read both forward and reverse wattage simultaneously for that perfect match. So upgrade with the DenTron W-2 Dual in line Wattmeter.

$99.50

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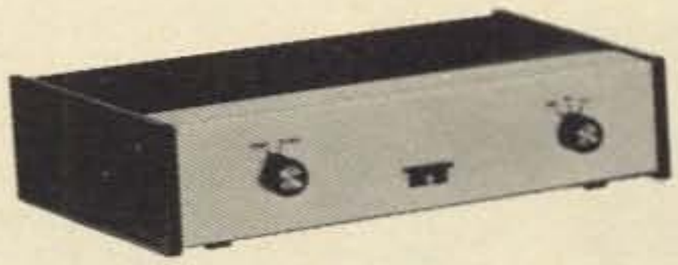
TRITON IV EQUIPMENT

TRANSCEIVERS

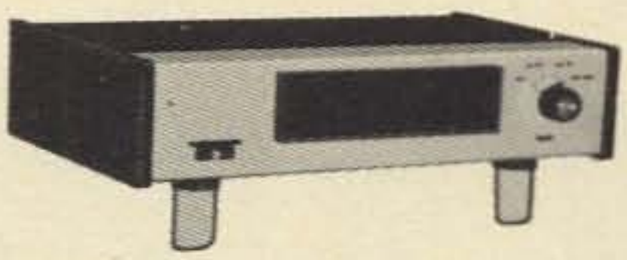
MODEL 540-200W, SSB/CW
3.5 - 30 MHz $699.00

MODEL 544- DIGITAL, 200W
SSB/CW, 3.5 - 30 MHz
$869.00



MODEL 240 $97.00
ONE - SIXTY CONVERTER

MODEL 242 $169.00
REMOTE VFO



MODEL 244 $197.00
DIGITAL READ OUT/COUNTER

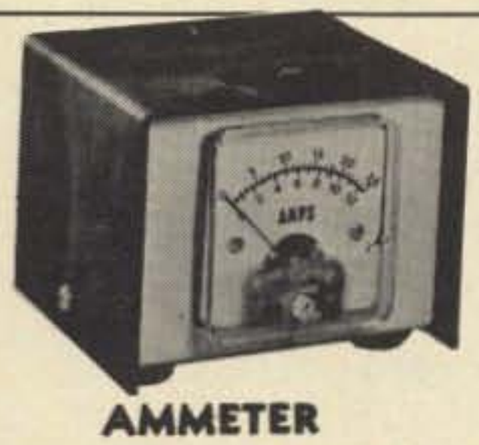
MODEL 262-G $129.00
DELUXE POWER SUPPLY

ARGONAUT

MODEL 509 $329.00
SW, SSB/CW, 3.5-30 MHz

LINEAR AMPLIFIER

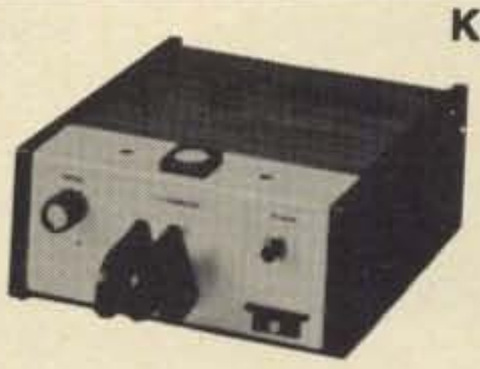
MODEL 405 $159.00
100W, 3.5 - 30 MHz



AMMETER
207 $14.00

XTAL CALIBRATOR
206 $26.95

KEYERS



ELECTRONIC KR-50
$110.00

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KR20-A $67.00

ELECTRONIC KR-5A
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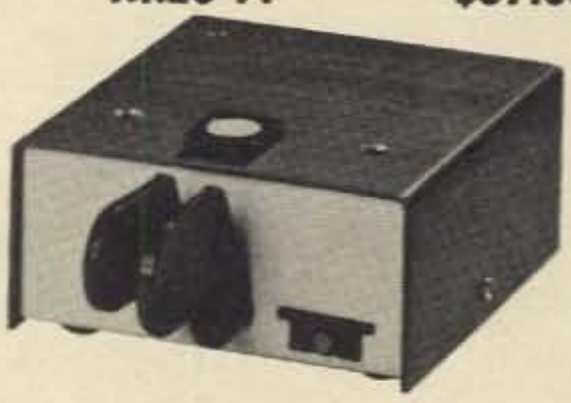
KR-2A $15.00



KR1-A $35.00

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SSR-1	General Coverage, .5 to 300 MHz	$350.00
SPR-4	Programmable, Solid State	$629.00
DSR-2	VLF-HF Digital Synthesized SSB, AM, CW, ISB, RTTY	$2950.00
R-4C	C-Line. HF. 160-10M	$599.00
4NB	Noise Blanker for R-4C	$52.00
5NB	Noise Blanker for SPR-4	$70.00

TRANSMITTER

T-4XC	C-Line. HF. 160-10M	$599.00

TRANSCEIVERS

TR-4CW	80-10M. SSB, AM, CW	$649.00
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MMK-33	Mobile/Dash/Desk Mount for TR-33C	$12.95
34PNB	Plug-In Noise Blanker for TR-4 Series	$100.00
MMK-3	Mobile Mount for TR-4	$7.00
RV-4C	Remote VFO for TR-4 CW	$120.00
FF-1	Crystal Control for TR-4	$46.95

SYNTHESIZER

FS-4	General Coverage for 4-Line and SPR-4	$250.00

LINEAR AMPLIFIER

L-4B	Linear and w/power supply & tubes	$895.00

MATCHING NETWORKS

MN-4	Antenna Matching Network. 200W	$110.00
MN-2000	Antenna Matching Network. 1000W	$220.00
RCS-4	Remote Control Antenna Switch	$120.00
W-4	RF Wattmeter, 1.8 to 54 MHz	$72.00
WV-4	RF Wattmeter, 20 to 200 MHz	$84.00
7072	Hand Held Microphone	$19.00
7075	Desk Top Microphone	$39.00
1525EM	Pushbutton Encoding Microphone	$49.95
HS-1	Head Phones	$10.00
AA-10	10W, 2M Amplifier	$49.95
TV-300-HP	300 ohm High Pass TV Set Filter	$10.60
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TV-42-LP	Transmitter Low Pass Filter. 100W	$14.60
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TV-5200-LP	Transmitter Low Pass Filter. 1000W. 100W, 6M	$26.60

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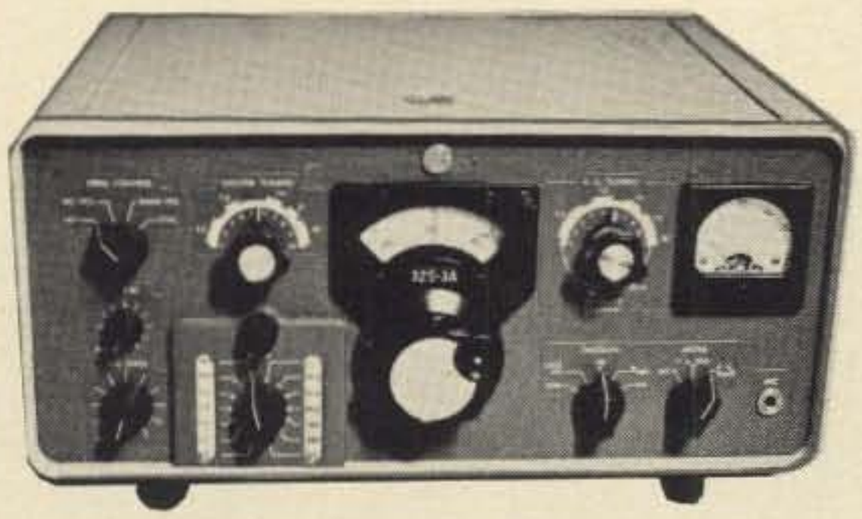
COLLINS AMATEUR EQUIPMENT

KWM-2A TRANSCEIVER **$3533.00**
Unmatched for mobile and fixed station applications. 175W on SSB, 160W on CW. Switch select up to 14 optional Xtals. Can be used for RTTY. Filter type SSB generation. Automatic load control. Inverse RF feedback. Reimeability-tuned variable oscillator.

75S-3C RECEIVER **$2504.00**
Sharp selectivity. SSB, CW and RTTY. Single control rejection tuning. Variable BFO. Optional mechanical filters for CW, RTTY and AM. 2.1 KHz mechanical filter. Zener regulated oscillators. 3-position AGC.



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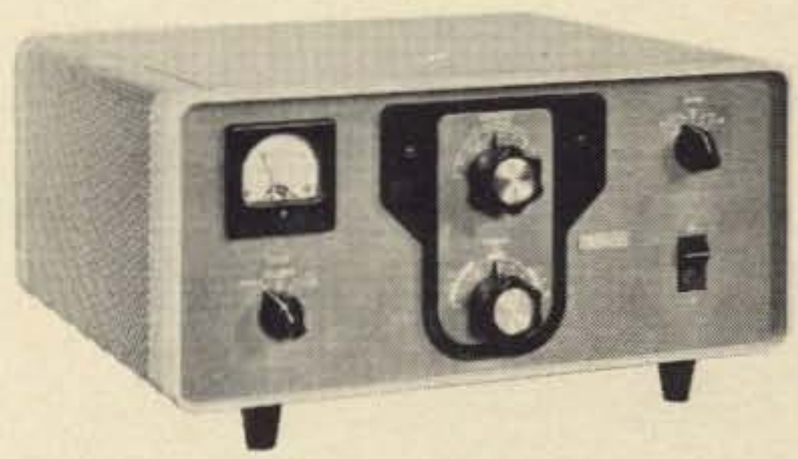

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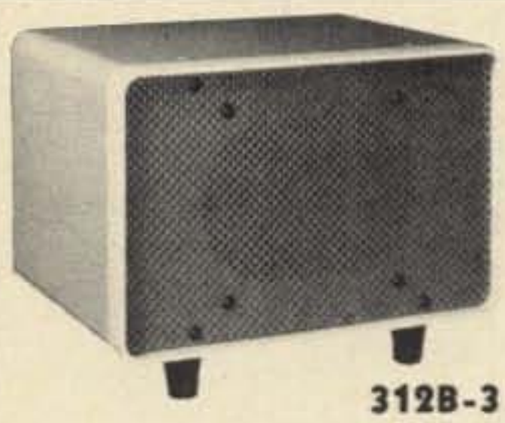

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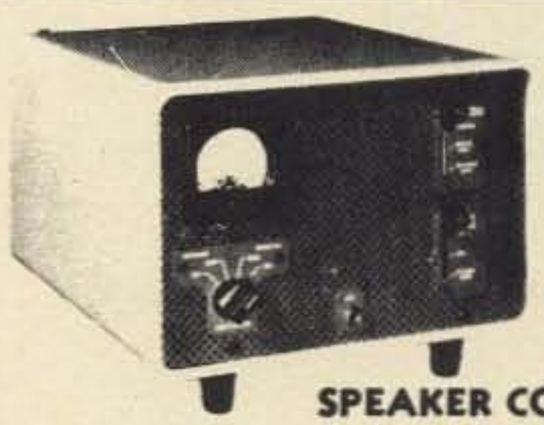

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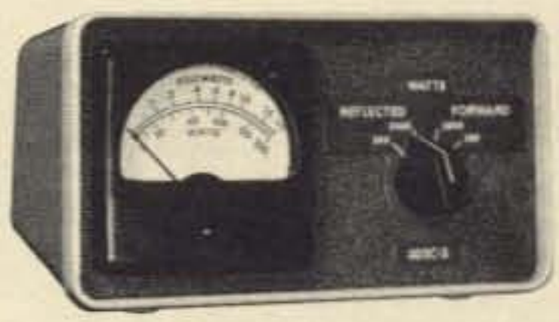

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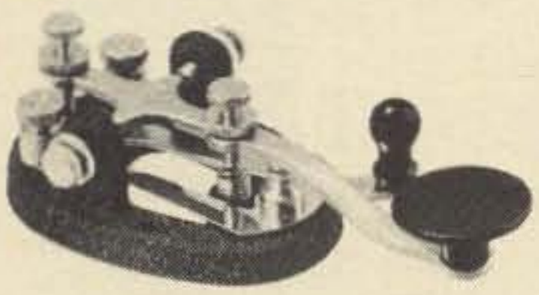

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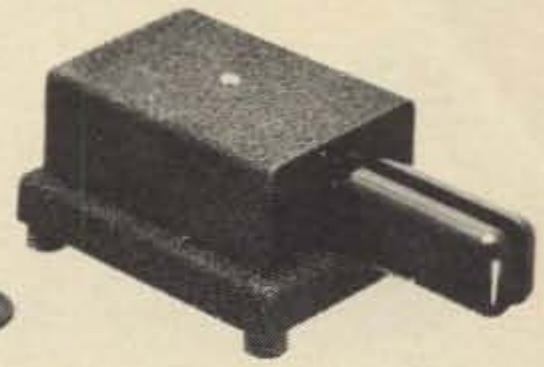

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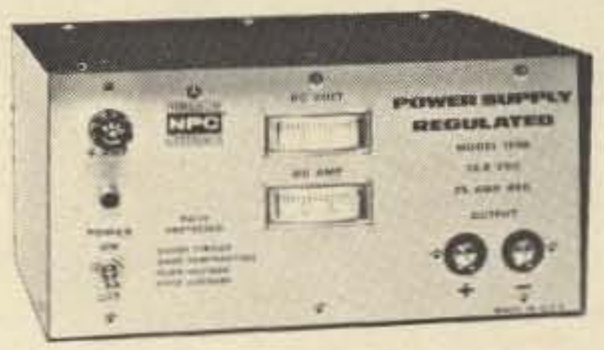

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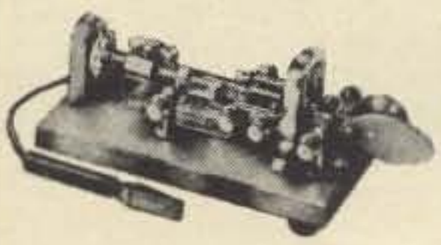

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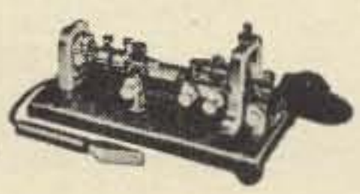

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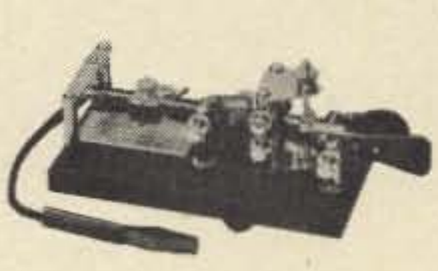

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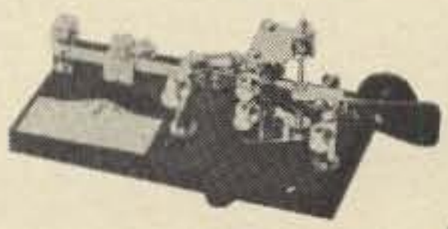

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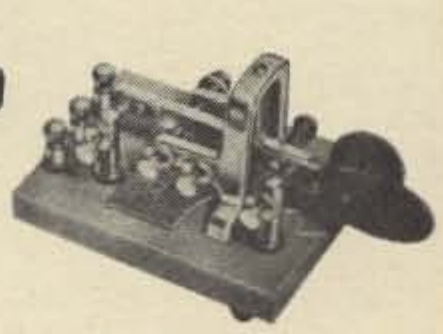

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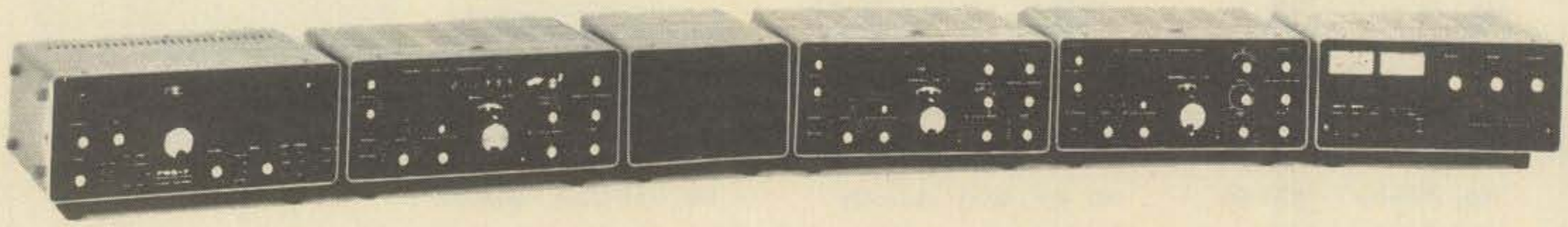
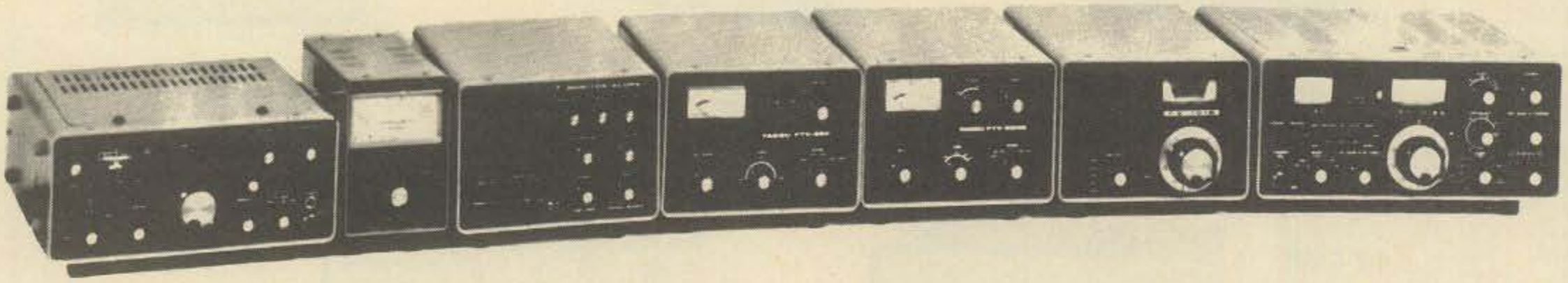
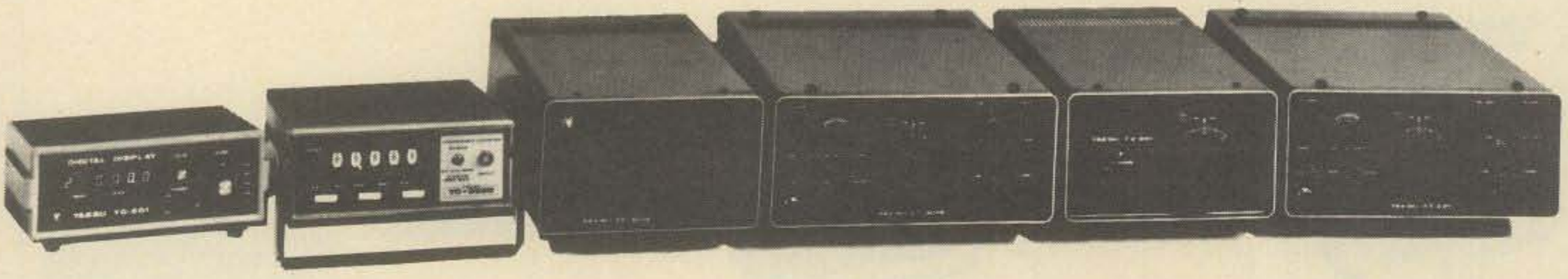


Left to right – **FRG-7, Solid State Synthesized Communications Receiver** • FR-101 Digital, Solid State Receiver • SP-101B, Speaker • **FR-101, Digital Solid State Receiver** • FL-101, 100 W Transmitter • FL-2100B, 1200 W PEP Input Linear Amplifier



Left to right – **FT-620B, 6 Meter Transceiver** • YP-150, Dummy Load Wattmeter • YO-100, Monitor Scope • FTV-250, 2 Meter Transverter • FTV-650, 6 Meter Transverter • FV-101B, External VFO • FT-101E 160-10 M Transceiver



Left to right – **YC-601, Digital Frequency Display** • **YC-355D, Frequency Counter** • **FP-301, AC Power Supply** • **FT-301S Digital, All Solid State Transceiver** • **FV-301, External VFO** • **FT-221, 144-148 All Solid State All Mode Transceiver**

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SSB TRANSCEIVER. PLL RF Monitor Noise Blanker. Digital hold locks counter & display at any frequency, but allows VFO to tune normally. True RF compressor adjustable speech processor. IF shift control. RF attenuator. VOX, GAIN, ANTIVOX and VOX delay controls. RF negative feedback. Optional digital readout. DRS Dial. High stability FET VFO.

TS-520 **$629.00**

SSB TRANSCEIVER. Proven in the shacks of thousands of discriminating hams, field day sites, DX and contest stations and mobile installations. Superb engineering and styling.

SP-520 **$22.95**

Optional external speaker for better readability.

TV-502 **$249.00**

TRANSVERTER. Puts you on 2M the easy way. 144-145.7 MHz or optional 145-146 MHz.

PS-5 **$79.00**

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TR-7200A **$229.00**

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COMMUNICATIONS RECEIVER. 1.8 to 29.7 MHz, WWV and CB band. 50 MHz, 144 MHz converter optional. Stable VFO & oscillator for 5 fixed channels. 1 KHz dial readout. Xtal filters (SSB/8 pole, CW/8 pole, AM/6 pole). Squelch. S meter. Noise blanker.

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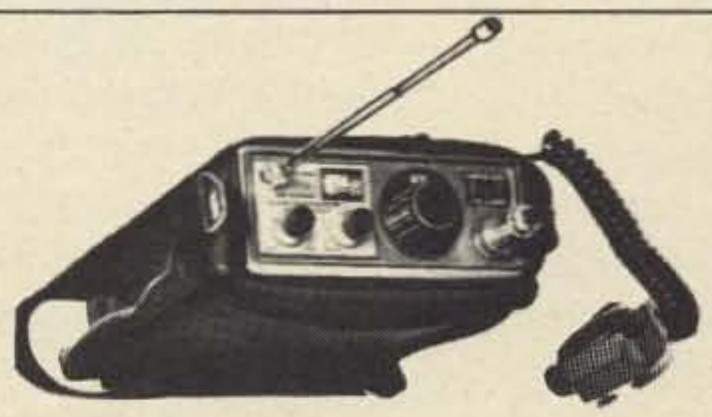
SSB TRANSMITTER. 3.5 to 29.7 MHz. Stable VFO. 1 KHz dial readout. 8 pole Xtal filter. AM Xmission available. Built-in AC pwr supply. Split frequency control available.

VFO-820 **$139.00**

Designed exclusively for use with TS-820. RIT circuit and control switch. Fully compatible with optional digital display.

VFO-520 **(Not Shown)** **$116.00**

Solid State Remote VFO. RIT circuit with LED indicator.



TR-2200A **$227.00**

PORTABLE 2M FM TRANSCEIVER. 12 Ch. capacity. Removable telescoping antenna. External 12 VDC or internal NI-CAD batteries. 146-148 MHz. 6 CH. supplied. Switchable 2W or 400mW output.

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Wow! Anyone can put up a big beam with a helicopter or crane. Using a hot air balloon takes style—and $32 worth of gas!

It's Not Just Hot Air!

BY BILL GUIMONT*, W7KW

In the process of putting together a DX contest station at W7KW, I obtained a KLM prototype, 4-element, 75-meter yagi. Needless to say, this is a large antenna, measuring about 82 feet square and rendering it unwieldly to handle under the best of circumstances. In an attempt to determine how we were going to raise this monster up through a maze of guy wires to its resting place at 175 feet we discarded idea after idea. Then I observed a group of about 40 hot air balloons flying around the Phoenix area. I had seen them several times before and understood there was a balloon flying club located at one of the colleges in Glendale, Arizona. On this particular occasion, one landed about a mile away. FLASH! It struck me that here might lie the solution. I climbed into my pickup and, within minutes, cornered the pilot, Mr. Fred Gorrell. It turned out that he is a balloon pilot of renown and president of the local club. Within a half hour of babbling out my strange tale, I discovered Fred was as crazy as me. It didn't take much persuasion to convince him we could shoot for a front cover on one of the national amateur radio magazines, coverage by NBC and lots of other publicity, and he was hooked! I quickly agreed to pay for the propane gas which for three days amounted to $32.00, and we made final plans.

After the smoke cleared away, second thoughts on my part revealed that I still had a lot of work to do on the 75-meter antenna before we hauled it up. Also, Fred indicated that the balloon season was at an end. About this time of year, the outside temperature is so high by 7 a.m. that you can't reach a substantial difference in outside/inside temperatures as there is a limit to the heat you can apply to the inside of one of these balloons. Quick calculations indicated that if we got up early enough, prayed a lot, and *if* the wind was absolutely calm, we might squeeze in a payload of 650 lbs.

Further thoughts were that if we hauled the last section of the tower (which had to be rigged and checked out in advance) up separately then the bearing plates, prop pitch motor, and 125-lb. rotating mast, each on a separate trip, it would take days of work on the tower and we didn't have the time. We'd have to wait until the fall.

In addition, everything had to be preassembled on the tower section, and checked out, then disassembled and hauled up. Another HOT FLASH! Why not assemble the tower section and all components including the antenna on the ground and haul the whole thing up in one swoop-all 500 lbs worth!

Most of the members of the DX clubs I belong to and my friends up and down the coast, meekly suggested that perhaps I had been exposed to the Arizona sun too long? They suggested many reasons why it wouldn't work and that I might even be subjecting the tower and the balloon people to some unnecessary risks.

I have never gone along with the crowd and on Saturday, April 30, 1977 at the early hour of 5 a.m. the gang plus about 50 spectators, arrived. Fred brought along 15 or more people as ground crew to inflate the balloon and handle the tethers. I had a crew for climbing the towers and handling technical details that included W7KAR, WB7CYU, (who took the photos illustrating this article) WB7DPM, WA7YRP, W7CKW, W7YU, W7YQ, WB7DOX and W7VO. W7JHQ brought another team from Sun City to handle the cameras and there was of course the crew from KTAR for NBC news. If I was to fail, I was certainly going to do so in style! Many shook their heads and even Fred had some last minute reservations. After a pep talk spiked with confidence (on the outside) the skepticism was overcome and we cautiously proceeded. Gingerly flying the balloon under tether to test wind conditions and see how it would handle around the tower guys, we spent 1½ hours before finally hooking up to the 15-meter (six element) assembly and bringing it up.

WHAT A SIGHT! UNBELIEVABLE! We were over the tower, guided by the tether ground crew and in

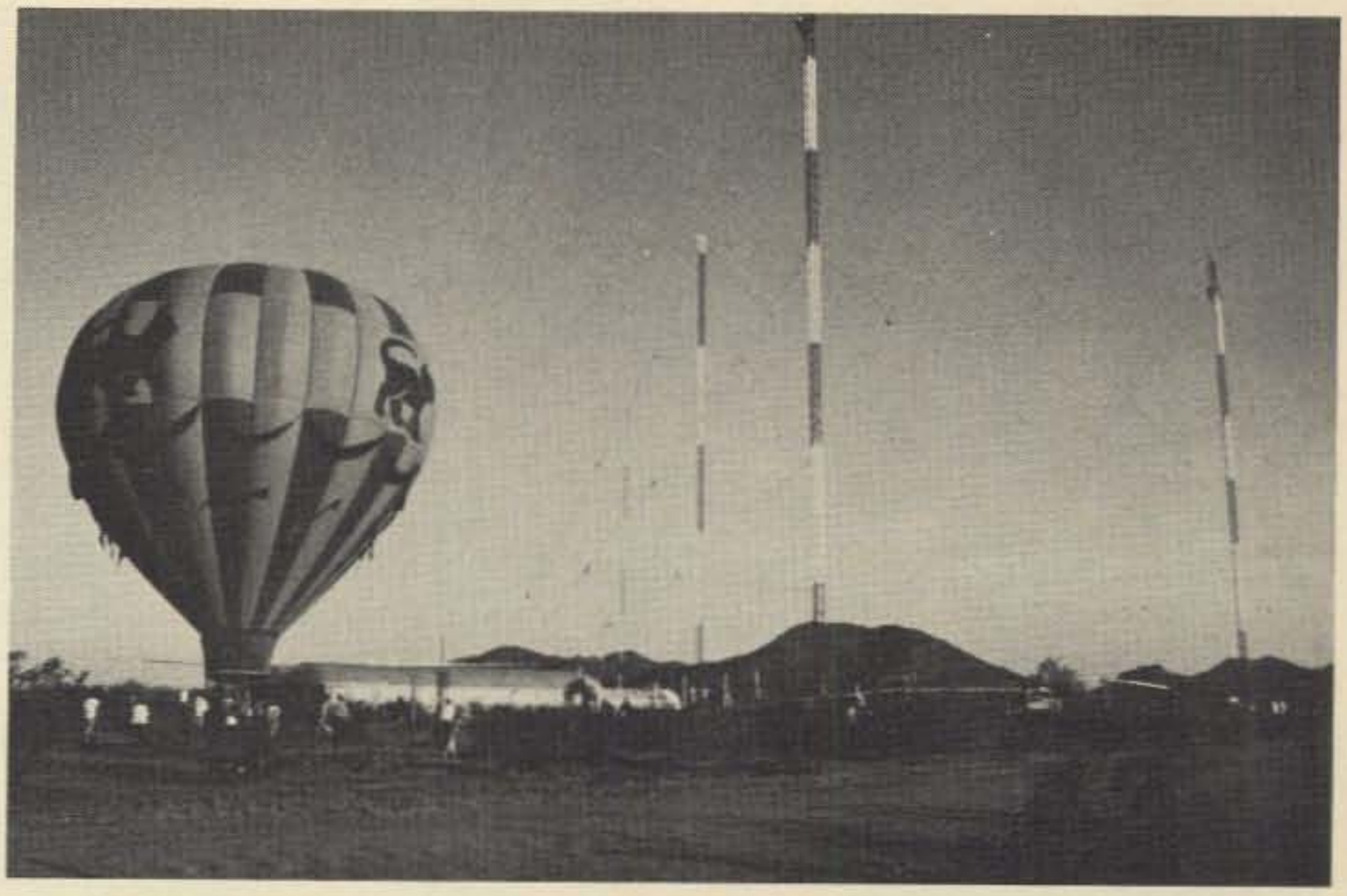
*23522 North 77th Avenue, Peoria, AZ 85345

position to let the assembly down when Fred shouted over the 2-meter rig, "I'm out of gas—TAKE ME DOWN QUICK!" By the time we got him down to the ground, there wasn't a drop of gas left — he just made it. Needless to say, it was a dejected crew and many had the knowing look that said "I told you so."

I'm a poor loser, and when I regained the blood to my veins, I was determined to try again. Feeling sorry for me, the crews returned Sunday at 5 a.m. minus the curious on-lookers. Well, the dress rehearsal paid off and each man and woman knew what was expected of them. I talked Fred into trying the 20-meter assembly this time because it was larger and if we could only do one, we wouldn't have to haul that 58-footer up by hand. Within 15 minutes the balloon was inflated and another 5 minutes saw us lifting off. Within another 20 minutes, we were positioned about 10 feet above the 175-foot tower. Gad—WHAT A SIGHT! That big assembly being floated around as if it were only 10 lbs. Two tower men (W7KAR and WB7DPM) reached out and grabbed a tie-rope hanging down from the bottom of the tower section and pulled it into place. Quickly and deftly the tower men shot the alignment tools into the bolt holes and minutes later had them secured. There is no way to explain the exalted feeling each of us had in his part of the operation. We had accomplished another "FIRST" for amateur radio.

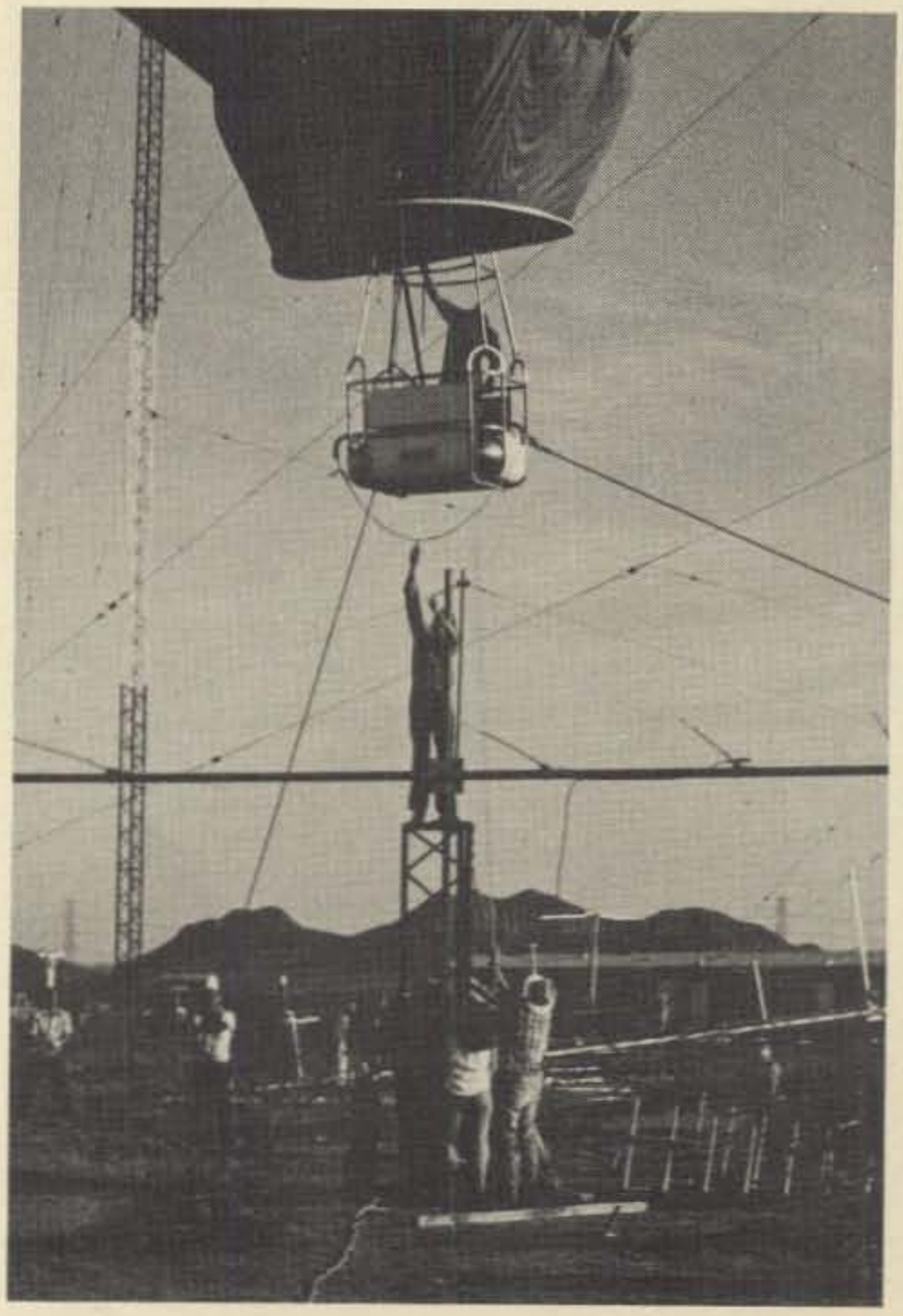
The exhilaration resulting from the success carried through the week and the following Saturday, May 7, at 5 a.m., the balloon crew and our crew were ready to do it again. This time, we tackled the KLM 4-element, 40-meter beam. We had set it up so that I would check the temperature and wind at 4 a.m. and broadcast over our 2-meter DX net whether it would be go or no go. The gods were in our favor and everthing went like clock work. You would have thought we were a group of professionals and everything went that way. We even shaved 35 minutes from the previous week's schedule.

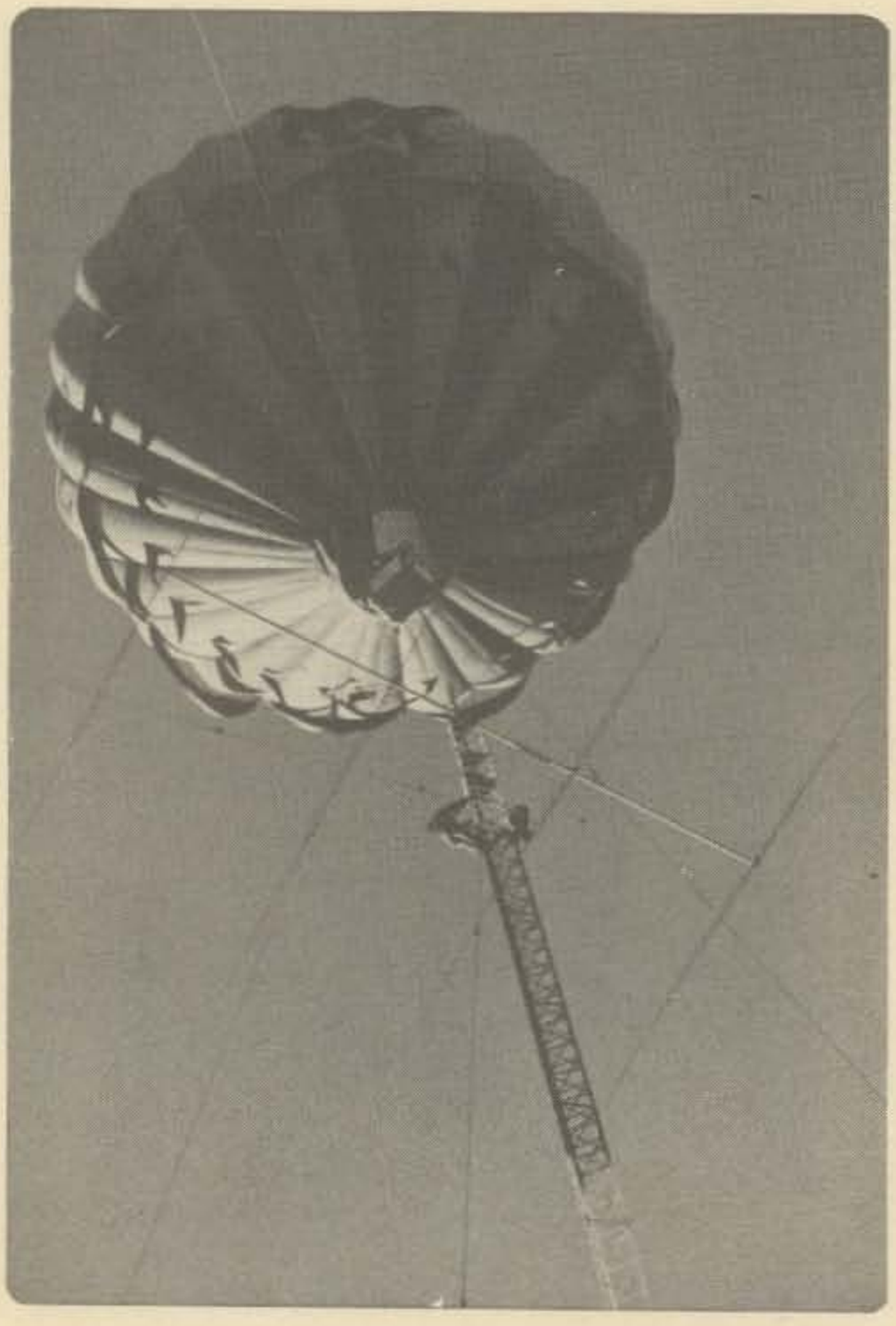
Well, I must confess not everything went smoothly. As we were filling the balloon with hot air prior to ascent, one of our tower men had still not shown up. Our reserve man had a motorcycle accident and still another had the flu. It turns out our man had met a cute little chick the night before and somehow the hours had melted away. Butch, one of Fred's ground crew volunteered to climb the tower with WA7YEP. We didn't know, but Butch had never been on a tower before and here he was at 175 feet performing like a veteran.



These photos on this page plus the others on the next page tell the whole story.

However, our luck was certainly far beyond what we expected for this time of year and it was definitely too late to put up the 15- and 75-meter KLM yagis. Flushed with success, we agreed to do this around the first of September which should still be in time to make the CQ World Wide. See you then! ■





BASIC RADIO

BY IRVING TEPPER*, WB2FUZ

Chapter 2 Static Electricity

Matter in its normal state is composed of atoms that have equal numbers of orbiting electrons and protons in the nucleus and so are neutral or without a charge. As explained in Chapter 1, it is possible to add or remove electrons from the valence ring of some atoms as shown in Fig. 1.7[1]. One way this might be accomplished is by friction between two different materials. The classic example given in most physics texts is the glass rod and silk cloth.

Static Charges: Rubbing the glass rod briskly with the silk cloth imparts enough energy to the valence electrons on the surface of the glass to break away from their parent atoms and move to the silk cloth. This action upsets the normal electrical balance in both the glass and the silk. The glass now having fewer electrons assumes a positive charge. The silk, having picked up the electrons freed from the glass has an excess of electrons and thus a negative charge. The protons cannot break away from the parent atom in either material because they are locked into the atomic structure so tightly that huge forces are necessary to free them. The result is that the charges that are developed are due only to the *movement of electrons.*

With the glass and silk now charged and the materials widely separated the charges remain unmoved or *static* and are called *static charges* or *static electricity*. When the two materials are brought together the charges will recombine and both materials will be neutral again. This is referred to as "The Law of Charges."

Testing the Law of Charges: There is a very simple way of testing the law of charges using the glass rod and silk cloth. Suspend the glass rod on a thin string, as shown in Fig. 1.8, so that it may rotate freely. Hold the glass rod and rub it briskly with the silk cloth. Separate the two materials and steady the glass rod so that it is hanging still. Bring the silk cloth close to the glass rod and observe how the positively charged glass is attracted to the negatively charged silk.

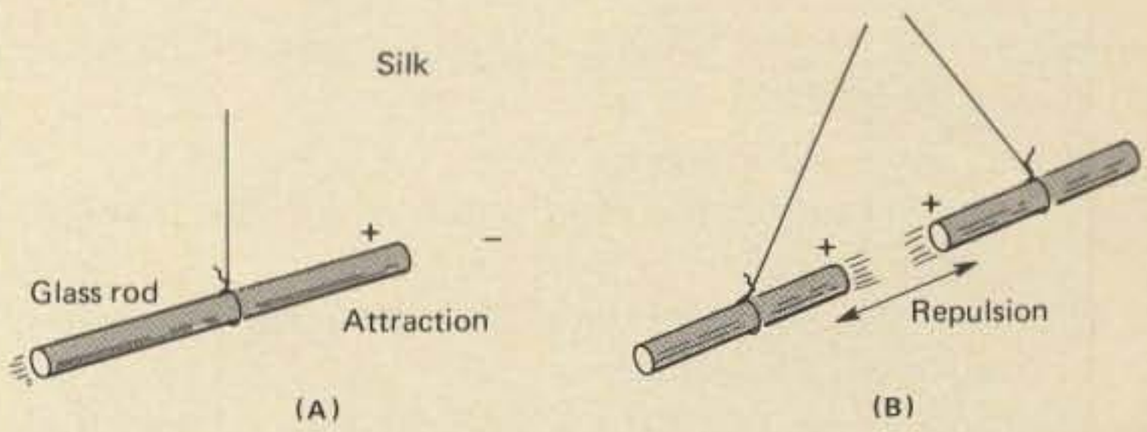


Fig. 1.8A—After glass and silk are charged by rubbing, they will attract as unlike charges attract. B) Two glass rods, both charged positive will repel as would two silk cloths.

If a second glass rod is available, charge it too and bring it close to the suspended glass rod as shown in Fig. 1.8B. Observe the repulsion between the two glass rods since they are both positively charged.

Electrostatic Field Measurements: The more electrons removed from the glass rod, the greater the strength of its positive charge. At the same time, the more electrons removed from the glass, the more electrons are transferred to the silk so that it too

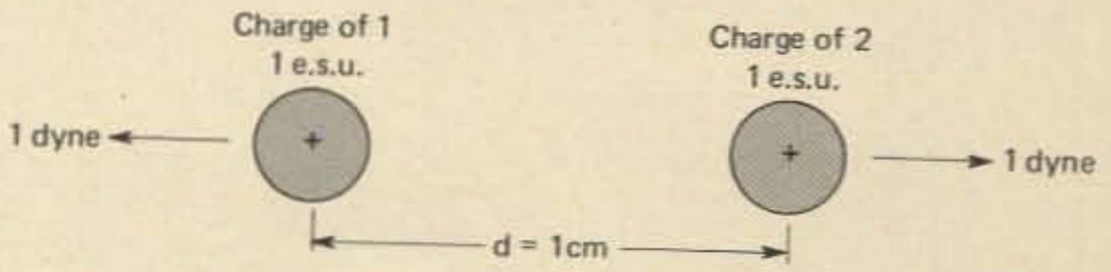


Fig. 1-9—The standard for determining the unit of electrostatic charge, the e.s.u.

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[1]This article is one of a continuing series entitled *Basic Radio.* Figures not shown in this month's article can be found in the July issue of *CQ*.

will have a greater negative charge. Since the strength of the charges can vary, it becomes necessary to establish a standard of measurement to allow comparisons.

There are two values that must be measured in charges. The first is the strength of the individual charge. The second is the repelling or attracting force between the two charges. The strength of an electrostatic charge is measured in *electrostatic units* abbreviated e.s.u. The definition of one e.s.u. (Fig. 1.9) is a charge that repels an equal charge of the same polarity with a force of one *dyne* when separated by one centimeter. A dyne is equal to 0.00102 grams or a force of one gram is equal to approximately 980 dynes.

The second measurement, the repelling force between the charges, is determined from a formula developed by the scientist Coulomb in the year 1784. Our interest in the formula is not for purposes of calculations; these calculations are not done by a technician. What is necessary is an understanding of what the formula implies so that you can apply this understanding to learn the operation of capacitors, transistors and vacuum tubes, all of which operate on electrostatic principles.

Coulomb found, by experimentation, that:

$$F = \frac{q_1 \times q_2}{k \times d^2} \qquad (1.1)$$

where F = the force between the charges, in dynes.

q_1 = charge #1 in e.s.u.

q_2 = charge #2 in e.s.u.

k = a constant for the medium in which the charge exists. For air k = l.

d = the distance between the charges in centimeters.

The important feature for you to note is that the distance between the charges, d, is squared ($d^2 = d \times d$). It does not require any great understanding of the above formula to realize that the greater the separation between the charges the weaker the repelling or attracting forces will be. You could have determined this from Figs. 1.5 and 1.8 earlier. But what is the effect of d^2? Let's compare the results of two calculations. You needn't follow the math if you don't wish to; just compare the answers.

Problem #1:

Given: Two like charges of 2 e.s.u. each. A separation of 2 cm. between the charges. The charges are in air so k = l. Find: the repelling force between the charges, in dynes.

$$F = \frac{q_1 \times q_2}{k \times d^2}$$
$$= \frac{2 \times 2}{1 \times 2^2}$$
$$= \frac{2 \times 2}{1 \times 4}$$
$$= \frac{4}{4}$$
$$= 1 \text{ dyne}$$

Problem #2: We will now increase the separation between the charges, increasing d from 2 cm to 4 cm. All other values will remain the same.

$$F = \frac{q_1 \times q_2}{k \times d^2}$$
$$= \frac{2 \times 2}{1 \times 4^2}$$
$$= \frac{2 \times 2}{1 \times 16}$$
$$= \frac{4}{16}$$
$$= \tfrac{1}{4} \text{ dyne}$$

Note carefully that while we double the distance between the charges, the force did not drop by one half, it *dropped to one-fourth*. Thus we may conclude that the force of attraction or repulsion between the two charges while directly proportional to the product of the charges is *inversely proportional to the square of the distance between the charges.*

Electrostatics in Everyday Experiences: Generally speaking static electricity is more of a nuisance than useful in our everday life. When you walk across a plush carpet many electrons are exchanged between the rug and your body so that when you touch a neutral object such as a door knob or another person, the excess of electrons flow to the neutral object causing a shock and often a visible spark. You also generate a static charge when you slide across a car seat (particularly on cold days). When you touch the car door handle you can feel the discharge as a shock. Still another example of friction causing static charges is the tumbling action of a clothes dryer. When removing the garments from the dryer, they will cling together and snap, crackle and pop as you separate them.

There are, however, some beneficial applications of static electricity such as removing dust from the air, and removing ash before it leaves a smokestack. Static electricity is also used in some manufacturing processes such as coating abrasive papers.

While static electricity can be both useful and a nuisance, it can also be dangerous. A spark caused by static electricity in some plants that process volatile mixtures can cause an explosion. Lightning is a static discharge between the earth and clouds and its danger does not need stressing here.

Suggested Reading:

Schrader, Robert L., *Electronic Communication*, Third Edition, New York, McGraw Hill, pp. 1-5.

Tepper, Marvin, *Basic Radio*, Second Edition, Vol. 1, New Jersey, Hayden Publishing Co., pp. 1-14 to 1-26.

SELF CHECK QUESTIONS #2

1—An atom, in its normal state, contains a(an) _____ (greater; lesser; equal) number of orbiting electrons compared to the protons in its nucleus.

2—Matter, in its normal state, is _____ (neutral; positively charged; negatively charged).
3—In order to charge neutral matter, it is necessary to _____ or _____ (add to; remove from; leave) the electrons orbiting in valence rings of the atoms.
4—The energy needed by the valence electrons to break away from its parent atom can be obtained from friction (T or F).
5—After the electrons have been freed from one material and transferred to another material, the material that lost the electrons assumes a _____ (positive; negative; neutral) charge.
6—The law of charges indicates that unlike charges will _____ (repel; attract) each other.
7—Two glass rods, after having been rubbed with silk, will _____ (repel; attract) each other.
8—As the distance between two charges is decreased, the strength of attraction or repulsion will increase.

A) linearly
B) inversely
C) by the square of the distance
D) none of the above.

ANSWER KEY #2

1—Equal
2—Neutral
3—Add to or remove from
4—T
5—Positive
6—Attract
7—Repel
8—C

EXPERIMENT #1:

Generating Static Electricity
Materials: Glass tumbler, plastic bag, comb
Procedure:

Use an ordinary drinking glass of the type usually found in a kitchen and a small plastic bag of the type used to store food leftovers. The plastic bag performs the same job as the silk but is more readily available. Stand the glass, open end down, on the kitchen table and hold it down with one hand. With the other hand rub the plastic bag briskly against the glass. Hold the plastic bag ¼" to ½" away from the glass and observe the attraction between the bag and glass due to opposite charges.

Rub a second plastic bag on a glass and then suspend the two plastic bags close to each other. Note the repelling action. (Do not wait too long to charge the second plastic bag after the first one is charged as the first plastic bag may dissipate its charge).

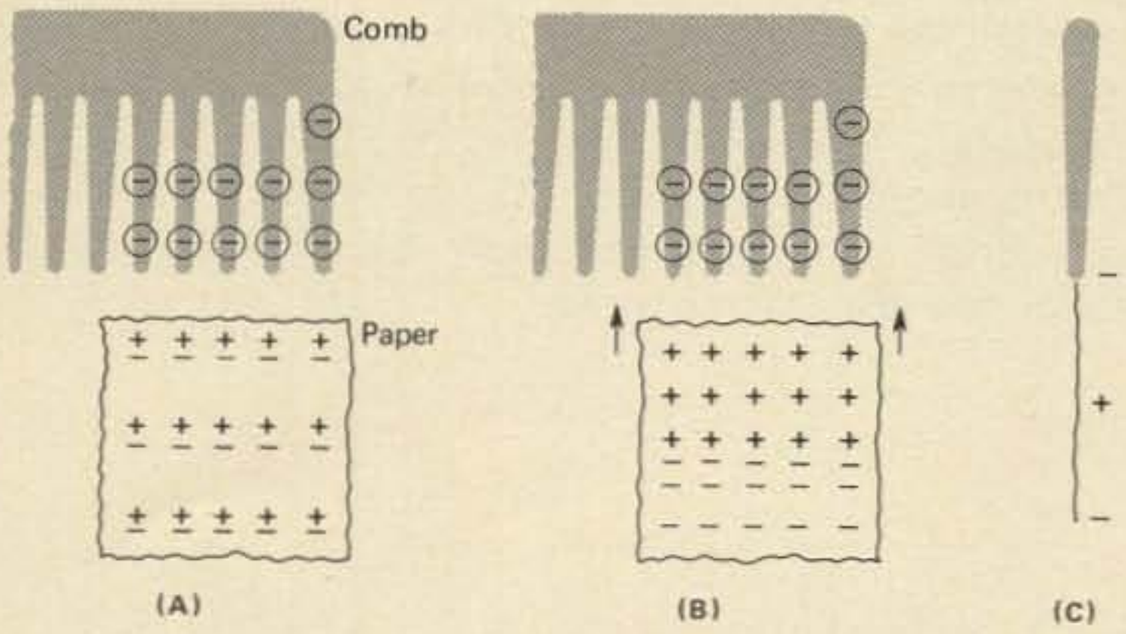


Fig. 1A—Negative charge on comb begins to affect the neutral paper charge distribution. B) When all the negative charges have been pushed to one end, the paper will be attracted to the comb. C) The paper will point straight down due to the repelling effect of the negative end.

NOTE: Size of paper is exaggerated in drawing to show movement of charges more clearly.

A second experiment can be performed with a comb and some small bits of paper, ¼" square. Running the comb through your hair repeatedly and quickly causes electrons to accumulate on the comb charging it negatively. When the comb is brought near the bits of paper nothing happens for a brief moment and then the paper is attracted to the comb. What has happened is illustrated in Fig. 1. The negatively charged comb is placed near the bit of paper that has a neutral charge with the positive and negative charges evenly distributed (1A). The negative charge of the comb repels the negative charges in the bits of paper and moves them to the far end of the paper (1B). The positive end of the paper is then attracted to the comb. Note carefully how the paper projects away from the comb because the negative end of the paper is being repelled by the negatively charged comb and tries to move as far away as possible.

SELF-CHECK QUESTIONS. EXPERIMENT #1:

1—Why was the plastic that was rubbed against the glass attracted to the glass?
2—Why did the comb develop a negative charge after being run through the hair?
3—Why could the comb pick up bits of neutral paper?

ANSWER KEY EXPERIMENT #1

1—The glass lost electrons making it positively charged. The plastic gained electrons making it negatively charged. Opposite charges attract.
2—The comb picked up electrons from the hair because of friction.
3—The comb picked up neutral paper by repelling all the paper's negative charges to one end causing that end to become negatively charged and the end of the paper close to the comb to become positively charged. The negative charge of the comb attracted the positively charged end of paper.

INFORMATION SHEET #1: HAND TOOLS—SCREWDRIVERS

One of the most useful and necessary tools for the electronics technician is the *screwdriver.* The average technician will usually accumulate at least a half dozen different sizes and varieties of screwdrivers but most often he will use one or two of this collection, the ones that are most comfortable. The others will be saved for the special jobs, the tight working quarters, the very small screw slot and so on.

The screwdriver shown in Fig. 1 is typical. It can have the flat blade shown or it may have one of two

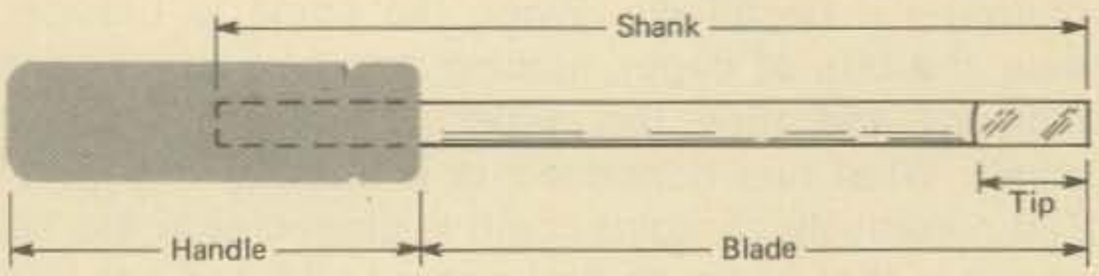


Fig. 1—Typical screwdriver with cabinet blade tip.

other shapes. The usual shapes for the tips are shown in Fig. 2. The keystone tip (2A) is used mostly for large screwdrivers and can most often be found in auto mechanic and carpenter's tool boxes. Some smaller keystone tip screwdrivers might appear in an electronics technician's tool box but its use would be confined to work on large housings, mountings and enclosures for large equipment. Screwdrivers using the cabinet tip (Fig. 2B) and the Phillips tip (Fig. 2C) are most commonly used by the electronics technicians.

The cabinet tip screwdriver is classified by the length of its blade and the width of its blade tip. Blade lengths can be as short as one inch and as long as eighteen inches. The typical blade tip widths $\frac{1}{8}$", $\frac{3}{16}$" and $\frac{1}{4}$". The most commonly used sizes are blade lengths of 4" to 8" with tip widths of $\frac{1}{8}$", $\frac{3}{16}$" and $\frac{1}{4}$".

The blade fits for the screw heads are shown in Fig. 3. A proper fit is shown in Fig. 3A; the blade fits snugly in the slot and is not wider than the screw head. Figures 3B and 3C illustrate improper fits. In B the blade is too small and will twist around in the slot damaging the screw head and worse, damage the screwdriver blade; in C, the blade projects out past the screw head and will chew up any components alongside the screw head and the blade will scar the device into which the screw is being tightened.

The Phillips screwdriver shown in Fig. 2C is classified by numbers. The smallest screwdriver is #0 running up through #1, #2, #3, etc. Most electronics work can be done with sizes #1, #2, and #3. On occasions, #0 might be needed for miniature work.

The proper fit for the Phillips screws is most necessary. A blade too small for the screw will spin around in the head, a blade too large will not even fit into the screw head.

The handles of all screwdrivers in your tool box should be of shock proof plastic. The blade, as shown in Fig. 1, should not run through to the top of the handle. While a through-handle blade is a good choice for a carpenter, a blade that runs through the handle is a dangerous shock hazard for an electronics technician and should be avoided at all costs.

You should also choose the handle for a comfortable grip so that you may apply the necessary twist to loosen or tighten screws.

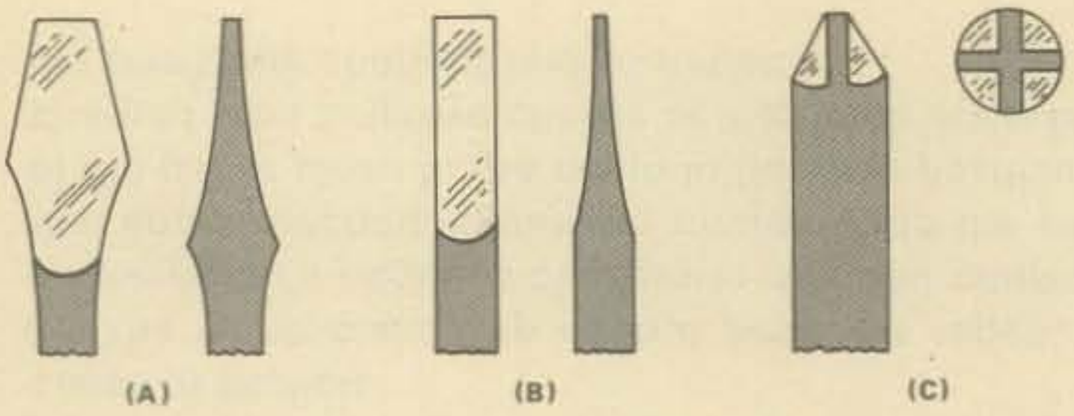


Fig. 2—Three basic screwdriver tips. A) Keystone, B) Cabinet, C) Phillips.

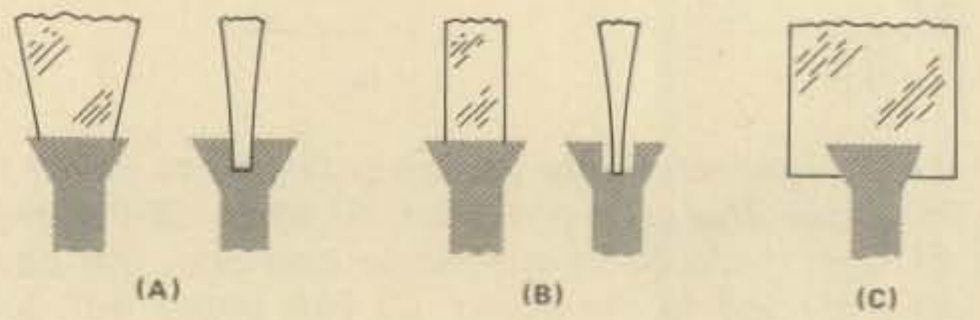


Fig. 3—A) Proper fit between screwdriver and blade. B) Improper fit—blade too small for screw. C) Improper fit—blade too wide for screw.

INFORMATION SHEET #2: HAND TOOLS—PLIERS AND WIRE CUTTERS

Pliers and wire cutters contend with the screwdriver for the top of the list in the technician's tool box. There are several types of pliers used in the electronics field. *Slip Joint Pliers* shown in Fig. 1 are used for heavy mechanical work. This includes tightening and loosening nuts and general holding, shaping and twisting purposes. For larger diameter work, the jaw can be slipped on the pivot (See Fig. 1B) so that the jaws will still be parallel when grasping the larger nut. This increases the gripping power and reduces the tendency for the pliers to slip.

To further reduce slippage the inside faces of the jaws are grooved or serated. Also serated is the round section just below the parallel jaw section. This portion of the plier is used to grasp and turn round shaped objects such as shafts and pipes.

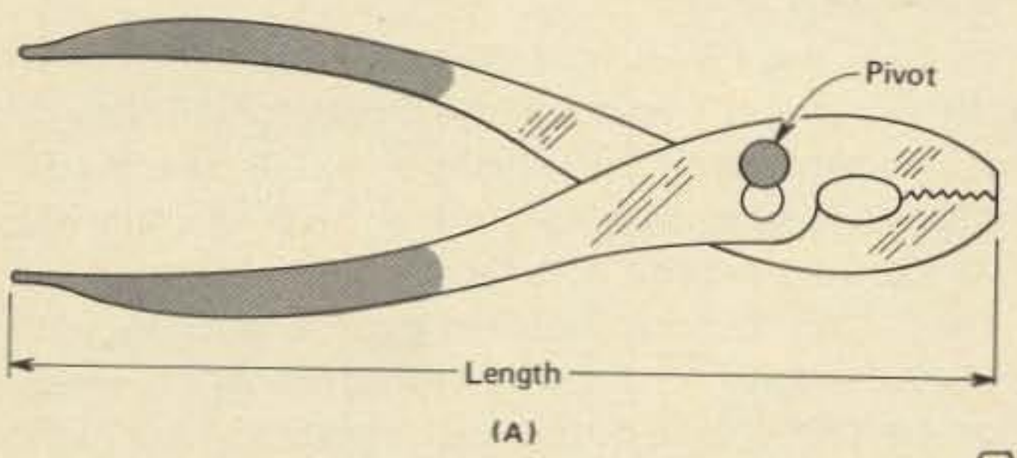


Fig. 1A—Slip joint pliers used for mechanical work. B) Pliers shown with joint "slipped" to accept large work.

Six inch slip joint pliers are most adequate for general electronics work but an eight inch pair occasionally is found to be quite handy for heavier work.

Long Nose Pliers, shown in Fig. 2A, are also referred to as needle nosed pliers. They are used for shaping wire ends in preparation for electrical connections. The wire to be connected to terminal has to be shaped, wrapped around the terminal and squeezed tightly; this is called *crimping*. The wire may then be soldered to the terminal.

The long nose pliers can also be used for mechanical work, particularly when working in close quarters but should not be strained too much or the jaws will be bent out of shape. The long nose pliers are also available with offset jaws as shown in Fig. 2B. The average long nose plier length runs 6" to 8".

Diagonal Wire Cutters are pliers designed specifically for cutting wire used in electronic equipment.

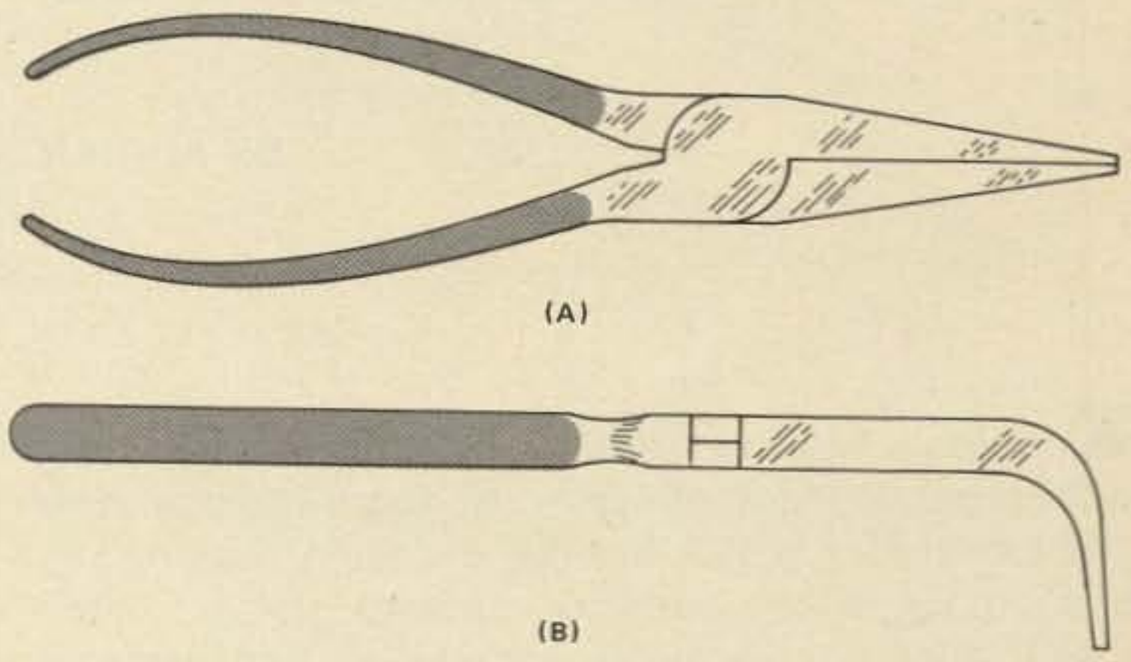


Fig. 2A—Needle nose pliers. B) Offset needle nose pliers.

Their appearance is as shown in Fig. 3(A). Their use should be confined to cutting wire; never cut heavy metals such as nails or screws as the cutting edge will be dulled. Diagonal cutting pliers cannot be sharpened easily, if at all, once dulled.

Another shape of cutter for special work is shown in Fig. 3B. This type of cutter, frequently called a *nipper*, is used to clip wires as flush to a surface as possible and finds use in printed circuit assembly work.

Cutters can be purchased from 4" long to 12" long. The large cutters are used for heavier wires. Most electronics work can be accomplished with 4" and 6" pairs.

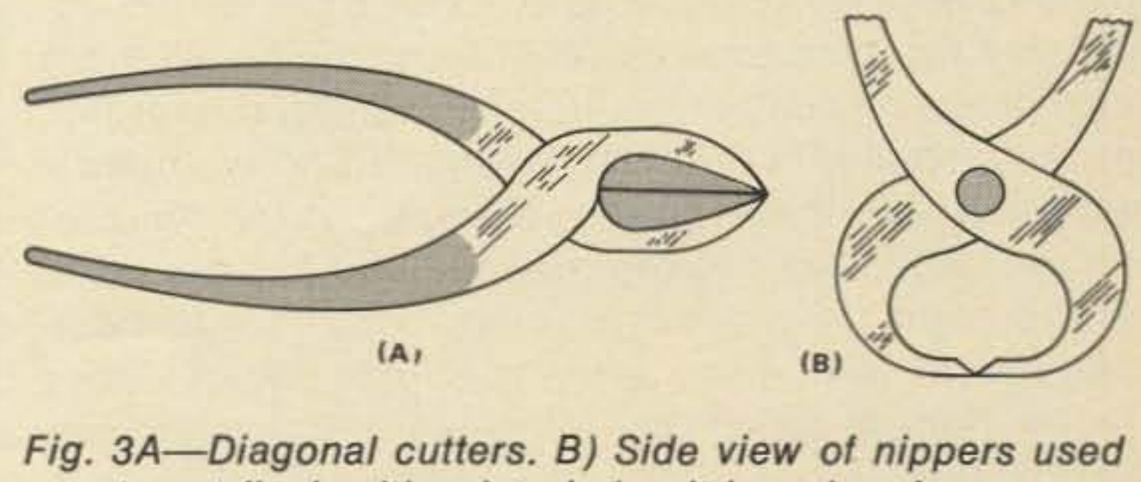


Fig. 3A—Diagonal cutters. B) Side view of nippers used to cut flush with printed circuit board surfaces.

Part I: 15 meter receiver improvement, cw filter, SWR/wattmeter, and pilot light modifications.

Super Modified HW-8 Contest Machine

BY ADRIAN WEISS*, K8EEG

The Heath HW-8 is a superb QRPp transceiver that will be popular and effective for years to come. Unlike the earlier HW-7, the HW-8 design requires no basic changes in circuitry—indeed, there is little that one could change to achieve an improvement in performance. Two exceptions where improvement could be made are: first, the insertion of a double-pi-net halfwave filter in the 80 meter transmitter output to eliminate harmonics on that band; secondly, rewinding the antenna link on the 15 meter receiver coil to bring sensitivity on that band up to a usable level of 1 μV. This latter improvement was described in my review of the HW-8 in a recent issue (*CQ*, May 1977, p. 33). Otherwise, the HW-8 is an excellent design which achieves optimum performance as it stands.

However, there are several "deluxifying" modifications which can add to the HW-8's effectiveness and independence from station accessories, I have never been able to resist the temptation to add my own touch to an already excellent design, and I have been so impressed with the HW-8's performance that the temptation to finish the job that Heath began was overwhelming. I call the finished product "The Supermodified HW-8 Contest Machine," and it includes a Bruene in-line SWR/Wattmeter, an additional two stages of audio filtering for really sharp selectivity, a receiver incremental tuning circuit that permits choice of receiver sideband and includes a zerobeat (spotting) switch, a loudspeaker for earphone-fatigue-free operation, and last but not least, a pilot-light for wee-hours operations. These additions have turned the already superb HW-8 into a really deluxe unit. The following paragraphs describe the additions. First, information on the receiver modification.

83 Suburban Estates, Vermillion, SD 57069

Increasing Receiver Sensitivity on 15 Meters

Testing of the HW-8 revealed that receiver sensitivity on 15 meters was on the order of 10 μV, far below a usable level. The difficulty lies in the inadequate antenna link on toroid L4. All HW-8 units can be expected to exhibit this lack of sensitivity, so, if you read this article before you assemble your HW-8, be thankful and perform the following modification *before* you put the unit together. The basic modification (before HW-8 assembly) is as follows:

Find L4, and remove the sealing wax by heating it with a soldering iron. Once the wax flows, bang L4 on the table with moderate force until the wax is cleared away.

The link is soldered to the two terminals next to the red dot on the L4 case. Desolder, and remove the link.

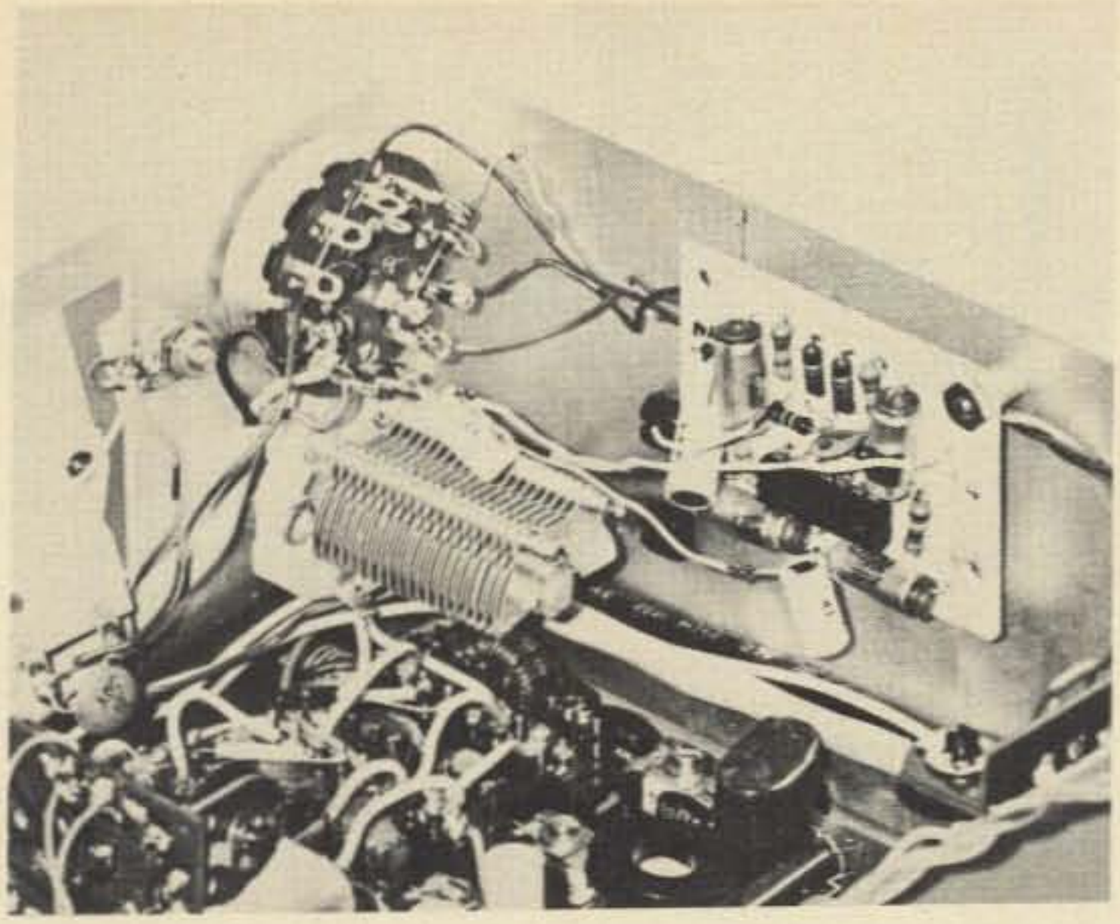
Wind a new link (4 turns of #26 enameled copper, #24/#28 will also work) and solder to the terminals on either side of the red dot. Continue assembly of the HW-8.

If by chance you have already assembled the HW-8, L4 must be removed before the above steps are followed. This can be a tricky operation, and requires a pair of really small needle-nosed pliers unless you remove the screws holding the p.c. board to the front-bottom edge of the chassis, and drop the p.c. board an inch or so for easier access.

Carefully desolder cable leads from terminals 1-2 of L4 (see pictorial 3-2).

Desolder and bend straight the tabs of the L4 case. Then pull out L4 and proceed with previously described preparation of a new link.

Replace the modified L4 and resolder the cable to terminals 1-2 of L4. Resolder case tabs.



Mounting detail for new SW302 and CWF-3 audio filter. The ¼-watt resistor mounted on SW302 goes to lead D of SWR/Wattmeter board. Cable Y is just to the front of the loading capacitor.

This completes the modification. There should be a dramatic improvement of sensitivity on 15 meters once the modification is completed. Usable sensitivity in the modified unit was tested at about 1 μV, which is more than adequate.

Audio Filter

The HW-8 circuit incorporates a two-stage IC active audio filter which helps in normal QRM situations, but which leaves much to be desired in the thick of a contest situation. The HW-8 utilizes a direct-conversion type receiver, which means that both sidebands appear for audio filtering, and hence, filter requirements at the audio end are more stringent than would be the case with a single sideband receiver in which the IF filter eliminates one sideband and about half of the interference that appears in the HW-8 output. The additional two stages of audio filtering provide the extra selectivity required. At first, I intended merely to duplicate the existing two-stage HW-8 active filter on a separate p.c. board, but impatience led me to use an MFJ CWF-3 filter that I had on hand. This unit is available, wired and tested, from MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762, for $12.95 plus $2.00 for postage and handling. The addition of the filter requires the *CWF-3* (or a duplicate of the HW-8 filter circuit), a four-position rotary switch (1.25 inch max. dia.) such as the *Mallory 3234J, 3 ckt, 4 pos, non-shorting*, and a pair of 10 mf (15 v) electrolytics. Figure 1A shows the modified circuit incorporating the CWF-3. Photo 1 shows the mounting position of the CWF-3 on the HW-8 sidepanel. This position is non-critical and, in fact, the CWF-3 could be mounted just about anywhere in the HW-8 box. Heath Manual Pictorial 4-4 can be consulted for the identifying letter(s) in the following instructions.

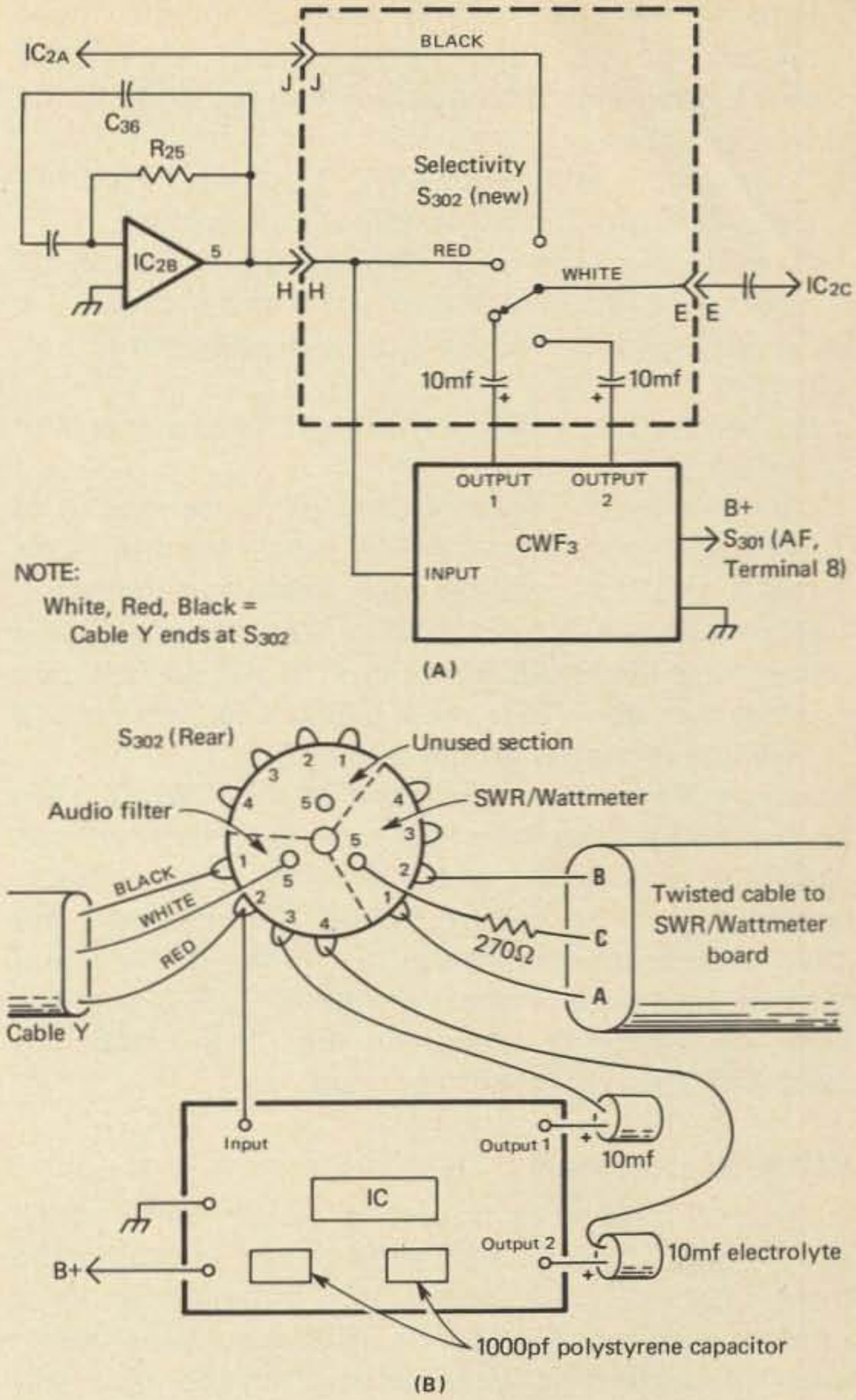


Fig. 1—(A) CWF-3 audio filter insertion into HW-8 circuit. (B)—Pictorial of CWF-3 filter and SWR/wattmeter wiring at SW302.

Locate selectivity switch SW302 (AE) and desolder and disconnect the white-red-black leads of cable Y from SW302.

Remove SW302 from the front panel.

Position the CWF-3 on the side-panel, mark, and drill two mounting holes to line-up with CWF-3 holes.

Prepare the CWF-3 as follows and refer to Figure 1B. Locate the B+, output #1, and output #2 leads on the CWF-3, desolder, and remove.

Solder a new 13 inch lead into the CWF-3 B+ hole.

Splice a 2.5- and a 3-inch wire to the minus (—) side of two 10 mf electrolytics and solder.

Solder the plus (+) lead of one electrolytic into the output #1 hole of the CWF-3.

Solder the plus (+) lead of another 10 mf electrolytic into the output #2 hole of the CWF-3.

Mount the CWF-3 on the side panel using ¼-inch spacers. Remove the insulation from the ground

lead of the CWF-3, and wrap it several times around the mounting screw near it. Make sure that a good electrical contact with the edge of the spacer occurs.

Connect the lead from CWF-3 output #1 (10 mf electrolytic) to SW302 terminal 3 and solder.

Connect the lead from CWF-3 output #2 (10 mf electrolytic) to SW302 terminal 4 and solder.

Solder the white lead of Cable Y to terminal 5 of SW302.

Solder the black lead of Cable Y to terminal 1 of SW302.

Connect the red lead of Cable Y to terminal 2 of SW302. Connect the CWF-3 "input" lead to terminal 2 of SW302; solder both leads to terminal 2.

Run the CWF-3 13 inch B+ lead along existing cables at the HW-8 front panel to the a.f./r.f. gain potentiometer (AF), and solder to terminal 8 (SW301) mounted on the rear of AF.

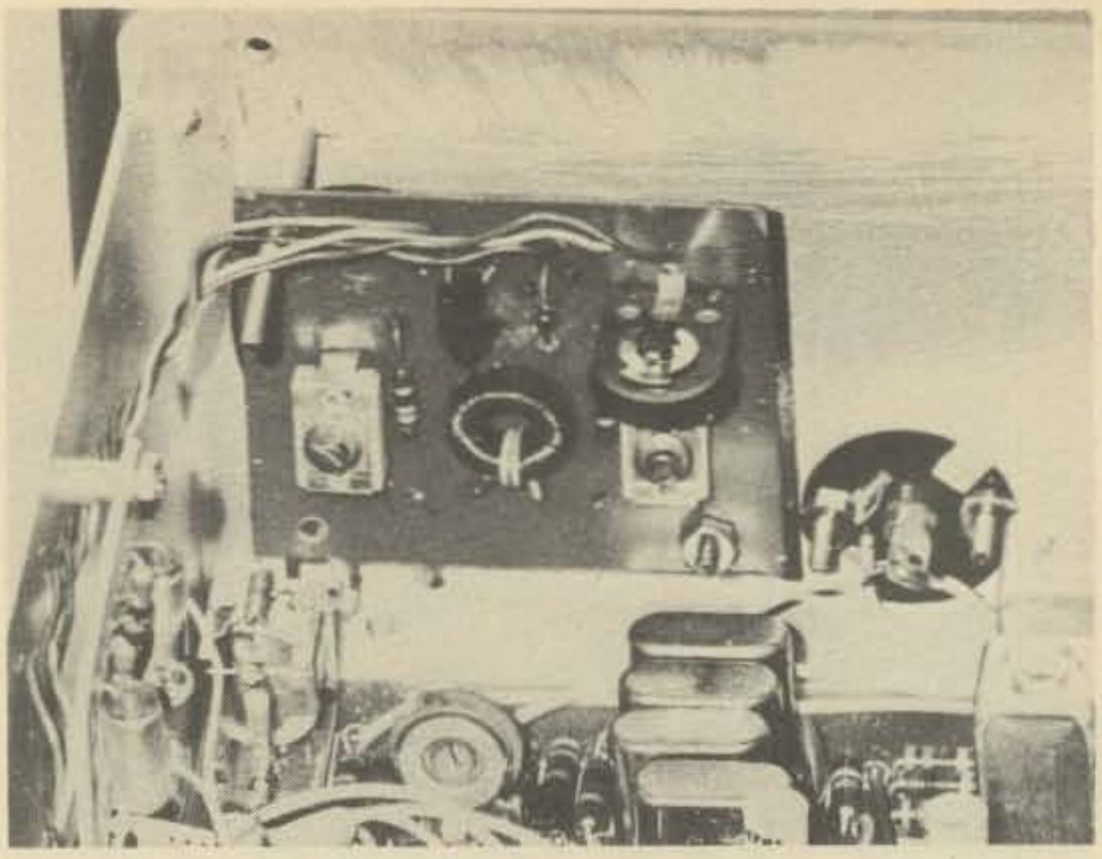
This completes the installation of the CWF-3. Turn on the HW-8, and turn the new selectivity switch SW302 to positions 1 and 2 to verify proper operation of original filter. Turn SW302 to positions 3 and 4 to verify proper operation of CWF-3. If the signal is lost in positions 3 and 4, recheck CWF-3 connections, check for B+ reaching the CWF-3 and that the ground lead is making contact.

SWR/Wattmeter

The HW-8 includes a relative power meter which uses a simple sampling circuit to aid in tuning the transmitter for peak output. In a situation where a random wire tuner is used, or where a new antenna must be cut to resonance, as is often the case with portable operation, an external SWR bridge is needed to monitor transmitter-antenna match. By incorporating a directional in-line Breune wattmeter into the HW-8, the need for external metering is eliminated.

Figure 2 shows the circuit of the SWR/Wattmeter used in this case, and it has been discussed in detail in earlier papers (In-line Wattmeter/SWR Bridge, *CQ*, January 1974, p. 42; The Silk-Purse In-line Wattmeter, *CQ*, May 1977, p. 50.) Its operation is as follows. The output power is fed thru the L2 link which induces a sample current in L1, and this current is then rectified by either D1 or D2 for the "forward" and "reflected measurements. This rectified current is then used to drive the meter thru a voltage divider which is appropriate for the meter sensitivity. The circuitry comprised of C1-C2, RFC1-C3 is used to null the effect of the sampling circuit on the r.f. power lead from transmitter to antenna. Once the bridge is nulled, it has no effect upon the r.f. power line characteristics.

Figure 3 shows the full-sized circuit board template. Fabrication of a p.c. board is quite simple, and should not deter even the rankest neophyte from attempting a project such as this. In brief out-



SWR/Wattmeter mounting detail. R1 at upper right, C1-C2 middle, L1-L2 center. Connectinig coax leads are fitted behind p.c. board (see photo #3).

line, the fabrication process is as follows. Cut a piece of p.c. board to the size shown. Trace the foil strip pattern and exact position of the holes (using a "+" to show dead center) onto a piece of paper. Tape this paper to the foil side of the p.c. board. Using a very small diameter drill (1/32 or 1/64 inch, available at many hobby stores, or from America's Hobby Center, Inc., 146 West 22 Street, New York, N.Y. 10011,) drill the holes as indicated by the "+'s" on the paper. For the C1-C2 rectangular holes, use a 1/16-inch drill: drill three evenly spaced holes, then "worry" out the ridges between the holes. Remove the tracing paper, and ink the foil pattern onto the copper foil. The inked parts will remain after the etching step, and all copper not inked will be removed. The simplest technique of inking is to use a sharp-tipped felt marking pen with *permanent ink* ("Sharpie #49" or similar, or a larger tipped pen whose tip has been carefully sharpened by cutting across it diagonally with a sharp razor blade) to draw the connecting foils between holes as shown in Figure 3. Mistakes can be scraped away with a knife edge and re-inked. Carefully check the inked p.c. board for correct foil connections *before* etching! The board is then immersed in p.c. board etchant (available at Radio Shack, Lafayette, etc.) until all copper not inked-over is removed. Agitate the board as soon as the etchant becomes black over parts of the board being etched away. When etching is completed, steel-wool the remaining copper foil to a shine, and assembly can proceed. Installation of the completed board is as follows.

Refer to page 56 of the HW-8 manual (pictorial 4-6). Remove all original meter circuitry, including the 1K resistor from terminal 1 of loading capacitor AJ, and the 47K resistor from terminal 1 of the meter. Remove the 3-lug terminal strip AD.

Line-up mounting holes on the HW-8 rear panel

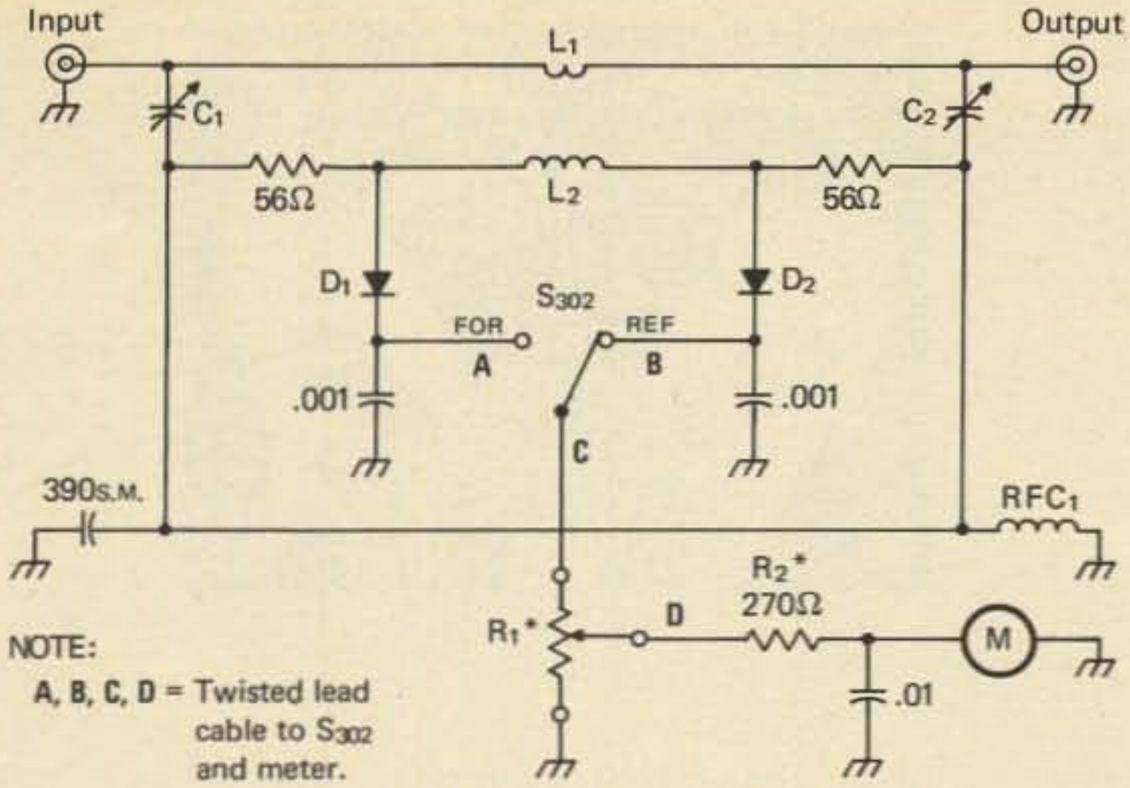


Fig. 2—SWR/wattmeter circuit.

with the p.c. board holes as shown in Photo 2 and drill.

Cut 4 different colored 6¾ inch leads, and solder into holes A-B-C-D. Twist the four leads to form a cable.

Cut two pieces of RG-174U miniature 50-ohm coax (or similar shielded hook-up cable, such as audio cable) 2 and 3 inches long respectively. Remove about ¾ of an inch of insulation from all cable ends, unfurl the braid shield, and retwist into a lead wire.

Solder the center conductor of the 3-inch cable into the *input* hole on the bottom side of the p.c. board. Solder the shield braid to the ground foil. Solder the center conductor of the 2-inch cable into the *output* hole on the bottom side of the p.c. board. Solder the shield braid to the ground foil. Solder the ends of the A-B-C-D cable to the appropriate terminals of SW302, as shown in Figure 1B. Lead C goes to the free end of the 270-ohm resistor. Lead D goes to the meter "+" terminal.

The bridge is now ready for nulling adjustments. If a pair of phono jacks are temporarily soldered to the loose ends of the *input* and *output* cables, reversing the r.f. power and dummy load during the following steps is a lot easier. A short piece of 50-ohm coax is used to bring power from the antenna terminal of the HW-8 to the bridge, and the dummy load provided with the HW-8 kit suffices. The nulling procedure is as follows.

Connect the *input* of the bridge to the antenna terminal of the HW-8. Connect the dummy load to the *output* cable. Unscrew C1-C2 as far as possible.

With the HW-8 tuned for maximum output on 15 meters, put SW302 in the *forward* position*, press the key, and adjust R1 for a full scale meter reading. Put SW302 into the *reflected* position and slowly increase the capacitance of C1 (trimmer on the *input* side of the bridge) until a minimum reading is obtained.

Reverse the dummy load and coax from the HW-8 antenna terminal so that the dummy load is now connected to the bridge *input*, and coax to *output*. Press the key. Minimum reading should now occur in the *forward* position. Increase the capacitance of C2 (now on the side where the coax is connected) for a null in the meter reading. Put SW302 in the *reflected* position and adjust R1 for a full scale reading. Return to the *forward* position and renull.

Repeat the previous steps until a complete (or nearly complete) null is achieved in both directions. In this second run-through of the nulling procedure, R1 should be adjusted for full-scale meter reading on 80 meters. Check each band for completeness of null. In the unit described, a complete null was obtained on the first attempt, and only a very small amount of capacitance at C1-C2 was needed. 80 meter output is adjusted to the "5" point on the meter scale, and 15 meter output falls at about the "4" point. The nulling procedure is complete, and installation of the SWR/Wattmeter can proceed.

Refer to pictorial 4-2. Remove the 1¼-inch yellow lead from terminal 2 of RY1, and the other end from terminal 2 of output jack BA.

Temporarily place the bridge board top-down

*SW302 position which provides highest meter reading

NOTES

L1—54 turns #28, **L2**—2 turns #26, plastic covered hook-up wire, wound on Amidon T-50-2 core.
D1, D2—1N34A, 1N989 or similar diodes.
RFC1—1 mh miniature r.f. choke.
R1, R2—R1 is 1K vertical mount p.c. board potentiometer. R2 is selected to give full meter swing with R1 value.
C1, C2—Elmenco 403 or Calectro A1-245 trimmer capacitors.

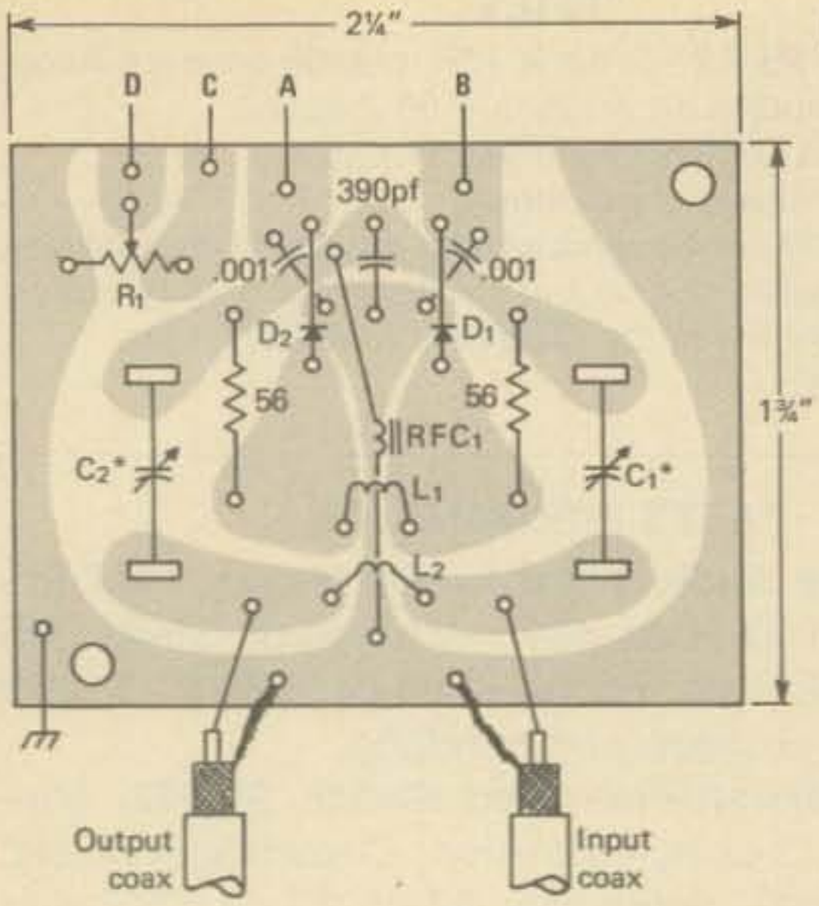
PARTS INFORMATION

CWF-3 Active Audio Filter, wired/tested: MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762 (Toll free phone—800-647-8660), $12.95 plus $2.00 postage and handling.

Selectivity/Forward-Reflected Switch SW302: Mallory 3234J, 3-pole, 4-position; Circuit Specialists, P.O. Box 3047, Scottsdale AZ 85257, $1.33. Could use Calectro E2-166, $1.50, same source.

C1-C2 SWR/Wattmeter trimmers: Calectro A1-245, 7pf, $0.85, Circuit Specialists. Or Elmenco 403.

L1-L2 SWR: wound on T-50-2 Amidon core: Amidon Associates, 12033 Otsego St., No. Hollywood, CA 91607, $0.55 ea., order several to have on hand. Also, for RIT circuit, FB-43-801 ferrite jumbo bead, $3.00 per dozen (very handy for winding r.f. chokes). (50¢ handling for orders under $10.00). Amidon also can supply a p.c. board etching kit with 2 boards for $6.75.



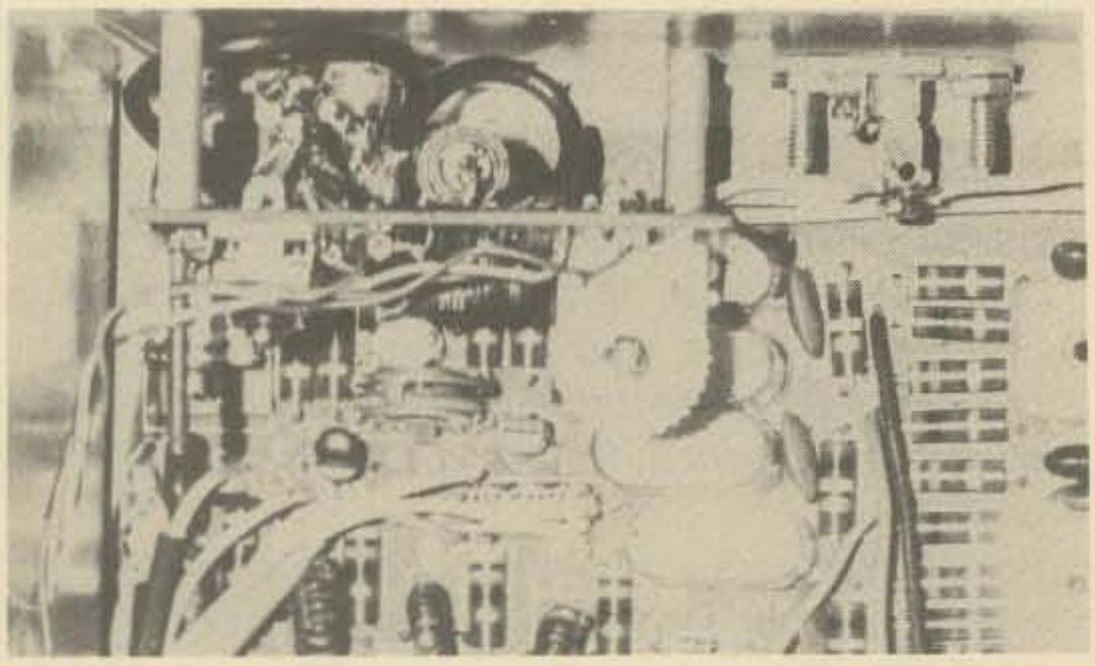
NOTE: C_1, C_2 *: Drill mounting holes to fit the actual trimmer capacitor to be used, as size may vary. Use metal spacers to insure ground contact.

Fig. 3—P.C. board template for SWR/wattmeter.

near the rear panel. Solder the center conductor of the *input* coax to terminal 2 of RY1. Solder the center conductor of the output cable to terminal 2 of the output jack BA. Solder the shield braids of both cables to the ground lug (terminal 1) of output jack BA.

If the CWF-3 has been previously installed, temporarily remove the upper mounting screw, and fit the SWR bridge twisted cable leads between the CWF-3 and HW-8 sidewall.

Mount the bridge on ¾-inch spacers (metal), curling the coax leads to fit, as shown in Photo 3.



Top view of SWR/Wattmeter mounting showing ¾-inch metal spacers, RFC1 mounted on foil side of board, and input/output coax leads fitted between p.c board and rear wall of HW-8.

For final checkout, hookup the 50-ohm dummy load to the HW-8 antenna output jack BA and apply power. The bridge should function exactly as it did during the nulling adjustments. The reader can decide which SW302 positions he wants to use to monitor *forward-reflected*, and attach leads A-B to coincide with those positions. Although no attempt was made to calibrate the meter in either watts or SWR, a 3:1 SWR will fall at about midscale. This completes installation of the SWR/Wattmeter.

Pilot Light

The pilot light, needless to say, doesn't affect the performance of the HW-8, but it adds a bit of class to the unit and impresses non-electronically inclined guests. Radio Shack carries a line of subminiature pilot lights (Workman E13—12VDC, 75ma) that work well in this application. To install, drill a ¼-inch diameter hole about ¾-inch "northeast" of the screw that attaches the meter-lug (AB, Pictorial 4-6) to the front panel, and about ¼-inch away from the dial plate. The leads of this type of pilot light are soldered in, so be sure that you ground the lead which is connected to the brass base of the pilot light. Locate the ground lead and tie it through lug AB so that the pilot light remains in its hole. Solder the ground lead to the lug. Take the B+ lead and tape it taut against the front panel so that the pilot light is held perpendicular in its hole and pressed against the outer front panel. Run this B+ lead over to the a.f./r.f. gain pot AF (Pictorial 4-4), and connect it to terminal 8 thru a 22-ohm, 1-watt, resistor. When the HW-8 is turned on, the pilot light provides a soft light for the dial and meter, and is noticeable even in sunlight. During nighttime operation, it is adequate for logging and reading purposes. Admittedly, the addition of this pilot light is a really deluxe touch that seems superfluous, but if you operate out in the boonies on a camping trip, it saves you the trouble of trying to hold a flashlight and run the HW-8 at the same time!

So much for the 15 meter receiver sensitivity improvement, additional audio filter, SWR/Wattmeter, and pilot light. These are all very worthwhile improvements, so get out the soldering iron and get these mods out of the way before the next part of this paper appears next month. We will then discuss an automatic receiver incremental tuning circuit (RIT) that greatly increases the operational flexibility of the HW-8.

(to be continued)

Here is the start of a step by step method to get you going in the fascinating world of radioteletype.

AN RTTY PRIMER

BY IRWIN SCHWARTZ*, K2VGU

After twenty years of off-and-on amateur activity I discovered radioteletype. I imagine that I stayed away from the mode for all this time as a result of some rather strong prejudices and misconceptions. Ignorance was sire to my apprehensions.

I hope that I can ease similar skepticism that other amateurs are sure to have.

Radioteletype (RTTY) means just what the word says: *radio*—a "wireless" method of communication; *tele*—distance; *type*—type. RTTY is a wireless method of communication whose end result is printed messages. The originator types his message on a typewriter-like device. It is then sent over the air via his transmitting system, whereupon it is automatically typed, in final readable form on the recipient's typewriter-like device.

The sequence of mechanical and electronic events between the signal originator's touch of his typing key and the signal recipient's machine printing the corresponding character is neither difficult to understand nor overly involved to reproduce in your own shack.

Radioteletype signals are transmitted in the form of electronic pulses in much the same way as a c.w. signal is. However, the similarity between the two modes ends very quickly. Morse Code is comprehended by amateurs because they are human. There are, of course, quite sophisticated circuits bandying about which can transmute the dits and dahs of Morse to either printed copy or video displays, but in the last analysis, nothing beats the human hearing mechanism for copying the code, especially if it is "down in the mud" and hard to understand.

To better understand the pulsed code used for RTTY it is wise to completely understand the pulsed code we use for c.w.

In Morse Code each letter, number and punctuation mark is represented by a different sequence of short pulses, long pulses and spaces. In point of fact, there are three different lengths of spaces used: the one between the dits and/or dahs of the individual character, the one between the characters themselves and the one between words. In all, c.w. fans have to keep in mind five different lengths of pulses and/or spaces in order to use the code.

In addition, each character, for the most part, consumes a different amount of time for its transmission (the reason for the "for the most part" is that, for example, the letter "b" (dah-dit-dit-dit) and the letter "v" (dit-dit-dit-dah) require the same absolute amount of time, one letter being the Morse mirror image of the other. But the generality of this occurrence is not the case since there are only six such pairs of letters).

Let's take a microscopic view of the Morse Code using the words "RTTY is fun." If we use the length of the dit as the unit from which all other lengths are derived, it will be seen that a dah is three dits long, the space between the dits and/or dahs in a single letter is one dit long, the space between letters is three dits long, and the space between words is five dits long. See fig. 1.

The Morse Code thus produced is deliberate and textbook. If we all sent like that, your fist would sound no different from mine nor anybody else's.

*260 65th St., Brooklyn, N.Y. 11220

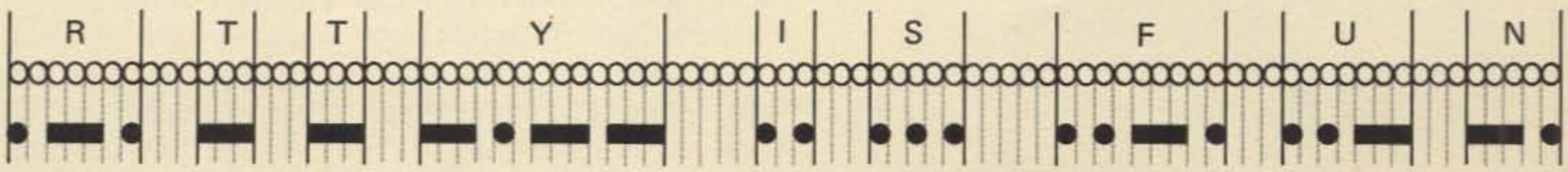


Fig. 1—RTTY timing sequence compared to standard c.w. spacing.

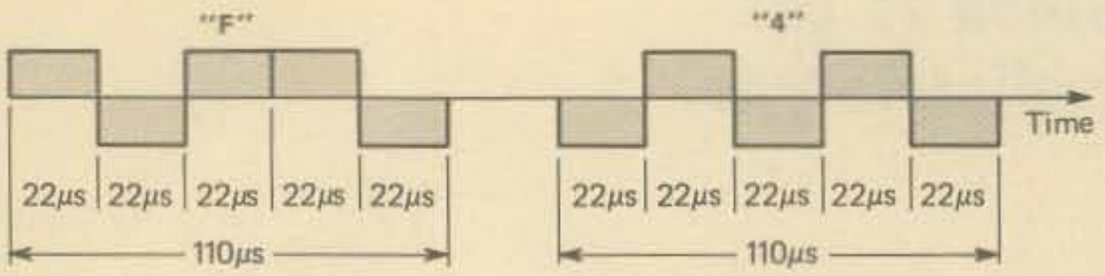


Fig. 2—Timing sequence of the Murray Code.

After having examined the Morse Code with an eye toward its character-to-character time-duration differences, it becomes clear that, for copying, a machine, which is a very time-consistent device, cannot hold a stick to the human ear-brain. Since a machine works on such time-invariant principles (for example, 420 revolutions per minute) it is necessary to mold the code to the machine's uniformity of operation. A code which is time-invariant vis-a-vis character length would do the trick.

The Murray Code is a pulsed code the length of whose character representations is time-invariant, that is, the sequence of pulses for one character takes as much time to be sent as the sequence of pulses for any other character.

The Murray Code, like the Morse Code, consists of a series of on-pulses and off-pulses. The on-pulses are called "marks" and the off-pulses are called "spaces."

Each character is a combination of five marks and/or spaces. Consider the case where the unit length of the code (one mark or one space) is 22 microseconds long. Each character, regardless of its nature (alphabetic, numeric or punctuation mark), will have a time duration of 110 microseconds.

Referring to the illustration, fig. 2, the part of the square wave above the horizontal time axis represents the mark pulse and the part of the square wave lying below the axis represents the space pulse. The letter "F" is Murray-encoded by the sequence *mark-space-mark-mark-space* and the number "4" is encoded by the sequence *space-mark-space-mark-space*. The complete encoding scheme for the Murray Code is shown in Table I.

Note that a total of 32 possible combinations of mark and/or space can be used. Each pulse has either a mark or space possibility and since there are five different pulses per character, $2^5 = 32$ combinations exist. This number is inadequate for the 26 letters of the alphabet, the ten numerals and the several punctuation marks. However, the RTTY machine can be made to shift by using a system analogous to, but not mechanically the same as, the shifting scheme of an ordinary typewriter.

There are some "non-printing" keyboard operations also. Among these are keys for *letters shift*, *figures shift*, *carriage return*, *line feed* and *blank*.

Unlike an ordinary typewriter, the teleprinter must be told each and every time it is to go from printing alphabetic characters to numeric characters, and *vice versa*. A typewriter "unshifts" when the shift key is let go. This is not the case with a teleprinter; hence, the necessity for separate "letters" and "figures" shifts.

We now have a code, the lengths of whose characters is constant and is therefore compatable with machines for transmission and reception.

The electro-mechanical method used for the transmission of RTTY is not, however, of the off/on type. Unlike c.w. where the carrier is interrupted (key up) for space and the carrier is transmitted (key down) for mark, the RTTY signal is sent under constant carrier (100% duty cycle) conditions. There are two commonly used methods for transmitting the mark and space of the Murray Code under this constant carrier condition, see fig. 3. Both involve the shifting of audio frequency tones. In one method (frequency shift keying or FSK) the carrier, with a beat frequency injected at the receiver, changes frequency; in the other method (audio frequency shift keying or AFSK) two tones of different audio frequency modulate a steady carrier and thus effect a frequency change by alternating from one tone (for the mark) to the other tone (for the space). For the sake of simplicity and convenience this discussion will assume that the higher tone represents the mark and the lower tone represents the space (although this is not always the case in the actual transmission of RTTY signals).

There are two fundamental considerations with reference to shift keying (FSK or AFSK). These are (1) the desired r.f. frequency of transmission and (2) the number of Hertz separating the mark tone from the space tone (the frequency shift). Item (1) is largely at the discretion of the individual amateur, while item (2) is pretty well standardized within the amateur RTTY community. Typical frequency shifts used are 170 Hz. and 850 Hz., with the former being the most popular among amateurs, see fig. 4.

Regardless of the keying method used—the advantages and disadvantages of each will be discussed later—three basic pieces of equipment are needed for two-way communications. Since it is assumed that the reader already has in his possession a transmitter/receiver, only two other specialized units are necessary for the transmission and reception of radioteletype signals. These are the keyboard-teleprinter combination and the demodulator (also called the terminal unit, TU, or converter).

The teleprinter (Teletype® is a registered trade

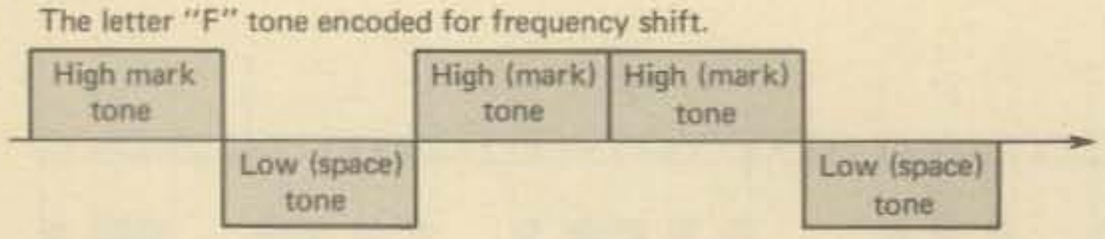


Fig. 3—Transmitting the mark and space of the Murray Code.

name) is an electro-mechanical device for encoding and decoding the Murray Code. It also prints messages on a piece of paper. There are many types of teleprinters available to the amateur, ranging in price from the cost of picking it up (free) to many hundreds of dollars. Teleprinters and related mechanical equipment will be discussed at greater length in a subsequent article.

The demodulator is an electronic device which converts the mark and space RTTY tones sent over the air into d.c. pulses which are understood and transmuted by the teleprinter into printed characters. There are many types of demodulators. These, too, will be discussed at a later time.

The sequence of events for the transmission and reception of RTTY signals is, therefore, as follows:

(1) depressing a key on the teleprinter keyboard
(2) mechanically encoding the Murray Code equivalent of the character via the teleprinter
(3) transmission of the encodement, via a transmitter, using one of the two frequency shift methods
(4) receipt of the r.f. tone encoded signal in one's receiver
(5) demodulation (changing to dc pulses) of the RTTY tones in the converter
(6) transmutation of the d.c. (Murray encoded) pulses by the recipient's teleprinter. This gives the final printed copy.

The basic RTTY station, with the signal path indicated is shown in fig. 5.

Note that each box in the diagram does not necessarily represent a different piece of equipment sitting on your operating table. For example, the demodulator and shift keyer can be housed within the same cabinet; so can the printer and keyboard; so can the transmitter and receiver if one uses a transceiver.

With the fundamental RTTY station setup in mind we are now in a position to look at some variations on the theme.

The spectrum of mechanical radioteletype equipment is quite broad. Much of the basic gear and many intriguing accessories are more readily available than one might think. And (here is the best part) quite cheap to boot. Of course, as any amateur worth his mettle knows, it is very possible to spend next month's rent and food money on a fascinating piece of equipment but that is neither necessary nor, interestingly enough, desirable when wetting your feet in RTTY. The best education and most convincing arguments in this regard are found in buy and sell ads in the various amateur publications. It is quite possible to set up a teletype station for a surprisingly small amount of cash.

Now to take a look at some of the auxilliary goodies available to amateurs.

Usually the first two pieces of gear that most

THE MURRAY CODE
(Upper-case characters may vary from machine to machine)

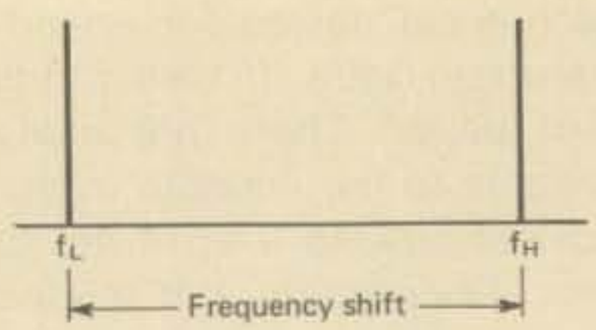
UPPER CASE	LOWER CASE	ELEMENTS 1	2	3	4	5
—	A	M	M	S	S	S
?	B	M	S	S	M	M
:	C	S	M	M	M	S
$	D	M	S	S	M	S
3	E	M	S	S	S	S
!	F	M	S	M	M	S
&	G	S	M	S	M	M
#	H	S	S	M	S	M
8	I	S	M	M	S	S
'	J	M	M	S	M	S
(	K	M	M	M	M	S
)	L	S	M	S	S	M
.	M	S	S	M	M	M
,	N	S	S	M	M	S
9	O	S	S	S	M	M
0	P	S	M	M	S	M
1	Q	M	M	M	S	M
4	R	S	M	S	M	S
Bell	S	M	S	M	S	S
5	T	S	S	S	S	M
7	U	M	M	M	S	S
;	V	S	M	M	M	M
2	W	M	M	S	S	M
/	X	M	S	M	M	M
6	Y	M	S	M	S	M
"	Z	M	S	S	S	M
Letters		M	M	M	M	M
Figures		M	M	S	M	M
Space		S	S	M	S	S
Carriage Return		S	S	S	M	S
Line Feed		S	M	S	S	S
Blank		S	S	S	S	S

M represents "mark"
S represents "space"

Table 1—The Murray Code.

RTTYers get are the typing reperferator ("reperf") and the transmitter-distributor ("TD"). These devices, completely compatible with the teleprinter, allow the storage and automatic retransmission of Murray encoded messages on a piece of paper tape. With these two machines one has the capability of preparing messages for transmission while simultaneously and independently printing a received message on the printer. When the message on the printer is complete and the other amateur turns it over to you, you merely turn on the TD and the message you prepared gets sent over the air automatically—at a speed of 60 words per minute (or 75 w.p.m. or 100 w.p.m. depending on the specific equipment).

Messages, CQs, tapes describing your station



NOTE:
f_L is the low (space) frequency;
f_H is the high (mark) frequency.
The frequency shift is $f_H - f_L$.

Fig. 4—Illustration of the frequency shift.

("brag tapes"), test tapes, tapes of pictures (there are some **very** talented amateur artists out there who can create virtual masterpieces out of printed characters—more on this later), tapes of complete conversations—the list is as long as your imagination—can be punched on tape, stored and played back at your leisure. The reperf and TD are, to some amateurs, an absolute necessity.

There are paper winders and tape winders (so the floor of the shack doesn't become covered with paper); there are automatic CQ callers, automatic station identifiers, devices which send out your message at a steady rate regardless of how slowly you type (even a hunt-and-peck typist can be a crackerjack RTTY-er); there are tuning display systems, both metered and 'scoped; and, most intriguing of all, there is silent, video radioteletype.

Video RTTY is the up and coming thing now. This does not mean, incidentally, that the mechanical method is outmoded or anywhere near it. It simply means that there are systems that can be either home-built or commercially purchased which are totally silent and display the sent and received messages on a television-like screen.

In subsequent articles I will describe in detail specific pieces of RTTY equipment, give instructions and diagrams for building and installing each of the three basic units needed for a RTTY station, talk about theory, and, most important to the newcomer, give step-by-step, deliberate and *simple* directions so that your odyssey into the world of RTTY is as painless and enjoyable as possible.

I would be pleased to answer any questions you might have if you send them to me directly or in care of this magazine. ■

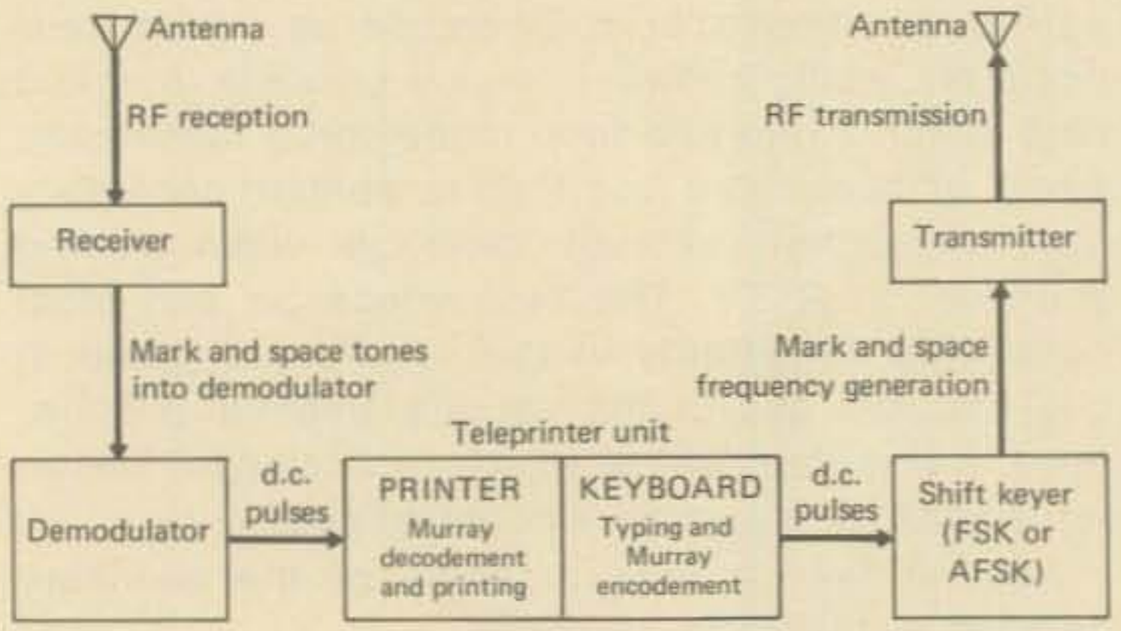


Fig. 5—The basic RTTY station.

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

In the course of experimentation, it occasionally becomes necessary to pass certain frequencies while attenuating others. In audio circuits it may be for speech shaping, with low frequency control signals to remove 60 Hz hum, or other unwanted products and at higher frequencies to select one signal from many. The way all of this is accomplished is of course, by the use of filters.

In this preliminary investigation, we will try to give general information and considerations of the very simplest of all filters in the hope that this will allow the experimenter to apply what he has read, for his own individual requirements. The filters we will discuss are of two general types, low-pass, and high-pass. The first of these, the low-pass filter, is a circuit that only passes frequencies lower than a certain "cutoff frequency." It is shown in its simplest form in fig. 1.

As the operating frequency fed to this circuit increases, the reactance (or a.c. impedance) of the capacitor decreases and it shunts more and more of the signal by forming a voltage divider with the input resistor.

The so-called "cut-off frequency" of this simple circuit is usually considered as the point where the capacitive reactance is equal to the value of R. At this point, the attenuation is 50%. To easily calculate the value of C when R has been chosen, one uses the simple relationship:

$$C = \frac{.159}{f.\,R}$$

*5 Melville Lane, Great Neck, NY 11020

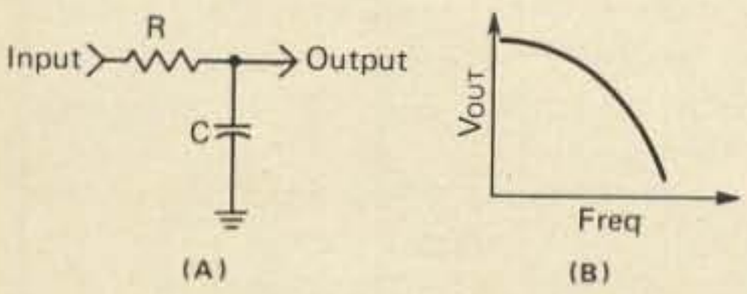


Fig. 1—Simple low-pass filter.

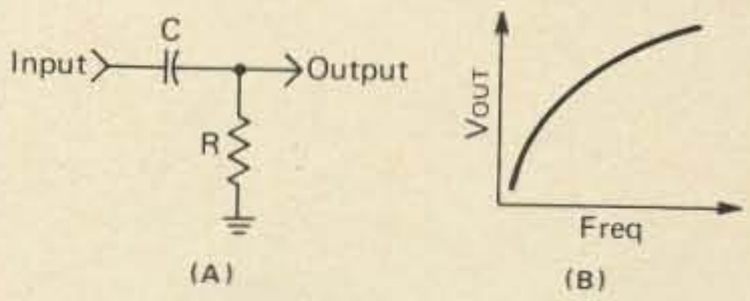


Fig. 2—Simple high-pass filter.

Where C = the capacitance in farads
f. = the desired cutoff frequency in Hz
R = the value of the resistor in ohms.

As shown in fig. 1, at frequencies below f_o, attenuation decreases while at frequencies above f_o, it increases. This type of circuit can be used to reduce "highs" in an audio circuit, or attenuate high frequency noise in a host of analog applications.

In fig. 2, we have the complement to the low-pass filter, the high-pass unit. Here as would be expected, low frequencies are blocked by the high capacitive reactance of C. As the frequency increases however, the impedance of C decreases and the output increases.

This filter also has a cutoff frequency which is the point, on the low frequency side, where attenuation is 50%. The same formula may be used for calculations of the value of C bearing in mind that R and C in this circuit are interchanged.

A high-pass filter such as this one is used where it is desired to reduce bass response and add "crispness" to audio signals. Similarly, the same idea can be used by reducing the

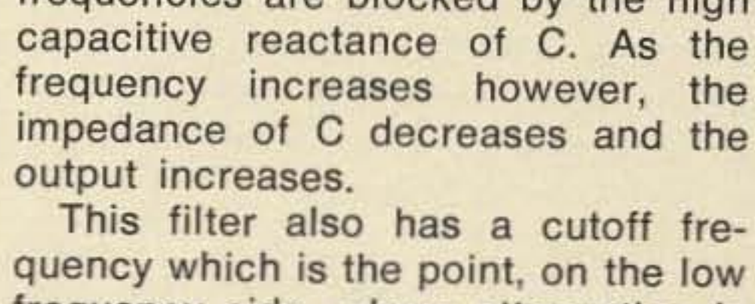


Fig. 3—Two stage high-pass filter with op-amp amplifier. Note that the input is a.c. coupled by virtue of "C".

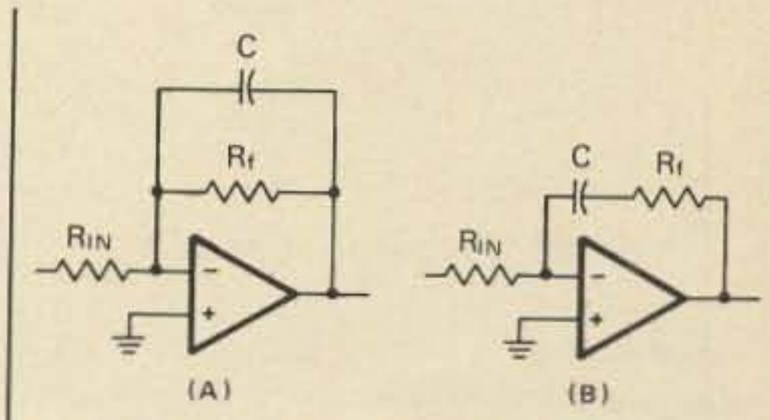


Fig. 4—Filter implementation with op-amps. Note that the high-pass filter of (b) has no gain at d.c.

size of the coupling capacitors in some existing equipment. Since capacitive reactance is always dependent on frequency, small coupling capacitors will always attenuate lows to a greater degree than highs.

By adding more sections to the filters of figs. 1 and 2, greater rates of frequency attenuation can be achieved. The cost to do this however, is decreased overall attenuation of the circuits. One way to make up this loss is by means of an operational amplifier, added to the filter. Fig. 3 shows a 2 stage high-pass filter/op-amp combination. The gain

(Continued on page 88)

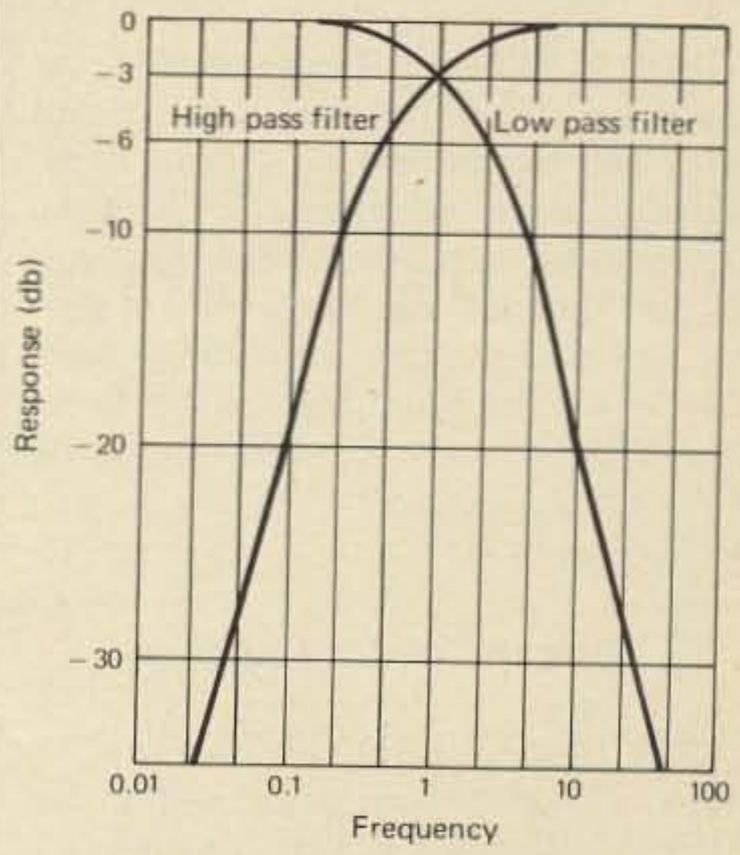


Fig. 5—Response curves for the simple filters discussed in the text.

CQ looks at some of the latest equipment and accessories of interest to amateurs.

New Amateur Products

500 MHz Frequency Counter

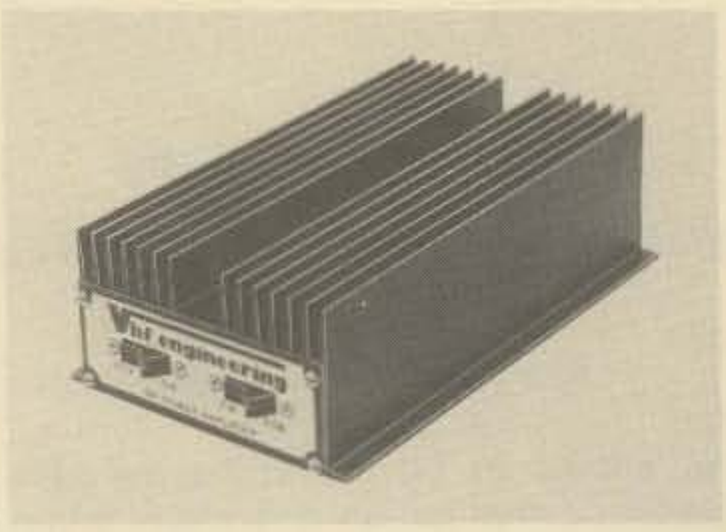
The Davis CTR-2 frequency counter with prescaler combines a frequency coverage of 500 MHz and an accuracy of ± .0002 percent with low cost. Features include a full 8-digit display, large .3 inch LED readouts, automatic Dp placement, resolution to 1 Hz, high input sensitivity, and automatic input limiting. It has selectable gate times of 1 ms and 1 sec. (with provision for 10 sec.) and a high stability of 10 MHz

TCXO time base. Recommended for measuring RF and audio from 1 Hz to 500 MHz. Guaranteed for 1 year. Price: $349.95 assembled and $249.95 for the kit. A wide range of optional accessories are available for the CTR-2. Delivery from stock. Free literature is available by writing Davis Electronics, Dept. CQ, 636 Sheridan Drive, Tonawanda, NY 14150, or circle no. 31 on Reader Service Card.

70-Watt 2-Meter Amplifier

The Blue Line BLC 10/70, a new 70-watt, 4-mode, 2-meter amplifier has been introduced by VHF Engineering.

Blue Line series amplifiers have been designed for reliability and long life and



feature unique broadband, stripline circuitry, which requires no tuning or adjustment during their lifetime. Automatic sensing and relay switching are provided to automatically switch the amplifier into the circuit when drive is applied in the class C (FM) or linear (SSB) modes. The amplifiers offer high efficiency and introduce a receive insertion loss of less than one dB. They are designed for 12-14 VDC operation in fixed or mobile service.

The BLC 10/70 sells for $139.95 and the BLC 2/70 for $159.95. These 4-mode amplifiers are available from dealers nationwide or from VHF Engineering, 320 Water Street, Binghamton, NY 13902, or circle no. 32 on Reader Service Card.

Stoner PRO 80-10 Transceiver

What is described as the world's most professional 200 watt SSB radio transceiver has recently been announced by Stoner - The Sideband People. A number of design techniques not usually found in amateur equipment are employed in the Model PRO 80-10.

The customary VFO and crystal controlled band selection technique has been replaced by the popular phase lock loop (PLL) circuit. The synthesizer permits tuning the 80 through 10 meter ham bands in 100 Hz increments. Broadband techniques and an overload immune "front end" provides freedom from crossmodulation seldom found in solid state equipment. A high quality ladder type crystal filter provides outstanding unwanted sideband rejection.

A unique aspect of the PRO 80-10 is the built-in independent WWV receiver. A master crystal oscillator for the PLL can be "zeroed in" with WWV to provide absolute frequency accuracy. There is no need for a calibrator to correct for frequency error at the band edges.

The PLL synthesizer employs microprocessor techniques to control an electronic tuning system which eliminates mechanical devices. Up/Down tuning data can be entered at a fast or slow rate by means of front panel switches. For mobile convenience, the radio can also be tuned from the microphone (500 Hz/sec.). The synthesizer also drives a frequency readout which features absolute accuracy. Other features include a built-in audio r.f./speech processor and a SWR meter for checking antenna performance.

To receive a color brochure on the PRO 80-10, contact Stoner - The Sideband People, John Hancock Bldg., Mercer Island, WA 98040, (206) 232-9464, or circle no. 33 on Reader Service Card.

a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

The Dayton Scene, '77

As Gertrude Stein might have remarked, "Dayton is Dayton is Dayton!" However, when more than 16,000 hams get together for a hamfest, you can expect to spend most of your time walking *sideways* and standing three to five deep around anything worth looking at. And that's the way it was—tiring, but fascinating!

My guess would be that between 150 and 200 slow scanners were at Dayton. As expected, the Friday night SSTV Seminar and Saturday's technical meetings made the trip worthwhile to all attending.

Exciting New Scan Converter Design In The Mill

At the SSTV Seminar, Dr. George Steber, WB9LVI (See fig. 1) gave a brief description of his new scan converter design. It sounds like just what we need!

*2112 Turk Hill Road, Fairport, N.Y. 14450

Fig. 1—Dr. George Steber, WB9LVI, designer of the famous "LVI scan converter" is shown here reviewing his plan to improve the resolution and picture quality of digitally scan converted SSTV pictures.

Fig. 2—Dr. Robert Suding, WØLMD, Research Director of the Digital Group looks pleased with the reaction of the SSTV Seminar group to his company's new products.

The new design will provide increased horizontal resolution and four times as many shades of gray for digitally scan converted SSTV pictures. As George pointed out, the horizontal resolution of P-7 displayed images is superior to that of fast scan displayed digitally converted images. He proposes to correct this deficiency with his new design which provides 256 pixels per line (instead of the 128 pixels per line achieved by both the Robot and WB9LVI designed systems at present). Readers of "In Focus" may recall references to this point and photographs by Dr. Steber published in the September 1976 issue of CQ.

Dr. Steber's new design will also provide 64 instead of 16 shades of gray for the scan converted display. This feature should eliminate the annoying contouring effects sometimes noticeable in portrait or other critical views as seen via digital scan conversion.

Please note that Dr. Steber will NOT be releasing any further information on his new design until he has completed development work still in progress and published the results.

SSTV needs every bit of quality that can be built into the system. Congratulations to George for his continued efforts to improve the quality of slow scan images!

The Super System Is Here?

Another highlight of the SSTV Seminar was Dr. Robert Suding's announcement that the Digital Group will soon produce a new board that will add SSTV to their minicomputer system.

What the Digital Group offers is video display of two-way CW and RTTY, a keyboard for control and transmitting purposes, plus scan converted SSTV. A program for CW and RTTY has been available for some time, so it can be assumed that a new program will be provided for use in conjunction with the new board.

The availability of the Digital Group's system that can give the amateur CW, RTTY, AND SSTV (when it happens) will add a new factor in the equipment field. No specific date for over the counter availability of the new board had been set as of April 30th, but it is

Fig. 3—Plug in the right boards and programs for horizons unlimited via the minicomputer route. I'll take CW, RTTY, and SSTV!

Fig. 4—Gary Davis, author of several articles on two-color television systems and W2DD captured by CQ's candid camera. See text for details on Gary's low cost color system.

expected that production will begin "soon."

The kind of sophistication found in the Digital Group's minicomputers is not inexpensive. On the other hand, those familiar with computer technology have high regard for the design and quality of DG products. So, if you want to go all out for computer capability plus exclusive amateur oriented facilities, smash the Piggy bank, or rob a casino!

The new C.W., RTTY, SSTV board was not demonstrated at Dayton but I believe that it can be safely assumed that its performance will be in keeping with that of other Digital Group products.

For a good look at the Research Director of the Digital Group, W0-LMD, and a DG system cluster, see figs. 2 and 3.

Two-Color TV

Among the displays and demonstrations of amateur projects at Dayton, the two-color television systems of Gary Davis and Dr. Don Miller, W9NTP, were outstanding. Gary Davis and a slow scan friend are pictured in fig. 4.

Both of the above experimenters are using two inexpensive black and white TV cameras synched together to create color images on a broadcast color TV set. The color information is derived by fitting one camera with a red filter, the other with a blue-green filter.

Many "In Focus" readers will recall Gary's articles on the subject of two-color fast scan TV which appeared in the July, August, and September 1975 issues of *Radio-Electronics* and the July-August 1976 issue of *A-5* magazines. Gary's is a strictly fast scan system.

Gary has researched the subject of proper filters for the two-color system at great length. He feels that he has now determined an excellent pair of filters for the job.

This low cost approach to color TV seemed to hold great interest for all who viewed his fine demonstration at Dayton. While it is true that the gamut of color that can be reproduced by a two-color system is limited, the low cost of the system makes it attractive to any experimenter who doesn't have the $1500 (used) and up price of a color camera!

In Gary's system, greens and reds were reproduced with fairly good saturation. Flesh tones were good. And, as might be expected, yellows were virtually non-existent and blues were essentially blue-green. This range of color reproduction is typical of red, blue-green (cyan) two color systems.

If you are interested in experimenting with a two-color system, there's a kit of filters available for $6.00 including postage. Write to Gary Davis, Rural Rte 3, Box 12, Columbus, Ind. For full details, see the magazine articles mentioned.

Fig. 6—The Europeans have landed! Volker Wraase, DL2RZ and Reino Janhunen, OH2HK met in person for the first time at Volker's Hamvention booth.

W9NTP Converts A Robot 400 To Color

With a long history of color slow scan experimentation behind him, Dr. Don Miller has come up with another version of a two-color slow/fast scan system. (Finding a short descriptive name for Don's system isn't easy!)

Like Gary Davis, Don is using two B & W cameras with red and blue-green filters to generate color information. However, Don's system works at both slow and fast scan rates. An external synch generator is used to tie the cameras together and there is some additional external circuitry. However, the big feature of Don's work is the addition of another memory to the Robot 400 scan converter. (This is a feature which Don included in a homebrewed scan converter last year, if I remember correctly.) Fig. 5 shows Don with the additional memory board in hand.

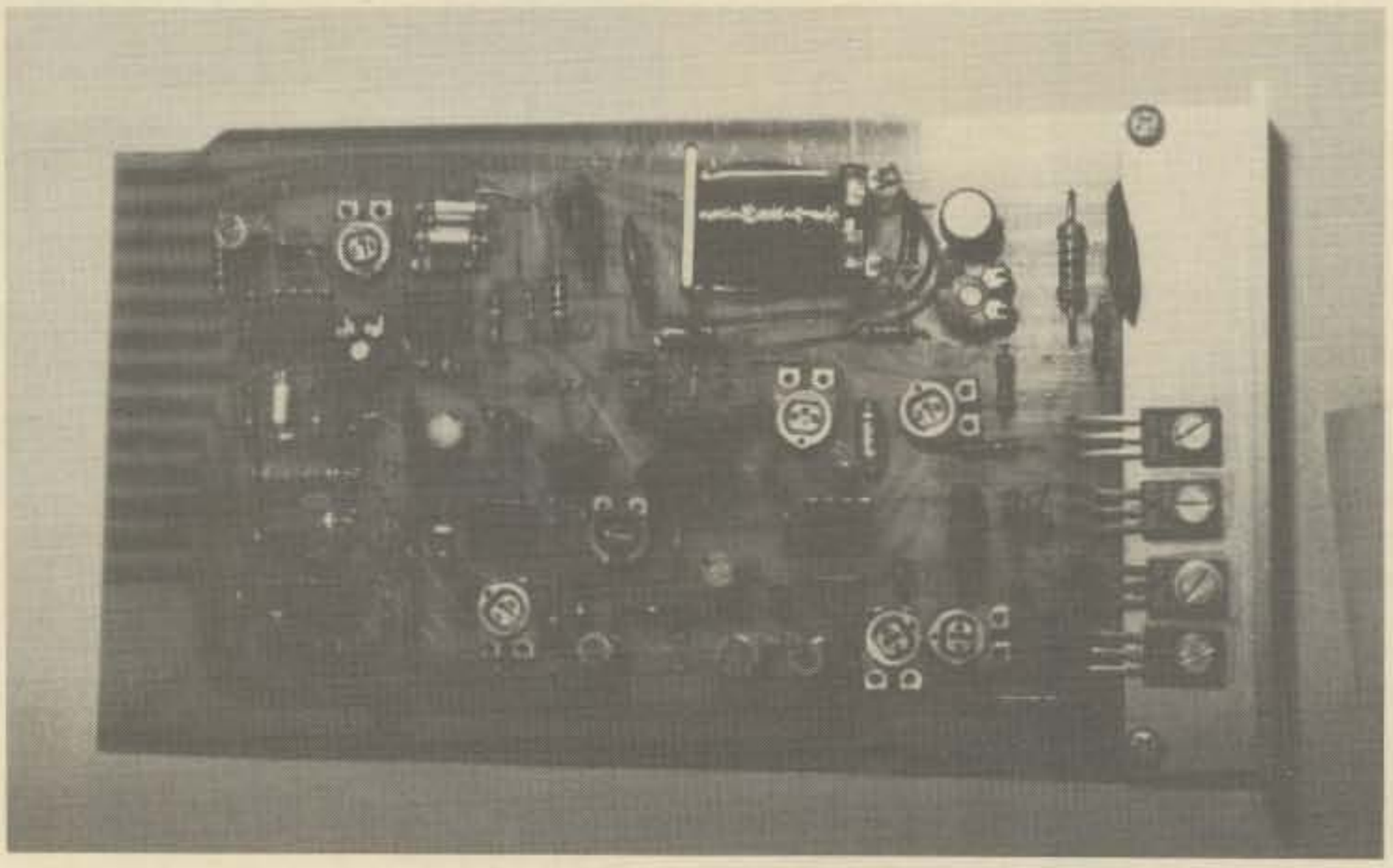


Fig. 7—DL2RZ's complete SSTV monitor circuitry (except for power supply, CRT, and yokes) on one board about five by eight inches!

As mentioned, Don's system can operate in either the fast scan or slow scan mode. In the fast scan mode, the two-camera video controls the color guns of a color TV set. (Blue information is derived from the red and blue-green video.)

In the slow scan mode (converted to fast scan display by the Robot 400) the color picture can be created by producing alternate lines of the two colors, or alternate fields—using the two-camera video which has been stored in the dual memory system of the modified Robot 400.

It is my impression that the alternate line color display was far more satisfactory than the alternate field method. The alternate field display

had intolerable flicker.

The extra memory board for the 400 was mounted in a plane parallel to and just below the main (top) board of the 400. I believe that Don intends to make this board available at cost to those who wish to experiment with this form of color slow scan.

In this connection, a word or two of warning. Don't expect that you can just throw another memory into the Robot 400 and "go color." You will need the information on how to use an external synch generator to control the cameras and how to interface the new board with the existing circuitry of the 400. Also, the addition of the extra memory to the 400 constitutes a real modification of the unit which takes it out of warranty. I sincerely hope that these two caveats will not discourage anyone genuinely interested in experimenting with color slow scan! Clarence Munsey and Joe Hawkins of Robot have suggested that the way to avoid the warranty problem just mentioned is to use TWO Robot 400s! Anyone wishing further information on W9-NTP's color system should write to him directly at Box 95, Waldron, Indiana, 46182.

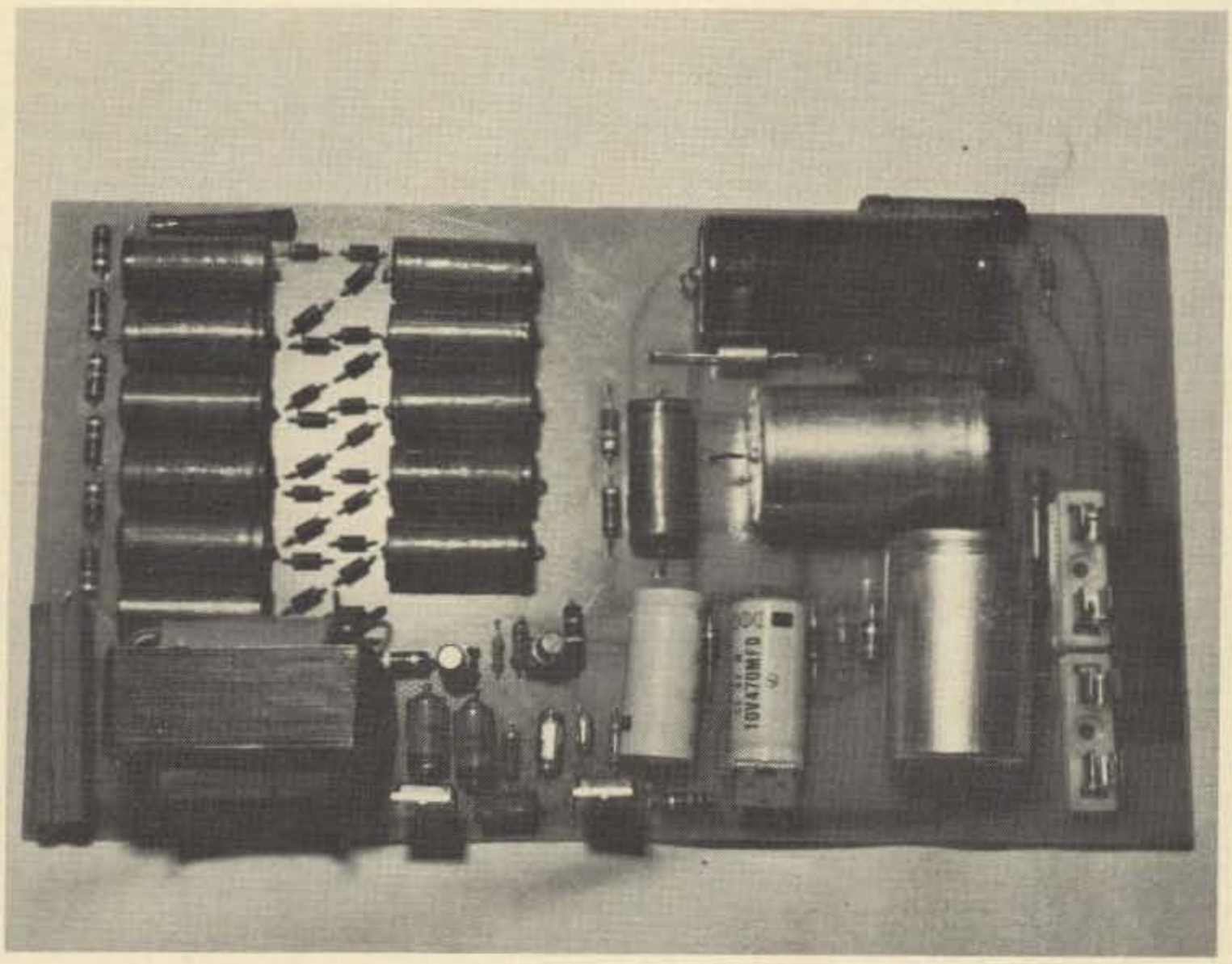


Fig. 8—Power supply board for the DL2RZ monitor.

German Scan Converter—Wunderbar!

For the past two years, U.S. slow scanners have been working Europeans using gear manufactured by Volker Wraase, DL2RZ. Volker was part of the Dayton scene this year with a booth full of goodies priced from ten bucks to $798 (for his new scan converter!). Young, intensive, and full of ideas that's how I'd describe Volker. He's pictured with Reino Janhunen, OH2HK, Editor of SW-Instruments Magazine in fig. 6.

Something For Beginners

For the beginners in SSTV, DL2-RZ's kits look very attractive. Fig. 7 shows a complete Model SSTV-5 monitor board (w/o power supply). The board is only $10.00, with parts $52, and wired for $79. The power supply, Model SSTV-2 (see fig. 8) costs $10, $48, and $69, as above. Get these kits, a 5FP7 tube, some yokes plus a couple of pots and you're in business.

On The Up Side

On the more elegant side, Volker offers the fast to slow scan converter Model SC-1402 (to generate slow scan pictures from a fast scan camera) complete as shown in Fig. 9 for $298. It has a built-in test pattern generator.

Top Of The Dots—Digitally Speaking

Top of the DL2RZ line is the SSTV scan converter Model SC-420 priced at $798. This unit converts either fast to slow or slow to fast. For a look at the crisp no-nonsense panel design of the SC-400, see fig. 10. This unit is fitted with all the input and output connections necessary to easily integrate its operation into the usual home station equipment. Switching from voice to video is easily accomplished—and vice versa. An unusual feature of the SC-420 is that it can be programmed to stop scanning automatically at the end of a frame if no further picture information is beinig transmitted. This means that when the sender stops his picture transmission, you don't lose the last frame. Neat. Of course, you can switch to continuing scan if desired.

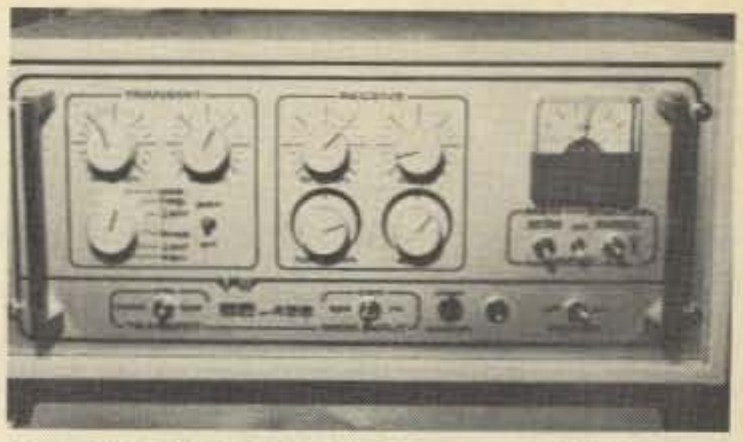


Fig. 10—A compact scan converter in a crisp gray package. The SC-420 designed by DL2RZ is becoming very popular all over Europe.

Available only to purchasers of the scan converter is an accessory item that I'm sure will find eager buyers. The Model LG-420 "electronic pencil" can be used to create or modify picture information as received or from memory by "writing" on the monitor screen. For an example of writing on the screen, see fig. 11. This is a rather expensive option ($97) but I am sure that most purchasers of the scan converter vill find it irresistible.

For detailed price lists and additional information, please write directly to Volker Wraase, DL2RZ, Elektronik, 23 Kiel 14, Ellernbrook

Fig. 11—Now you can put the frosting on the cake! An "electronic pencil" or "light pen" offered for sale with the SC-420 will permit you to "write on the screen" as demonstrated here. The writing can be either black or white. (This device works only with its parent equipment.)

Fig. 5—Don Miller, W9NTP, explains his method for doubling the memory capability of a Robot 400.

6A, West Germany. All prices mentioned are FOB Kiel.

More On Dayton Later

There'll be more pictures from Dayton next month.

2nd "Albatross" SSTV Contest Announced

Prof. Franco Fanti, I4LCF has just supplied me with the details of the 2nd Annual Albatross SSTV contest. The prizes are worth going after, so read the rules and join the action!

First prize is an A.T.C. TV camera (less lens) supplied by the firm A.E.C. Advanced Electronics s.r.l. of San Lazzaro (Bologna, Italy). Second and third prizes are one year's subscription to *CQ-TV* (the Italian ham TV magazine).

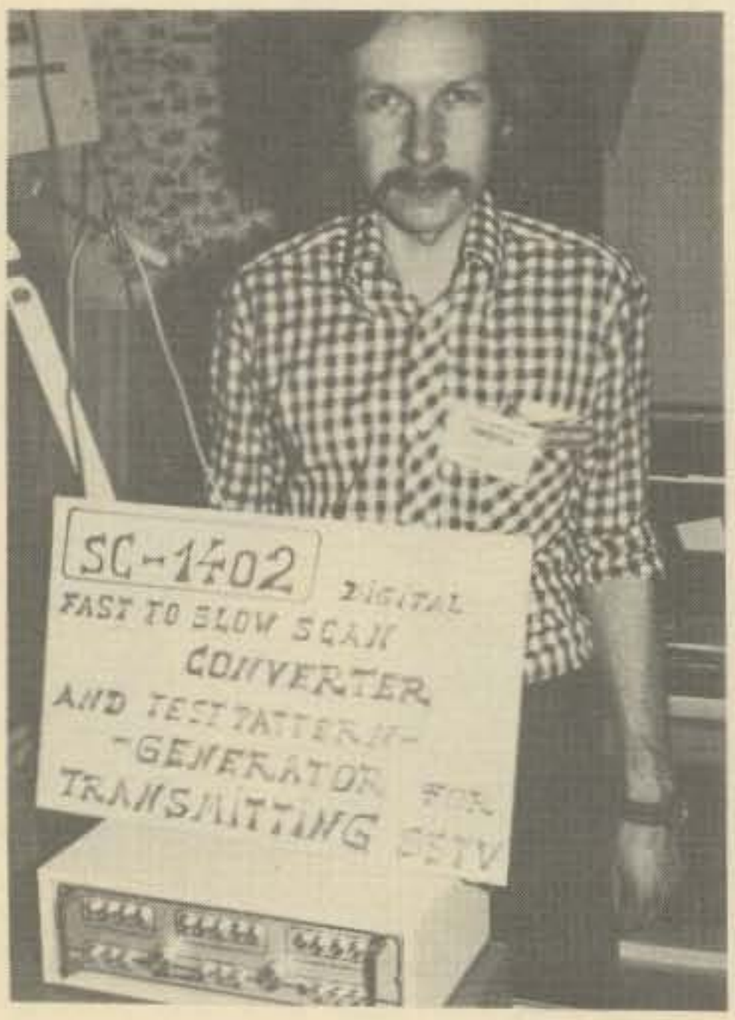


Fig. 9—Volker shows off his digital fast to slow scan converter with built-in test pattern generator.

No logs will be returned. The contest disqualification criteria of the ARRL are valid for this contest. The decision of the organizer will be final and any subsequent controversy cannot be referred to the Civil Court.

Be sure to include one dollar or the equivalent local money with your log. This will be used to send the final score and the rules for the next competition.

Now, here's the rest of the info as received from our good friend Franco:

Rules For "Albatross SSTV Contest"

2nd "Albatross" SSTV Contest

September 12th and 13th 1977

Sponsors: B.A.T.C. (British Amateur Television Club) and A.E.C. (Advance Electronic s.r.l.) S. Lazzaro Bologna (Italy).

In order to promote increased interest in the SSTV mode of operation I4LCF has pleasure in announcing the 2nd "ALBATROSS" SSTV Contest. Sponsors of this Contest are the B.A.T.C. and the Italian firm A.E.C.

Rules

Period Of Contest: Part 1—1500-2200 GMT on Saturday 12th Sept. 1977. Part 2—0700-1400 GMT on Sunday 13th Sept., 1977.

Bands: All the frequencies authorized within 3.5—7.0—14.0—21.0—28.0 MHz bands and via Oscar-Recommended frequencies are 3.754—7040—14.230—21.340 and 28.670 (± 5 kHz).

Messages: Messages consist of: Exchange of pictures with a) Callsign, b) Report (RST) c) serial number Example I0XXX 599 001.

Exchange Points and Multipliers: a) Points—1 point for contact on 14 MHz, 5 points on 3.5—7.0—21.0—28.0 MHz, 25 points via Oscar.
b) Multipliers—10 points for each continent (max. 60 p.) 5 points for each country (list ARRL) W areas from W0 to W9 and VE from VE0 to VE7 will be considered as separate countries.

Scorinig: Total exchange points multiplied by the multiplier total.

Sections: a) Transmitting and receiving video stations
b) Receiving video only
A separate table will be made for each class.

Logs: The Logs will contain: Date, Time GMT-Band-Call sign received —Report (RST) and number sent and received—Points—Multiplier and final score. A description of the station and photos would be appreciated, but this is not obilgatory. Logs must be received not later than October 30th 1977. Send Logs to: Prof. Franco Fanti, Via Dallolio n 19 Bologna (Italy).

CQ for Pennies A Day. . .

Somewhere in the deep dark recesses of your basement (where the XYL and kids fear to tread) is a carton of assorted parts and goodies for that ultra-fantastic, super-stupendous, downright necessary gizmo you were going to build someday. It was right out of the pages of *CQ* . . . let me see now . . . about 1969 or was it 1971. Gee, that's a long time ago and things *do* change. While you were gathering parts and hardware, the state of the art and technology kept moving on. Chances are that your project has been updated by now, and that gear that you're now using has been modified several times - tremendously improving its performance of course. And by now, several companies are making that same gizmo for less than you could ever build it for yourself.

The gist of all this is to remind you that $7.50 a year is a small price compared to your total investment in amateur radio to find out what is currently happening in the field and how to make the most of what you have. You'll be amazed at how much *CQ* can add to your knowledge and enjoyment of amateur radio . . . all for about 2 cents a day.

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast uttered a mild oath and gently removed his headset and placed it gently on the desk. "For the life of me," he said, "I don't know how *anybody* receives *anything* on 160 meters during the summer." He turned up the receiver volume and a blast of static shook the 'phones.

"Think how bad it must have been on 1,000 meters in the old days," I remarked. "Cheer up. The static level will drop soon, and the fall DX season for 160 meters will be upon us. In fact, since the band is so noisy, I think now is a good time to start planning your 160 meter antenna. Do you have any ideas?"

"No," admitted my friend. "I just don't know where to start. Do you have any good suggestions?"

"When in doubt, consult the expert," I replied. "In this instance, my expert is the Dean of 160 meter DX-

*48 Campbell Lane, Menlo Park, CA 94025

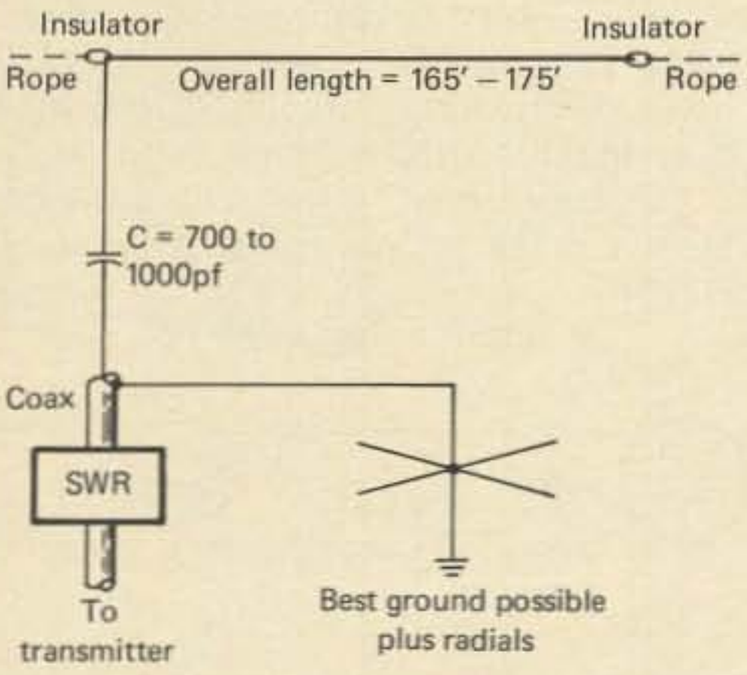


Fig. 1—The antenna recommended for the 160 meter beginner by W1BB is the Inverted-L. Slightly more than a quarter-wavelength long, the Inverted-L presents a good impedance match to a 50 ohm feed system. Resonance is established by means of the series capacitor. Antenna may be bent if it is required to place it in a small space. At least one ground radial (135 feet long) is required. More radials give improved performance. Radial can be insulated hookup wire laid along the surface of the ground (or slightly above it) and can run through bushes, etc.

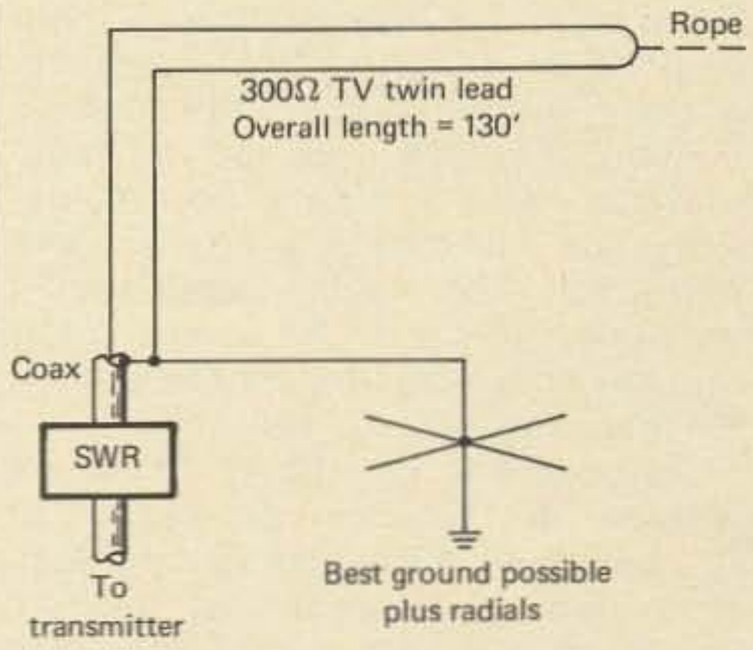


Fig. 2—The Folded Marconi antenna for 160 meters. Described first by Bell Telephone Laboratories in 1949, the antenna was featured in the December, 1953 issue of CQ magazine (page 58). The antenna is made of TV "ribbon" line, but may be made of two parallel wires, with air insulation, as the impedance of line has nothing to do with antenna operation. Antenna length is pruned for lowest SWR at the design frequency. One-third of the antenna should be run as vertical as possible.

ers—Stew Perry, W1BB. Stew has graciously provided me with some good information on 160 meter antennas that he and other prominent DXers use on the 'top band,' Would you like to hear about them?"

"Yes, yes," exclaimed Pendergast eagerly, as he opened his large notebook and prepared to take down the data.

"Well, I'll paraphrase Stew's letter. His opinion is that the best antenna for the 160 meter beginning enthusiast is the *Inverted-L* shown in fig. 1. This antenna is about 165' to 170' in overall length. The vertical section is as high as possible, with the remainder of the antenna running horizontally to a convenient tie-point. The vertical section does most of the work. The antenna is adjusted to resonance by a variable capacitor connected in series with it. The capacitor can be a two-gang broadcast unit with the sections in parallel, or what have you. It is fed with a 50 ohm coaxial line through an SWR meter. Stew says it will be great for local contacts even with a poor ground, but the better the ground connection, the better it will perform.

"As to the ground connection, Stew says to tie onto water pipes, wire fences, lay down quarter-wave radials of insulated wire and use *multiple* ground rods. You can use it with a poor ground, and then improve the ground as you go along. The better the ground, the better the results."

I handed Pendergast a second drawing (fig 2). Here's a sketch of a well-known 160 meter antenna. It is a *Folded Marconi*, first described in the *Bell Telephone Laboratories* "Record" of May, 1949. This two-wire antenna, if completely vertical, would have a base feed point impedance of about 145 ohms. When it is bent into an L-shape the impedance is lowered. Experiments have shown that if the vertical section is about one-third as long as the horizontal section, the feed point impedance is very close to 50 ohms. That makes the vertical section 43 feet high and the horizontal section 87 feet long, for an overall length of 130 feet. A 50 ohm transmission line is used, along with an SWR meter.

"The antenna can be made up of 300 ohm twin lead, since the imped-

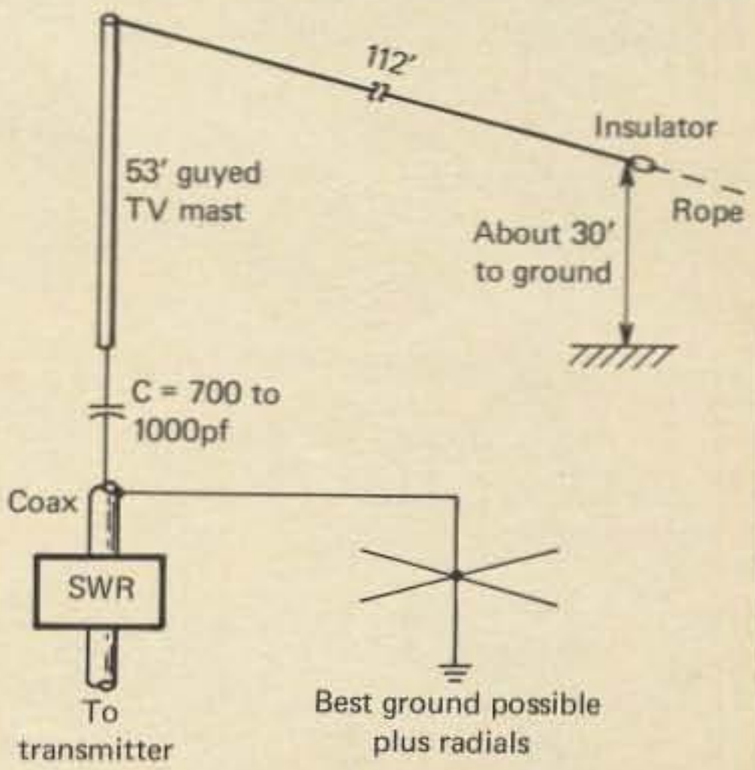


Fig. 3—The G3RPB version of the Inverted-L antenna. A TV mast is used for the vertical section, with top wire run down at an angle to the ground.

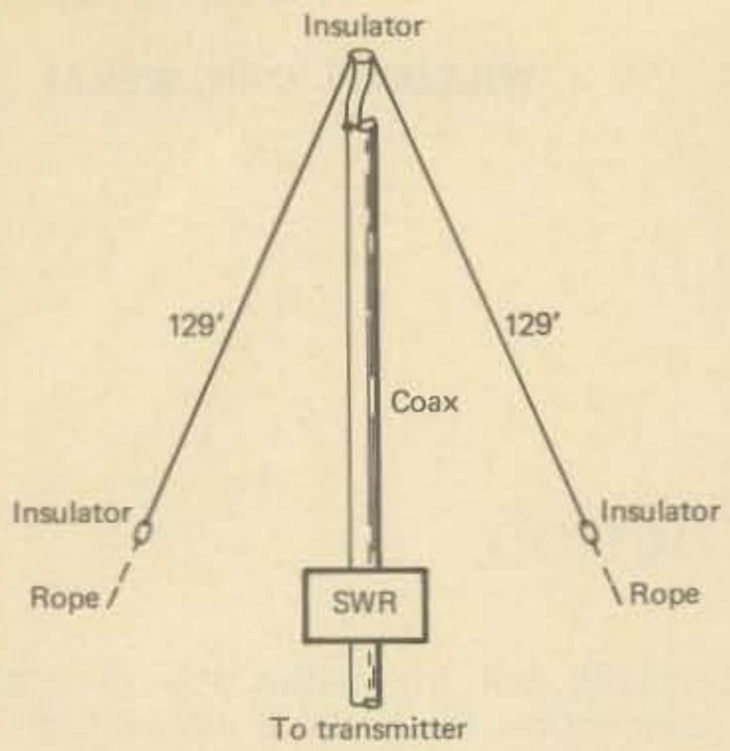


Fig. 4—The Inverted-V antenna used by W1BB for 160 meter DX. The wires are trimmed equally for best SWR at the operating frequency. The ends of the antenna are about 15 to 20 feet clear of the ground. The center of the antenna is at least 40 feet high, and works better if it is upwards of 70 feet high. If open wire line is substituted for the coaxial line and an antenna tuner is used, the antenna performs well on other high frequency bands.

ance of the twin lead does not enter into the picture. Again, the best ground system possible is very important WBGDQ, whose 160 meter signal is very impressive, has used this antenna for DX work.

"Stew says this antenna compares very favorably with his full-size vertical in tests with mobile stations up to 100 miles distant in daytime, which shows the low angle radiation of the antenna. This design was also used by W0VXO on his South American and Caribbean DXpedition.

"A variation of the folded, or bent, antenna is the one used by G3RPB for his trans-Atlantic work on 160 (fig. 3): It is a version of the antenna in fig. 1. The vertical section is a 53 foot metal pole (TV mast) and the horizontal section is a wire. The overall length is about 165 feet. G3-RPB uses buried copper objects (a water boiler, for example) for his ground, plus as many random length radial wires as he could lay down in his yard."

"Simple enough," remarked Pendergast. "But how about something a little more exotic?"

"Right. Well, Stew thinks the best all-around 160 meter antenna is an *Inverted-V* (fig. 4). He likes it because it provides radiation at many different angles, one of which is bound to hit the ionosphere for good propagation. For long distance DX, Stew says, the Inverted-V isn't quite as good as a high vertical used with a *good* (repeat, *good*) ground connection. For the average location, however, with soil of poor conductivity, the Inverted-V is an excellent performer. The center point should be fairly high (fifty to seventy feet) and the ends should clear the ground by fifteen to twenty feet.

"If operation on 160 is all that is wanted, the antenna can be fed at the apex with a 50 ohm coaxial line. If multi-band operation is desired, it can be fed with a two-wire open line of random length, and an antenna tuner.

"The ends of the Inverted-V are trimmed equally until a low value of SWR is achieved at the chosen frequency. For 1812 kHz, as an example, Stew found each wire was about 129 feet long."

Pendergast sighed. "It sounds as if the ground connection is the key to successful 160 meter operation."

"Yes," I replied. "Listen to this letter that ZE7JX (Rhodesia) sent to W1BB concerning his experience on 160 meters. Peter says he had a 265 foot wire, about 55 feet high for 160 work. It worked pretty well, but wasn't good enough. Peter wanted to work WAC on 160 meters and couldn't raise Europe, Australia or Asia, even on pre-arranged schedules.

"So he erected a 55 foot vertical, with a matching network at the base and laid out fifteen radials, each 130 feet long. The radials were placed on the grass. The antenna presented a load of about 4 ohms, so he spent a lot of effort matching the antenna. Once he got a low value of SWR on the transmission line, the antenna sounded "hot" on the receiver. He tried a CQ and raised EP2TW in Iran with a 449 report! Asia at last! Encouraged by this success, he went for Europe, but no luck. So he laid down 50 more radials and noted that the base antenna current increased considerably. A few nights later he raised G3SZA for a 559 report.

"This left only Australia for WAC. Night after night, schedules were held with VK6HD, with one failure after another.

"Finally, in desperation, 128 more radials were put down, for a total of nearly 200 radials. This amounted to something like *sixteen thousand feet of wire* either in, or atop the ground!

"However, the very next day after all this work, Peter worked both VK6HD and VK6IZ, followed by a VK3 a few days later!

"Peter says that with the present set-up, if a station is heard, a contact usually results!"

Pendergast gulped. "Sixteen thousand feet of radial wire." He thought for a moment then said, "I guess if you want something badly enough, and carry on to the end of the road, the results are worth the effort."

"It is mind-boggling," I replied. "But 160 meters is a very special band with very unique problems. Just listen to the summer static!

"Unfortunately, a vertical antenna is very noisy for receiving, especially

(Continued on page 88)

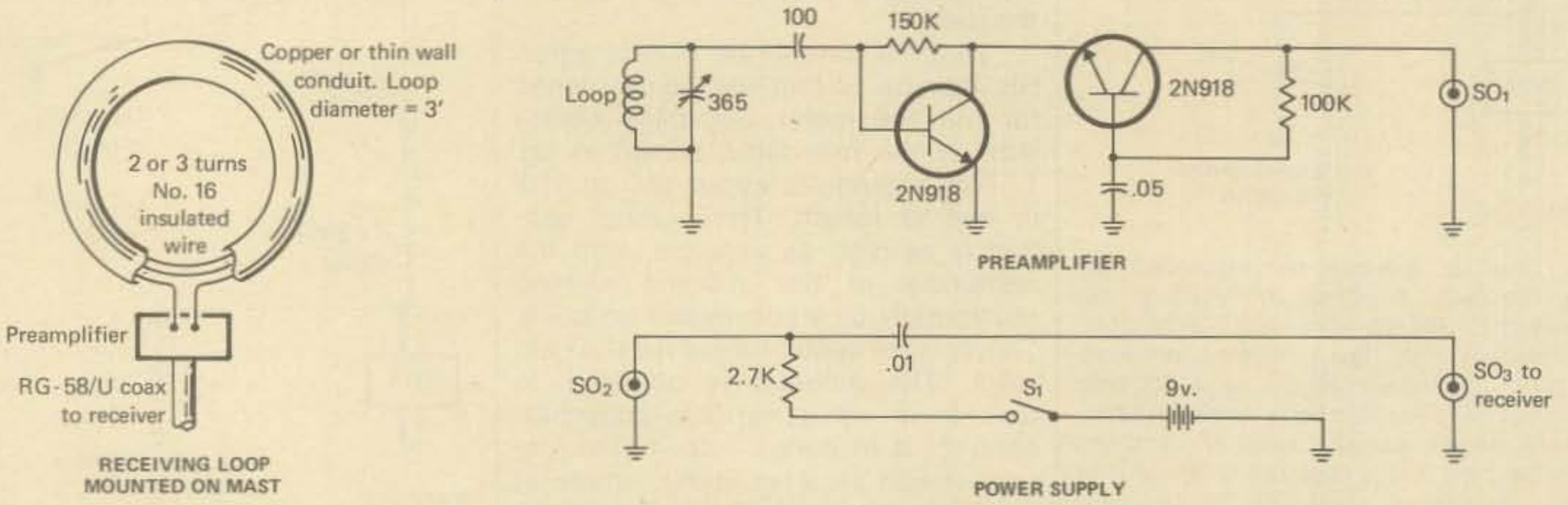


Fig. 5—The W7DOL/6 Loop and preamplifier for 160 meter DX reception. Loop is a 3-foot diameter circle of copper tubing or conduit. If a metal support mast is used, it is grounded to the mast only at the top. The bottom of the loop is insulated from the mast. Two or three turns of wire are passed through the loop and are resonated to the receiving frequency by the 365 pF capacitor in the preamplifier, which is mounted directly beneath the loop. The capacitor may be a mica compression unit. The preamplifier receives its power through the coaxial line which connects it to the receiver.

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How one man won the interference battle.
A story with a moral.

The Ham's Environment: Aesthetics, Interference, or Whatever

BY THOMAS J. OWENS*, K7RSC

Have you ever received official notice of complaint from the Federal Communications Commission? Did it deal with radio interference to home entertainment equipment of a neighbor who steadfastly maintained his problems stemmed from the operation of your amateur radio station? And, did that neighbor never bother to advise you of his dificulty but, instead, lodge his venomous lance directly with the FCC? Does any of this sound familiar?

Last summer a member of the Western Washington DX Club received such notice from the FCC—alleging interference emanating from his station. He was very fortunate to have the technical and moral support of the West Seattle Amateur Radio Club and their television interference committee. Several days were spent running tests between the amateur station and equipment of the complainant (Mr. Uptight). The tests demonstrated receipt of amateur signals by Uptight's two stereos and TV set (which was on a cable system).

Members of the TVI Committee constructed and installed filter networks which effected total elimination of the amateur signals by Uptight's two stereos. Tests were run at full legal power on all bands used by the licensee; those tests revealed absolutely no interference to the stereos under any condition of operation. However, the TV set was still receiving amateur signals and arrangements were made to conduct further tests to ascertain the reason for receipt of amateur signals by Uptight's television.

On another day, TVI Committee members took a separate portable color TV set to Uptight's home to determine a solution to the problem. Prior to taking this set to the Uptight home, it was set up in the actual operating room with the amateur transmitter and linear amplifier. Tests were conducted on all bands and no visual or audible interference was observed. After this had been done, the set was taken to the complainant's home.

Recall that Mr. Uptight's set was connected to the local cable system. TVI Committee members substituted the portable color set with that of Mr. and Mrs. Uptight. The portable TV "test set" was hooked directly to the cable system; tests revealed both audio and visual disruption in the test set. It was then disconnected from the cable system and connected directly to Uptight's normal roof-mounted antennas. Again tests were run on all bands at full legal power and there was no interference to either the picture or sound. A similar result was obtained with the complainant's set when connected to his roof antennas; but, when reconnected to the cable system, interference was again present. Such was the plight of Uptight.

The TVI Committee concluded that the amateur signals were gaining entry into Uptight's TV set through the cable system itself—and not through the normal roof-mounted antennas. The Committee advised Mr. Uptight to call the cable company to have them come out, inspect their equipment, locate the source of entry into their system, and establish adequate filtering to provide a TV signal source devoid of unwanted radiations. The licensee (and TVI Committee) believed Uptight would call the cable company, as he said he would, and request their assistance in correcting an obvious deficiency in the cable system. In their report to the FCC, the TVI Committee pointed out what steps had been taken to solve Uptight's problems and concluded by giving the amateur a clean bill of health. It was believed that Mr. and Mrs. Uptight were no longer up-tight!

Another case of amateurs helping amateurs solve a neighborhood problem. Not hearing a word of thanks from the Uptights, the licensee was nonetheless delighted the matter had been satisfactorily

*3955 S.W. Ida, Seattle, WA 98136

concluded and his station equipment was not at fault. He heard nothing further from the FCC and assumed the matter had been laid to rest.

A few months elapsed and the licensee received a letter from the Engineer-In-Charge of the FCC District Office. It reported on the matter of interference to home entertainment equipment allegedly resulting from the operation of his radio station. Enclosed with that letter was a petition totaling some 80 signatures. Yes, you read that correctly—some EIGHTY (80) signatures! The petition *demanded* revocation of the amateur's license; it alleged "gross and intentional interference radiations emanating from his apparatus"; it further contended that the amateur's "unsightly antenna will decrease the property values and will be instrumental against enticing new neighbors from locating into the neighborhood." Have you ever heard of anything so preposterous? Imagine. An amateur antenna "unsightly"—such absurdity!

In any case, neither the FCC nor the amateur took the matter lightly. Although the Engineer's letter stated the earlier investigation revealed proper station operation, it further pointed out that the authority to operate was the "public's interest, convenience and necessity." It was very clear that to cause interference problems to such extent that 80 neighbors felt pressed to sign such a petition did not argue well for the position that the station was being operated in the public's interest. And, you know, at that point, one would have to agree! The licensee was directed to keep the FCC informed of measures being taken to resolve the matter to the relief of the neighbors and satisfaction of the amateur. Believe me, that appeared a helluva ominous task—and it was!

After lengthy discussions with the Engineer-In-Charge, and other fellow amateurs, a plan of attack was developed. It was decided that personal contact in the form of an interview would be made with each and every individual who signed the petition—all 80 of them. The purpose of such contact would be to determine the nature and extent of each person's interference problem and ascertain if the amateur station was, in fact, the source of such interference. Rather than just swoop onto their porch like a bird of prey, it was thought best to precede the visit with a personalized letter to each petitioner advising them of the impending visitation. The following is a copy of that letter.

"Recently the Federal Communications Commission forwarded a copy of your 'Protest Petition' dated July 26, 1976. The Engineer-In-Charge of this district office has asked me to contact you to help you identify and eliminate your interference problem.

Like you, I have also experienced radio, TV, and stereo interference occasionally in the past. It's very frustrating! However, there are ways to prevent it.

The attached sheet contains information on the steps I have taken to prevent my radio station from interfering with your electronic equipment. It also contains information that is needed to pinpoint whether any interference you experience is from the other radio operators in the neighborhood or me. Regardless of where the interference is coming from, I'd like to help you eliminate it.

I'll stop by your home in the next week to meet you and discuss any problems you've had in the past. I look forward to meeting you.

Please feel free to report any interference to me. You can normally contact me at home in the evening by calling 935-0457."

As you may have guessed, the petition's perpetrator was the self-anointed and appointed neighborhood marmot—Margrave Uptight. He had not bothered to call the cable company as he had agreed, but, instead, enlisted his two neighborhood cronies as left-handed lieutenants in the battle against that "unsightly" antenna. It later turned out the signature solicitation campaign was conducted in a somewhat devious and nefarious manner. More on that later.

Fully aware that the source of his problem was the virulent Uptight, the amateur called the cable company for their assistance. Later that same day repair crews were up and down the block checking their outdoor equipment. Their manager stated they had serious problems in the area but were working to correct/replace defective transmission lines, inadequate or non-existent grounds, and other malfunctioning outdoor equipment. Two weeks passed and they were ready to check their system with the equipment of the licensee. Tests proved the amateur signals were no longer being picked up on the transmission line system. Then a technician from the cable company, the amateur, and other assisting amateurs conducted additional tests between Uptight's home and the "ham station." The tests revealed there was still intermittent but attenuated receipt of amateur signals by Uptight's TV. Ultimately, the problem proved to be a defective cable company converter unit located in Uptight's home; the technician replaced it with a new one of different manufacture and the TVI became non-existent! Mr. and Mrs. Uptight have no interference whatsoever to any of their electronic equipment; however, they are still up-tight about that "unsightly" antenna. The matter of radio frequency interception by the Uptights was (and is) a closed case; and, the elated amateur was free to deal with 79 other complainants. As Midnight The Cat would say: *nice!*

Having once and for all (lets keep our fingers crossed) taken care of Mr. Uptight, the aspiring young licensee was free to deal with the peripheral

perpetrators of peril. The letter quoted above was now mailed to each petitioner. A couple of days passed and the telephone rang. A man identified himself and stated he had received the letter. "Oh, boy," thought the amateur, "he can hardly wait to get his teeth into me." What a surprise! The man began apologizing for having signed the petition. Some years ago he had worked with the person soliciting signatures, he said. Eating dinner and not wishing to be bothered at the time approached, he signed in order to rid himself of the solicitor. He hadn't realized what he had signed and was most embarrassed because he had no interference anyway. Wow! If they would all be half that easy. . . .

That weekend the neighborhood visitation program began. The first person interviewed said she had never experienced any interference, but thought it might be helpful for the person bringing the petition around if she signed it. She said, "You know, strength in numbers". She apologized, stating the seriousness of the matter had not been impressed upon her. One couple stated they had had some interference in the past but did not know its source. A man came to their home and told them the amateur was causing their problems, if they had any, and to sign the petition to have his station inspected by the FCC. They told the man they did not know if the source of interference had been the CB station across the street, the one in the block behind them, the amateur up the street (another one), or the amateur in question. They were assured it was the amateur with that "unsightly" antenna, so they signed the petition. A friend had come to their home and installed a high pass filter several months earlier which had eliminated the interference, but they had signed because of the picture painted of the amateur and his equipment. Another couple read the petition text and stated it was totally different from what they were shown when their signatures were sought. Their problem turned out to be defective parts in a brand new TV set. An interesting thing came out of that interview. It became evident that the person taking the petition around was misrepresenting what the petition, in fact, was —and what was going to be done with it.

An elderly lady stated she was asked if she had any kind of interference and had mentioned she didn't get color on channel four. The man told her it was because the amateur's antenna was so big it sucked all the energy out of the sky and there was nothing left for color on channel four. Not knowing better, she signed the petition. A slight tweaking of her fine tuning produced magnificient color on channel four—and all other channels too. She was somewhat embarrassed and apologized to the amateur; she too had been misled. One couple occasionally heard names like "Coffee Grinder," "Dragon Lady," "Jungle Bunny," "DJ Lady," "Come On," and the like. The petition solicitor told them it was the amateur and that he was operating illegally. Another couple apologized to the licensee when he introduced himself at the door. When asked why the apology, they said the interference was on at that very moment (with him in their presence). Their problem was misalignment of the TV's agc and fine tuning circuits.

One complainant was told the amateur was running 10,000 to 100,000 watts power output and that was illegal. I should say so! However, with that power level, one could approach the signal strengths of the VOA—maybe. The man said, "I did not realize the seriousness of what I signed. I was led to believe you were causing interference to all the neighbors and that you would do nothing about it. I personally have no interference, my TV does not work, but that's the TV set's fault; it won't even turn on. I feel this was misrepresented to me. I wish to withdraw my name from the petition." Another man said, "He told me you were operating illegally. We have no interference to any of our electronic equipment. The reason we signed was because he gave us the impression he was taking you to civil court regarding violation of zoning laws. He led us to believe he needed as many signatures as possible — he didn't appear to care if we had interference or not. He was just out to get as many signatures as possible."

As you can see, whatever was necessary to obtain signatures was done. There were many other enlightening stories but, in the interest of brevity, they are omitted. The interviews revealed five distinctive categories of petitioners.

Group I. No Interference. This group represented about 30 percent of the petitioners. They signed solely due to the false and misleading picture painted of the amateur and his equipment. They admitted *never* having had any interference! Most were apologetic, sorry they had signed the petition, and were upset by the manner in which their names had been used. They *all* released their names from the petition.

Group II. No Outside Interference. This group also comprised about 30 percent of the petitioners. They too signed due to the false and misleading picture painted of the amateur and his equipment. They were led to believe *any* imperfections in television, radio, or stereo reception was the amateur's fault. This group did have slight to moderate internal interference attributable to their own electronic equipment. The most common problem with TV sets was misadjusted fine tuning or misoriented rabbit ears, or both. In the case of stereos and radios, the interference most often was between-channel noise; it was most effectively eliminated by adjusting the set to exactly the desired frequency.

(Continued on page 90)

a monthly feature by
HERBERT S. BRIER, W9AD

Novice

"How to" for the newcomer to Amateur radio

Emergencies and Third-Party Messages and Nets. Recent FCC actions.

One important reason for Amateur Radio in the United States is its potential for emergency third-party communications in widespread tornadoes, floods, earthquakes, and other disasters. If past history sets a precedent, the first radio message from a nearby location, cut off from the rest of the world by disaster will probably come via Amateur Radio. A message signed by the area Civil Defense director or other responsible official addressed to the American Red Cross, will tell the magnitude of the problem, the expected casualties, and the amount of aid required. The amateur outside the disaster area to whom the message is sent will probably be asked to deliver it by telephone, long distance and "collect", if necessary. Almost immediately after the area of disaster has been identified, networks of amateur stations spring into action to handle the heavy volume of welfare traffic in and out of the area.

Radio Amateurs in the United States may send and receive messages in behalf of third parties without restriction as long as no financial remuneration is involved or the messages themselves are illegal. But international radio law strictly forbids the international exchange of third-party messages by amateur radio, unless special arrangements between the governments involved have been made. The United States has negotiated third party message agreements with Canada, Israel, Liberia and all the republics of Central and South America. But third-party messages (or phone patches) via Amateur Radio between the United States and other countries are strictly forbidden. One exception is that countries with United States personnel stationed within their borders permit them to send and receive messages to and from home via the Military Affiliate Radio System (MARS). These MARS messages are frequently handled on the amateur traffic nets in the United States.

The Amateur Message Form

A standard amateur written message, illustrated below, has four parts: the preamble, address, text, and signature.

> Nr 100R W9AD 21 Chesterton Ind. Time, Date filed. To: James Newham, 1234 His Street, His City and State and Zip Code, plus telephone number, if available. - . . . - This is an example of a twenty-one word amateur message consisting of a preamble comma address comma text and signature - . . . - Herbert Brier.

The message number is followed by the letter "R" or "P" to indicate the sender's opinion as to whether it is a routine or priority message. Next comes special "HX" handling instructions. Consult the back pages of a standard ARRL log book or omit. Next comes the call letters of the originating station followed by the number of the words, including punctuation, in the message text; the place of origin; time filed, preferably in Universal time (optional) and date.

It should not be necessary to stress a complete address on a message or the importance of an understandable text and signature.

Amateur Traffic Nets

As previously mentioned, immediately after a communications emergency arises, there are amateur nets standing by to provide the communications. This is the main function of the many amateur traffic nets heard in the 80-meter c.w. band, including the Novice segment and the 75-meter phone band every afternoon and evening. Similar nets meet at other times and in other amateur bands, but they are especially numerous on 80 and 75 meters.

Many of the traffic nets are tied in with the National Traffic System and meet two or more times a day. The NTS is designed to deliver most messages from a local state or section net in one evening to other local nets, or to the opposite coast, by the next evening. This is done by liaison stations relaying the messages cross country to and from local nets via regional and national nets between the scheduled local net times.

Typically, the net meets at the scheduled time and frequency under the direction of a net control station (NCS), who calls "CQ the ABC Net DE———," announces the purpose and rules of the net, and calls the roll of regular net members and lists the messages they have to send. After listening for visitors, the NCS directs the distribution of the messages reported. In phone nets, the NCS gives his instructions in plain English. In c.w. nets, however, special net "QN" signals and regular Q signals are used heavily.

QN Net Signals

QN*A:* *Answer* in order
QN*B:* Relay *between* —— and ——
QN*C:* All stations *copy*

Part of the last 89-student York Amateur Radio Club Novice class copying code at Elmhurst College, Elmhurst, Ill. Students of this and other code courses bring their tape recorders to record practice material for use between classes. (W9QKE Photo.)

*409 So. 14th St., Chesterton, Ind. 46304.

Bill Burns, Novice, WB9TDV, Reedsburg, Wisconsin, uses a Heath-Schlumberger frequency counter to keep his signals in the Novice bands! His Heathkit HW-16 transceiver and HG-16 variable frequency oscillator have teamed up with separate 80- and 40-meter dipoles for 27 states, confirmed. A Heathkit R.F. wattmeter completes his equipment. We are sending WB9TDV a one-year subscription to CQ for sending this winning photo in our Monthly Photo Contest.

QN*D*: The net is *directed*
QN*E*: *Entire* net stand by
QN*F*: The net is *free*
QNG: Act as NCS
QN*H*: Your frequency is *high*
QN*I*: Reporting *in* net
QNJ: Can you copy
QNN: NCS is——
QNO: The net is closed
QN*T*: Transmit messages from —— to ———
QN*X*: You are *ex*cused from net
QNY: Shift to —— to take tfc from ———
QNZ: Zero beat your frequency with —

A slightly more complete list of QN signals can be obtained upon request accompanied by a stamped return envelope from the Communications Department, American Radio Relay League, Inc., 225 Main St., Newington, Conn. 06111. Make the envelope about 10"x12" and put 35 cents postage on it and request the latest edition of the ARRL Net Directory while you are at it.

Not every amateur likes traffic nets. The critics say that any group that wants a clear channel picks a net name with the word "emergency" in it and pretends to be big-time communicators, relaying unimportant messages and conducting useless drills that prevent real amateur use of the frequency. Actually, most of the routine messages handled on the traffic nets are not very important in themselves, and the time spent handling them could be spent ragchewing or chasing DX. (There are many nets devoted to these activities listed in the ARRL Net Directory.) But the experience gained by handling third-party written messages under actual conditions becomes invaluable when disaster strikes.

Instant License Upgrading Now a Reality

Since March 1, 1977, any licensed amateur who appears at an FCC office trying for a higher-class license will have had their examinations graded immediately. Those that pass are given an Interim Amateur Permit to use their new licenses up to 90 days while the new permanent license arrives from Washington. Amateurs operating on phone under the authority of an interim permit will send the word "interim" followed by the special identifier appearing on the interim permit after the call sign. On radiotelegraph, the call letters will be followed by DN and the identifier.

Novice Power and Other FCC Items

As I discussed in the December column, the standard method of calculating the d.c. power input of an amateur c.w. transmitter is to multiply the d.c. plate voltage by the current in amperes of the output amplifier. Some years ago, however, the FCC started including the screen grid power with the plate power input of Novice amplifiers. But in 1976 when the FCC raised the d.c. power input of transmitters operating in the Novice bands to 250 watts the order dropped the reference to screen power. This was an oversight; the FCC still requires the screen power included as part of the power input to Novice amplifiers. Whether the screen power is or is not included as part of the tube input power it makes a difference of a few per cent at best, certainly not enough to affect the getting-out ability of the transmitter. On the other hand, if you did not know that combined plate and screen grid c.c. power input is measured in determining Novice transmitter input, you might easily answer a question incorrectly about the requirement.

Speaking of incorrect answers in Novice tests, there has been one Ohm's Law question in some Novice exams that cannot be answered correctly with the information provided. Fortunately, applicants who get the question are automatically credited with the correct answer.

73, Herb, W9AD

Herbert Brier

Born: February 28, 1914
Ent. Into Rest: May 21, 1977

The Chesterton Tribune
Chesterton, Indiana 46304

Herbert S. Brier, 63, 409 S. 14th st., died Saturday, May 21, in Porter Memorial Hospital after a lifetime of accomplishment even though he was bedridden with rheumatoid arthritis since the age of 12.

Mr. Brier had lived here since August, 1975, moving from Gary. He was born, Feb. 28, 1914, in Lemont, Ill., a son of Herbert F. and Mary Louise (Nelson) Brier.

Surviving are his mother in Chesterton; a brother Thomas of Columbia, Mo.; two sisters, Miss Claire Brier and Mrs. Robert Paulson (Lucille),

He also leaves his sister-in-law Mrs. John Brier (Betty) of Gary; an uncle Dr. Peter A. Nelson of Fort Lauderdale, Fla.; seven nieces and six nephews.

Herb, as he was known to amateur radio friends all over the world, was not able to attend school past seventh grade, but taught himself advanced mathematics, Spanish, Braille (for a blind friend), and electronics.

He was the author of one book on amateur radio and co-author with William I. Orr of "VHF Handbook." For 17 years, he was amateur radio editor of Popular Electronics magazine, and until his death wrote a monthly column for CQ magazine.

Radio friends also knew him by his call letters, W9EGQ. He held an Extra Class amateur radio license, and was an active FHA operator during the late 30's and 40's, running the Gary emergency radio station during World War II, for which he received a citation.

He also maintained industrial electronic equipment for utility companies. In addition to technical writing in numerous journals, he tutored in non-electronic subjects, and edited professional manuscripts.

This month by
ROD LINKOUS, W7OM

DX

News of communications around the world

The 1977 Malpelo operation of HK0TU is now history. To many it was another new one, and another of the ten most wanted countries drops lower on the most wanted list (depending on where you are located).

The HK0TU DXpedition by the Radio Club of Columbia brought special joy to the avid DXer who entered DXing in the last six years. It was his first try at this rare country. Landing on the huge rock is perilous at best and shows to what extremes amateurs will go to activate a rare country. It probably will be the DX event of 1977, at least until the Bouvet reports are in for us to compare.

To the Pacific Northwest DXers, the short DXpedition was one of frustration. The 800-foot rock crest came between the Malpelo operating site and the Pacific Northwest. Those northern W7s, VE7s, and KL7s working the DXpedition number less than ten. Listening to the pileup from out here illustrates the law of relativity quite well. It does make a difference from what perspective you evaluate conditions.

The DX community as a whole, I am sure, was elated by the efforts of the brave Columbian amateur crew. They risked their lives to bring us another chance to work one of the really rare countries.

Transcontinental DXing

In the United States, a recent Federal Communications Commission ruling has changed DXing in W-land. The FCC eliminated the requirement to identify portable operation within the ten W call areas. With this came "transcontinental DXing."

For those avid enough, it allows a western U.S. DXer to go to the east coast to work Malpelo. A W6 can now operate from four-land as W6, without signing W6/W4. Since the FCC no longer polices the portable operations, the DXCC had no choice but to cave in and rewrite the 150 mile rule. With the change came the overnight elevation of many on the Honor Roll. It meant DXers who have made many moves around the U.S. can now count *all* their countries regardless of where or when they worked them. For example: the W3 who moved to W6-land can now count the fifteen year old contacts towards his honor roll total.

*5632 47th Ave. S.W., Seattle, Washington 98136

The CQ DX Awards Program

S.S.B.

489....ZL1BOQ
490....WBØNHG
491....W8ILC
492....W1NG
493....WBØHAD
494....LA7AH
495....VE4AT
496....WA7MKI
497....K4SB
498....WD8BJK

C.W.

258....W7DAZ
259....W1NG

S.S.B. Endorsements

275....K4SB
250....K4SB
250....W8ILC
200....K4SB
200....W8ILC
200....WBØNHG
150....K4SB
150....W8ILC
150....WBØHAD
150....WBØNHG
28MHz....K4SB
QRPP....W8ILC
Mobile....WA2EAH

C.W. Endorsements

200....K8PYD
150....G3FVC
150....W1NG
150....W7YBX
3.5/7MHz....W1NG

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.

This single event has made a dynamic change in our hobby. Unfortunately the advantage of the change comes to the large countries. To smaller countries (geographically) like Japan, the rule change will have a very minor effect. To the U.S. it is an opening of a new approach to DX. With the forecast of only one U.S. callsign per amateur, the rule change takes on new dimensions. If I ever get into a position of having a winter home, it looks like Florida here I come. The best location to work the 16 I have left is from southern W4-land. With the last 20 to go on 75/80 for 5BDXCC, I am saving plane fare for a quick trip to W1-land. With a good opening to Europe I should finish up in a couple of nights. Anyone want to volunteer a station. Hi!

DX Awards

Several years ago I wrote the following article for our DX club paper. It appears more timely today than it did then.

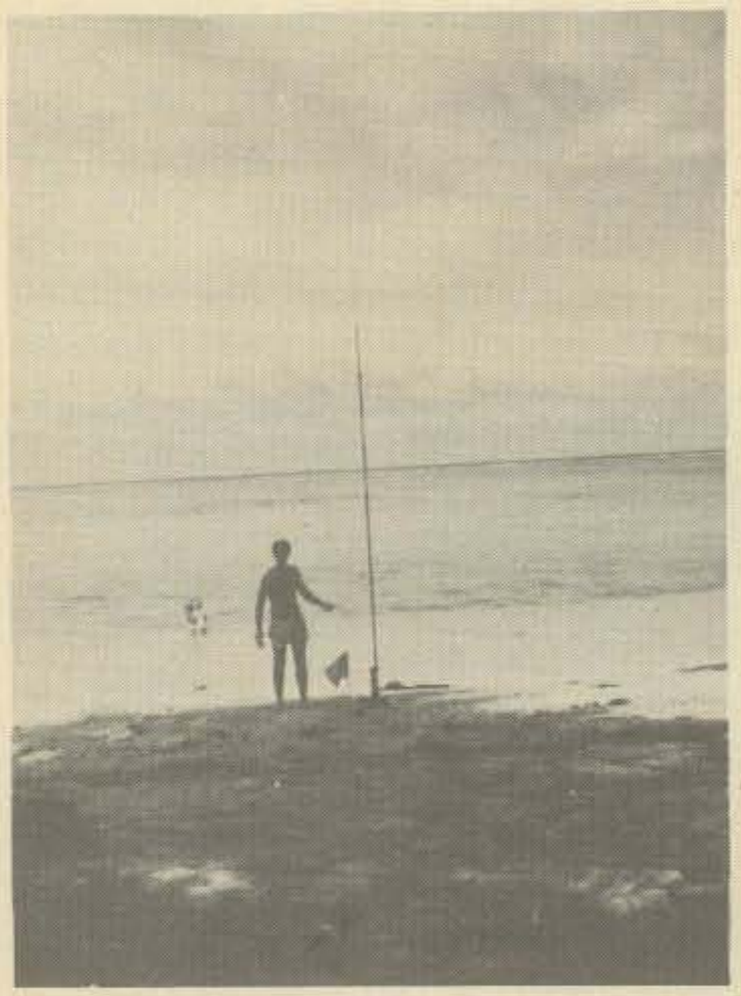
"STREAMLINING THE DXCC—It may be time for automation to be used with DXCC. As many know, the climb to the DXCC Honor Roll is a long and trying one. As you get down to the last thirty or forty countries

Franz Langner, DJ9ZB, has given us many a new country, including his recent 4U1-ITU operation in March 1977. His other operations include: C31LY, DU1ZB, DU9ZB, F0ZN, HB0XJV, JY8ZB, TA2ZB and 4W1ZB. And he is a QSL manager for many more.

Karl Metzger, DL6DE, an early holder of WAZ is one of Germany's most active DXers. Karl operates his neat shack in Celle, West Germany.

you quit counting how many worked and switch to how many are left. Analyzing the thirty or so left, you'll notice BY, ZA and/or YI; and many others who are no longer active, do not allow amateur operation, or are of the DXpedition class. To get to the top is an effort of years of devotion and is a direct result of tenure.

If you have all the countries on the DXCC list today, eleven new ones will have to be generated to bump you off the list. Matter of fact, you can be totally inactive, own no gear and have an elapsed or suspended license and you'll still be on the Honor Roll. At today's rate you'll be safe until the mid 1980's. One of the suggestions provided to streamline the DXCC bookkeeping and the Honor Roll standings is to automate the DXCC records. Yes—use a computer. When this is done the station worked and date would be entered.



The Saipan multiplier in the 1977 ARRL March phone weekend was the result of the Saipan Amateur Radio Club picnic at Pau Pau beach as KG6RE. Using a FT-101 to a 4BTV vertical in the surf, the gang passed out a lot of contacts via battery power. The antenna is being inspected by Keith KG6SS. All but Thelma, KG6RX are gathered around the operating position. Back row: (right to left) Len, KG6SW; Steve, KG6RI; Dan, KG6RL; Linda, KG6SO; and Pat, KG6RK. Front row: (right to left) Rio, KG6RO; Bert, KG6SL; Hoss, KG6SG and Keith, KG6SS. (photo KG6SW)

CQ DX Honor Roll

The *CQ* DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, less deleted countries, is used as the country standard. Total number of current countries on the DXCC as of this listing is 319. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted anytime.

C.W.

W6PT	317	W4YWX	308	W4IC	301	W4BQY	296	WA6EPQ	282
K6EC	313	W2GT	307	W6ISQ	301	K6JG	295	W6SDO	279
ON4QX	312	W8LY	305	K6LEB	298	VK3AHQ	292	DJ7CX	276
W6ID	312	W9DWQ	303	WØAUB	298	WA8DXA	287		
W8KPL	309	N6AV	302	DL3RK	297	W6NJU	284		

S.S.B.

W2TP	318	K4RTA	319	KH6BB	305	N6AV	296	W6FET	287
DL9OH	316	W2QK	310	W4IC	305	OZ3SK	296	G3RWQ	286
K2FL	316	W3DJZ	310	K6WR	304	WØSFU	296	K1KNQ	286
W4EEE	316	W6EL	310	K6YRA	303	W2CNQ	295	W6HUR	286
WA2RAU	316	W6KTE	310	VE2WY	303	WØSD	295	DJ7CX	285
TI2HP	315	F9RM	309	VE3GMT	303	K6XP	294	OE3WWB	285
G3FKM	314	SM6CKS	309	WA3IKK	303	W4WSF	294	G3KYF	284
IØAMU	314	WA2EOQ	309	K4MOG	302	DJ9ZB	293	W6DSO	284
W3CWG	314	W4DPS	308	ZL1AGO	302	I5WT	293	N6AW	282
W3NKM	314	W6YMV	308	OE2EGL	301	VE7WJ	293	WB2RLK	282
W6RKP	314	WA6AHF	308	W6NJU	301	K6AQV	292	YV1LA	282
VE3MR	313	I8YRK	307	ZS6LW	301	K8PYD	292	SP5BSV	281
W3AZD	313	IØZV	307	W3GG	300	WA2HSX	292	WA4WTG	281
W9ILW	313	K6JG	307	I4ZSQ	299	HP1JC	291	WA0KDI	281
I8KDB	312	K8DYZ	307	W6KZS	299	WØYDB	291	XE2YP	281
W4SSU	312	K9WEH	307	W9OHH	299	W9YRA	290	W9QQ	280
W4UG	312	ZL3NS	307	YV1KZ	299	DL6KG	289	DL1MD	279
W6EUF	312	F2MO	306	EA4LH	298	G3WW	289	K4SB	279
W6REH	312	I6FLD	306	W9QLD	298	OE1FF	289	OK1MP	279
W9DWQ	312	K6EC	306	WB6DXU	298	VE7CE	289	WB4SIJ	279
I8AA	311	SM5SB	306	F9MS	297	W6FW	289	VE7HP	277
VE3MJ	311	SM6CWK	306	G3DO	296	K4HJE	288	XE1KS	276
XE1AE	311	W9JT	306	G3TJW	296	YS1O	288	N2SS	275
IT9JT	310	W9KRU	306	K8DYZ	296	DK2BI	287		

SSTV

W8YEK 108

All records as of the implementing date would be given the same date, i.e., January 1, 1977. This method could then be used to give you an updating of your list when you submit your next bunch of cards. But, better yet, the year-end standings would be a real time product.

Using the computer allows the automatic purging of obsolete countries or outdated contacts. The old timer shudders at the thought that his 1946 YI1A contact and his 1947 ZA8U contact may be no longer credited. Yet vitality can be added to the DXCC if a DXer is required to work the country at least once every five years.

The suggestion being submitted is that a QSO has a definite life span; then a DXer must be active to stay on top. Many Honor Rollers are; all should be.

This also gives the DX committee another tool with which to handle the politically sticky problems such as Minerva Reef. With a computer you simply say 'no future contacts will be counted' and when the time elapses for the purging, the country drops *completely* off the list. Nullifying a specific DX contact is also a simple operation insuring no credit where a simple bookkeeping error allows credit. If DXCC is to continue to be a viable international activity, we must streamline and look for new methods to enhance DX activity. Cost of this suggestion is very nominal. After seeing the workload of the manual system used today, it may very well be a cost saving."

Although the 1973 item was slanted at DXCC, it has merit to all DX award programs. We are evaluating the CQ DX Awards program in light of the recent DXCC rule change. We want and need your inputs. *Write us.*

CQ DX Honor Roll

The 1 × 2 calls in the U.S. have made lots of changes. So that you can recognize some of your old pals on the Honor Roll, here are the new calls:

The WPX HONOR ROLL

The WPX Honor Roll is based on 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

W4WV	1645	WB2FMK	1270	WØKDI	1019	YU2OB	882	K8UDJ	750
K6JG	1531	DJ7CX	1252	N2AC	1013	DL1CF	872	CT1LN	749
F9RM	1497	W4BQY	1230	K6ZDL	1007	W4BYU	859	WA5LOB	749
K6XP	1476	PAØSNG	1229	DL1MD	993	G3DO	849	PY4AP	735
W9DWQ	1365	WB4KZG	1220	I6SF	988	I3ANE	848	KØBLT	733
W2NUT	1363	WA2EAH	1200	K4KQB	960	WØSD	844	WA2AUB	733
VE3GCO	1340	W8ROC	1181	W4IC	950	JA1AG	831	K8LJG	750
W3GJY	1336	N6AV	1150	WA1JMP	948	YU3EY	811	K7NHG	719
W3PVZ	1333	WA5VDH	1148	SM6DHU	940	W9WHM	811	WA6EPQ	713
YU2DX	1328	WØAUB	1107	WA6JVD	940	W6NJU	811	PAØVB	706
YU1BCD	1327	WB4SIJ	1102	K5DB	923	W9ZTD	807	OE6RP	622
ON4QX	1322	N6CW	1092	WØSFU	908	IØJX	803		
W8LY	1319	YU1AG	1059	SM7TV	905	IT9AGA	791		
W4CRW	1308	W9FD	1035	WA6TAX	899	K2ZRO	782		
N4MM	1290	W6ISQ	1028	W3YHR	882	YU4EBL	782		

S.S.B.

W4UG	1433	YU1BCD	1063	CT1PK	923	DJ7CX	852	G3DO	765
F9RM	1418	I4ZSQ	1058	IT9JT	916	N2SS	850	WA5LOB	747
IØAMU	1329	PAØSNG	1034	F2MO	904	W4CRW	840	W6YMV	720
K6JG	1248	DL9OH	1033	DL1MD	903	OE2EGL	839	WB6DXU	708
K6XP	1242	DK2BI	1003	WB4KZG	890	W6RKP	822	CX2CN	702
I8KDB	1166	WB4SIJ	964	WA5VDH	889	W3DJZ	818	WB2FMK	700
IØZV	1181	HP1JC	954	WØYDB	884	OK1MP	817	I4LCK	653
N4MM	1149	WA2EAH	950	K2POA	883	OY3BXW	808	N2AC	620
I8YRK	1108	WB2NYM	941	ZL3NS	874	W4IC	800	CR7IK	613
W9DWQ	1089	WA6TAX	925	W3YHR	857	YU1AG	777		

C.W.

W8LY	1300	W9FD	1053	K6ZDL	899	K7ABV	812	SM5BNX	706
W8KPL	1281	W4CRW	1041	WA2HZR	895	VK3AHQ	809	OK2DB	693
DL1QT	1156	W2AIW	972	WA6JVD	895	WA2EAH	800	WB4KZG	670
K6JG	1146	G2GM	959	WA5VDH	871	VO1KE	787	K2ZRO	649
ON4QX	1133	DJ7CX	957	N2AC	866	I6SF	771	K1LWI	629
W2HO	1126	VO1AW	932	YU1AG	865	W4BYU	768	KH6HC	620
WB2FMK	1120	W3ARK	910	IT9AGA	825	W4IC	754	OK2QX	600
YU1BCD	1086	N4MM	905	W6ISQ	824	OK2BLG	714	VE4OX	600
K6XP	1070								

K3GKU is now W4DPS
K4DJC is now K4SB
W2EHB is now N2SS
W3CRE is now W3GG
W6ISQ is now N6IQ
W6TCQ is now K6XP
WA6MWG is now K6JG
WAØCPX is now WØSD
WB6PNB is now N6AW

More on Consistency

A reader spoke to me regarding my comments on the inconsistencies in DXCC country rulings. He asked not to be named, but his comment is so noteworthy that I'll share it with you: "If there is just rationale for making a specific DX country decision which is inconsistant with established precedence, the DX community deserves to know that rationale."

Actually, he summarized the point of my May 1977 column very well. When a ruling is made regarding DXCC, the why is as important as the ruling itself. The acceptance of new countries and the deletion of others took about two column inches in a recent *QST*. Lost in that two inches was the undertone of something worth further explanation. The ARRL headquarters staff (employees of the ARRL membership) overruled the decision of the ARRL DX Advisory Committee without giving any reasons why. It seems if there is to be unquestionable rule making there have to be open reports to the DX community—not just one line summaries. When the August group of *active* DXers on the ARRL DXAC are overruled without full explanation, it generates more questions than it might if we knew *all* the facts.

The 80 Meter Sport

Several fine articles have been written on chasing DX on the low bands. Directional antennas and propagation head the success criteria. The directional antenna is a tough one for the city dweller. Yet the slopers described by Bill Orr, W6SAI, in his recent columns work well. Just talk to any of the 75/80 meter DX gang.
(Footnote: CQ, Antenna May '77)

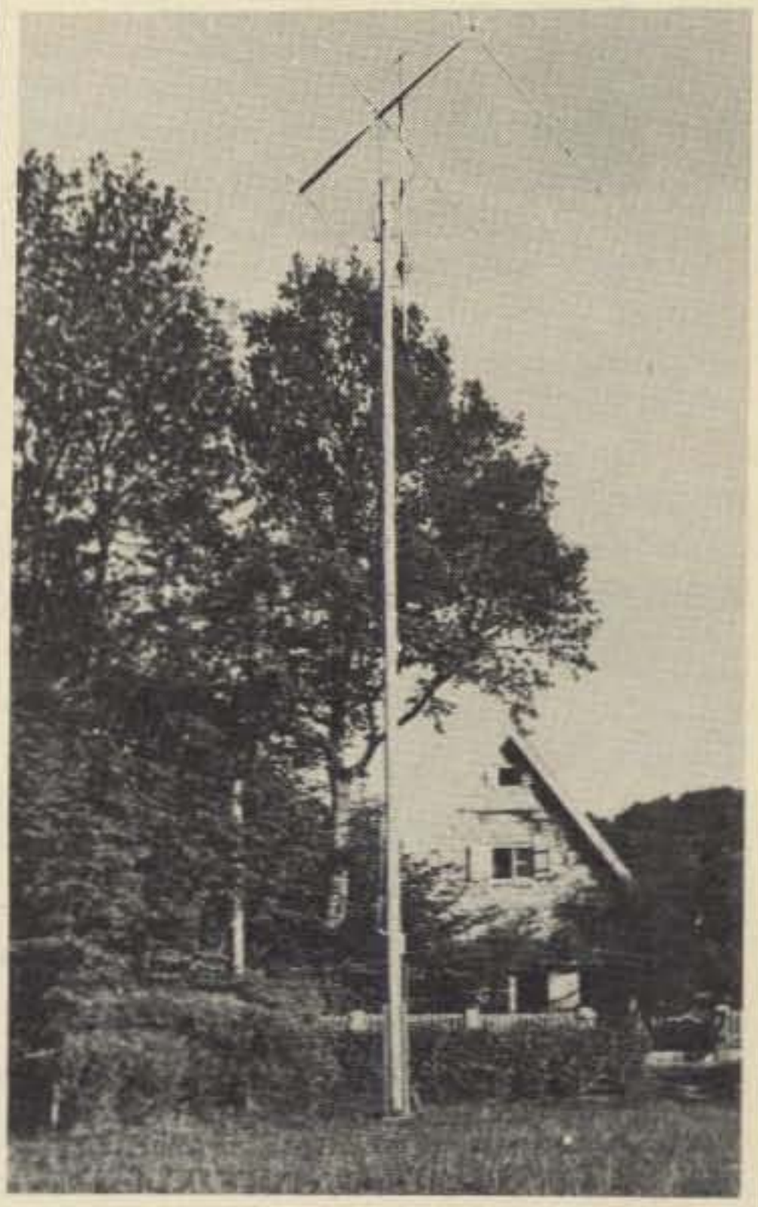
Propagation is one area where we can all improve our game. All the gear and dedication won't work a new one if your timing is wrong. This game is another one played in

Gene Goffriller, OE2EGL, is not only one of Europe's top DXers, he is a contester par excellence. Gene was the top Austrian entry in the ARRL DX contest for nine years straight. He is with the Salzburg tax department when not running this impressive layout to a 3 element quad up 60 feet.

Jirka, OK1HBE, and daughter Katty, age 4, are setting in the operating chair of this completely homebrew station. He runs the maximum Czech power limit to a quad. (Photo K9ZZ)

the dark. A set of sunrise/sunset tables is a must. As you may know, the maximum propagation advantage (best opening) occurs at the time of sunset or sunrise at both ends of the desired path. Rarely will you ever work a rare one when either of you are in total daylight. Simple?, not quite, check the propagation charts too.

This month's kudos for helping their fellow DXers goes to Arnold Tamchin, W2HCW, and Randy Sobol, KH6IIV. They are fine examples of what makes the wait worthwhile and how to push conditions to their maximum. Remember a DL is common place to a W1 and rare as heck to a VE7. So as you are working your 25th Italian station, listen. You may find a new friend trying to



This is the control position from one of the top CQ WW contest stations—W6-PAA. The man at the controls is the owner and chief op—Ken Keeler. Most agree, this is a DX contester's dream station.

break who still needs Italy on 75. The reward of the helping hand exceeds most certificates.

The Alligator Award of the Month (mostly mouth and tiny ears) list is still too long to single out credit to a few. In which group do you have a nominee?

Tricks of the DX Trade

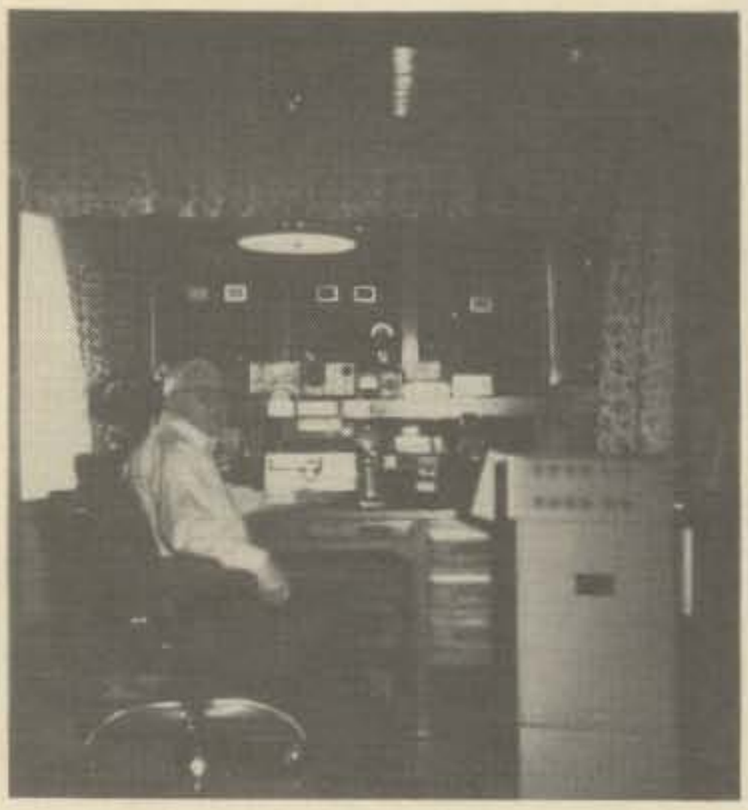
The hints and rules of the DX trade are growing thanks to your inputs. A fine article written by Dave Hayden, W4WHK, in the North Florida DX Association News had some great hints for the c.w. gang. Those who submit hints and rules that are accepted will receive a copy of all the past tricks of the DX trade.

Hint 30.6. Tailending. Does the DX operator you are trying to work permit tailending or calling during a QSO? Be sure before you tailend. This sometimes causes many DX operators to start black-lists. Listen first. If the DX station returns to the tailenders, tailend. Tailending as a general rule is *not* a good or effective practice. (Thanks W4WHK).

Hint 30.7. Zero beating. Does the DX station only call stations that are zero beat? If not, see where he listens, and QSY. Sometimes, operating 0.5 kHz or more off the previous caller's frequency will yield a quick QSO. Many DX and contest operators do this. (Thanks W4WHK).

Hint 30.8. CW exchanges. Sometimes in a pileup with good antennas and high power plus strong signals from the DX area, a 1 by 1 call will snag them fastest. That is the point: Keep your calls short. Use a 1 by 3 at the most unless conditions are marginal. This allows the DX operator to work more stations and keeps your competition happy. (Thanks W4WHK).

Rule 30.9. Reply in kind. When the DX station is working contest style, reply in a similar manner. *If you receive a 599, repeats are not necessary.* Most contest style DX operators rarely care about your exact location so use your state, not city and state.



Robert Tiefenbacher, DK8GT, a recent recipient of the CQ 2 × SSB DX award also holds WAZ from his Stegen home. Bob is also QRV on RTTY.

Hint 80.7. DX Bulletin items. Remember the DX bulletin you take is only as good as its inputs. Share your DX information with your fellow bulletin readers. A postcard to the bulletin editor a few times a year multiplied by all the readers makes the bulletin.

Rule 120.8. QSL card format. If a DX station is to return your card rapidly he must be able to find the necessary information on your card. Date and time are imperative. Almost all DX stations present the date in the form of day-month-year. Time must be in GMT (UTC). Remember the date is the GMT date. Make sure the band or frequency is identifiable. Don't make him hunt for the data on your card.

Hint 125.5. Cheaper IRC's. The cost of postage and IRC's will always be a big expense. One source of IRC's at a reduced rate is form QSL managers. The cost of a U.S. IRC is 42 cents. The redemption rate at a U.S. post office is 18 cents. Most QSL managers will gladly sell them to a fellow DXer, usually at 20 cents each. (Thanks WA6AUD).

Hint 125.6. Team up on postage. When you work the new one listen and see if a buddy got him too. If so, send both cards at one time. (Thanks K7UR.)

CQ DX Awards Checkpoints

Max Gilliland, WB0NHG, of the Mile-Hi DX Association and Rick Roderick, WA5DH, of the Arkansas DX Association are the newest members of our DX awards checkpoints team. Max can be reached at P. O. Box 39092, Denver, Colorado 80239 even when in the pileups. Rick can be reached at 515 Brookside Drive, Apt. 16, Little Rock, Arkansas 72205 when not on campus pursuing a degree. They join checkpoints: DL3RK, G3FKM, I8KDB, VE3GMT, W1AM, K2FL, W2GT, K4AEB, W4-KNW, W4UG, W4WSF, K5YMY, WA-5ZNY, K6AHV/W6RJ, W6EJJ, W6T-CQ/K6XP, W7OK, W8IMZ, WA8TDY, W9DWQ and W0SFU. Welcome aboard.

DX Hot Spot—Portugal

Don Rieboff, K7ZZ, closes his operation from Lisbon, Portugal with

The WPX Program
New Certificates

Mixed

575....WA2AOG
576....JAØMT
577....PY2DBU

S.S.B.

971....K4SB
974....LA7AH
972....DK5WQ
975....I3GBC
973....IØRKK
976....4Z4GH

C.W.

1577....HA8KVK
1580....YO5ALH
1578....VE2TH
1581....DM2ABL
1579....YO2RA
1582....YU1OCV

WPNX

95....HI8NVA
96....WB9SAD

VPX

121....DM-6734/B

Endorsements

MIXED: 1562 F9RM, 1313 W3GJY, 1150 WA5VDH, 900 I3ANE, 872 DJ4XA, 829 W1CHA, 812 SK6AW, 657 WB8AAX, 622 CX9CO, 595 PY2-DBU, 544 IT9WGI, 452 WA2AOG, 400 JA0MT.
SSB: 1149 W4WSF, 1100 K2POA, 850 N2SS, 651 DJ4XA, 636 W1CHA, 609 I4CLK, 575 CX9CO, 495 4Z4GH, 394 K4SB, 352 IØRKK, 343 I3BGC, 334 LA7AH, 302 DK5WQ.
CW: 920 N2AC, 905 W4WSF, 904 WA6JVD, 848 YU1SF, 810 W5MCO, 749 W3NB, 739 OK2BLG, 700 W4KFB, 664 DJ4XA, 571 YU1OCV, 549 SP6BAA, 556 WB8AAX, 401 HA8KVK, 400 W7ISY, 372 W6ZGM, 353 WA2AOG, 320 YO2RA, 306 YO5ALH, 300 VE2TH, DM2ABL.
10 Meters: DJ4XA.
15 Meters: DJ4XA, CX9CO.
20 Meters: WB2CKO, I3ANE.
40 Meters: OK1DKR, DJ4XA, YO5ALH.
80 Meters: DJ4XA.
Asia: LZ1XL, SP6BAA.
Europe: OE1TKW, DK5WQ, YO5ALH, GM4DKO, WA2AOG.
No. America: DJ4XA, WA2AOG.
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 envelope to "CQ WPX Awards," 5014 Mindora Dr., Torrance, CA 90505 U.S.A.

Musty Mustermann, W2TP, is the man at the top of the 2 × SSB CQ DX Honor Roll. Note the homebrew in the rear. His big signal from New Jersey has snagged all but one. Guess which one.

a full log book. The big signal of CT4AT will certainly be missed. But many of us look forward to his next overseas assignment as it always means more good DX. Don has been part of many outstanding DX performances from such rare spots as Thailand (HS), Khmer Republic (XU), Vietnam (XV), Spratly (1S), and Cocos (TI9) just to mention a few. His past calls read like part of the most wanted list. For at least a short time, Don will be in the Washington, D.C. area prior to his next assignment with the U.S. Department of State.

Vasco Felize, CT1ZG, is a journalist and radio announcer/producer in Lisbon. Since the revolution of 1974, he has been a very busy guy reporting the changing times of a dynamic country. He did take time to drop us a letter about the amateur operations in Portugal. He relates, all licenses are issued by the D.S.R. dos C.T.T. (Director of Radio Electric Services of the Portuguese Post Office and Telecommunications Department). Unlike most agencies, they like short calls so two letter calls are the standard. Prefixes CT1, CT4, CT6 and CT7 are for Portugal; CT2 and CT8 are for the Azores; while CT3 and CT9 are for Maderia. Three letter calls are for special event calls except for the letter A which identifies mobile operation, i.e. CT1ZGA.

Operators are issued one of three classes of permit: Class B — all bands, mobile and power up to 400 watts; Class C — same as B with power up to 125 watts; Class E — all bands (reduced segments) first two years with power up to 30 watts. After two years they lose the low band privileges and must operate above 144 MHz. A distinct incentive program. Class B and C require 10 w.p.m. c.w. and different levels of written exams while Class E is a codeless exam.

Some interesting sidelights of Portuguese operation is their annual $8 fee and their performance criteria. A station is inspected by the D.S.R. prior to going on the air the first time. Any station causing interference to radio, TV or audio equipment in the neighborhood stops operation until it is fixed. "The D.S.R. is very strict in this matter." Our thanks to CR1ZG for his interesting letter and insight into amateur radio in Portugal.

Rolf Rasp, PY1RO, only got in four hours during the CQ WW DX contest as PY1RO/5N2. Between Rolf, as PY1RO/Ø and J. Alexandre Filho, PY7PO, as PYØFOC they made 6,500 contacts from their recent DXpedition to Fernando de Noronha. They operated 10 through 160 on c.w. and SSB.

DX Club—1977 Style

The two meter alert nets operated by many clubs obtain outstanding results with the aid of on-the-air bulletins and club want lists. The evening on-the-air meeting provides a definite time to exchange DX tidbits of the day. It also provides a means to exchange QSL information and forecasts of events to come. When conducted on a specific schedule it can be more effective than the best DX bulletins received by mail.

The club DX want list is an effort worth undertaking. It requires a lot of work and dedication by the committee chairperson taking on the job. With each interested club member submitting a want list to the club focal point, the process begins. Then all the want lists are reduced to a manageable form. For smaller clubs this provides a lot of options. For the larger clubs the options get fewer, quick. Here are some proven techniques when data automation is not available.

1. Publish the club want list quarterly or when a specified amount of changes have been reached. The latter approach will reduce the publication job. Be ready for lots of changes at first.

2. Publish only the top wanted countries. If your list covers all 319 countries, the volume of the list becomes unmanageable. Something less than 150 wanted countries works well. With larger clubs the number of countries on the list must go down. With smaller clubs, the list naturally can be larger.

3. If most need the same country use "less W4ABC, ABD, K4ABC, etc." Consider not listing those countries on the wanted list if they are in the DXpedition class. Also consider not listing countries where amateur operations are not permitted.

4. Establish criteria for listing a club member on the club want list.

The WAZ Program

Single Band WAZ

20 Meter Phone

42...I4JBJ
43...WA6EVX/KG6
44...JA1TNV

S.S.B. WAZ

1370...JAØMJ
1371...IØRKK
1372...JA1CZI
1373...K4SB
1374...JA6WW
1375...K1RAW
1376...OZ6RT

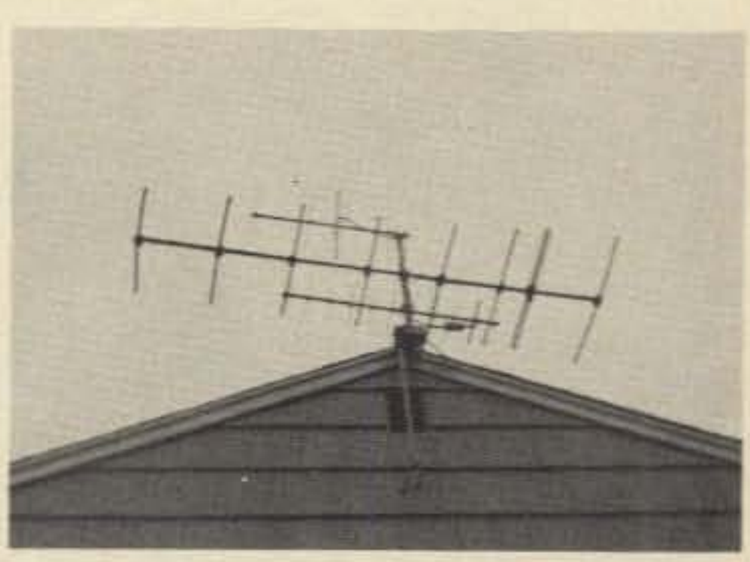
C.W.—Phone WAZ

4077...WA9WKA
4078...K4LRO
4079...JAØMT
4080...YU3EP
4081...JA1FGB
4082...WA2UOA
4083...WØTIV
4084...JH1MPX
4085...GW3CBA
4086...WB4FJO
4087...G4BUE
4088...DM2DEO
4089...DM2CDL
4090...HA5LZ
4091...YV5BPU
4092...W7BCV

Phone WAZ

528...DM2BFK

The complete rules for all WAZ awards are found In the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a business-size, self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.



Ray Soifer, W2RS, is the proud holder of a 50 countries VIA OSCAR sticker for his CQ DX award. Ray is well along to 100. The antenna system at his New Jersey QTH includes 11 elements on 432 MHz, 8 elements (horizontal) on 2 meters and 4 elements (vertical) on 2 meters. Ray's other accomplishments include 5BDXCC and 140 countries on 75/80 meters.

If a member is not active, the situation is obvious. Some clubs list only those club members on the local two meter alert net. Others require the member to have his first 150.

5. If at all possible use a tabular format. A matrix with an X marking the needed country versus the needy is easier to keep up-to-date than the written text style. When most members need the same country, do not list it in tabulated form. Use the written text form at the end of the table. One of the most effective want lists I've seen had 150 wanted countries and about 50 club members on a single 11 × 17 inch single sheet. The list was in chart form, done by hand in pencil. The chart master was kept on a sheet 22 × 34 inches and photo reduced for publication.

6. Inquire if any club member can photo reduce the club want list. If so, then build a want list on larger than normal size and publish the smaller size. Single sheet lists get better use than book styles.

With the temporary demise of the QSL managers list, a must project for the active DX club is a *QSL managers reference library*. DX columns and DX bulletins provide viable sources for current data. Unfortunately they do not list them all. One DX club reports they have a single member who receives both callbooks and their supplements at club expense. The membership can call for the latest callbook addresses. On the same committee, another member keeps a copy of all QSL manager data that the club members forward to the committee. If a club is blessed with a member who likes to keep files, this can be an outstanding project. It is the short cut to obtaining QSL cards and it saves money too.

There are several approaches to handling the QSL manager reference file. A quick approach is a loose leaf binder with all the club input. The file is made available to members between meetings by passing it around. The file is brought to the club for use at the meeting and for entering new input. Some management is still needed.

This simple technique yields results from the start. Its cost: one binder and one package of paper for hand written entries (set up a single page for each prefix letter and number).

Once a QSL managers project is undertaken, remind the club membership of their obligation to provide input. It is amazing how the file will grow. After a member uses the club file, he senses an obligation to keep it current. DX clubs with existing files willing to share with other clubs will be listed in future columns.

Thanks to the following for their club inputs: NFDX Association-WA4-UFW, WCDXB-WA6AUD and WW-DXC-WA7RVA. Keep those club papers coming.

Old Man

Yes—you did notice a new call at the top of the column. After 27 years and seven calls, I finally joined the crowd. So if you hear the new call, remember it is just the old Man of W7YBX.

73 and good DX; Rod, W7OM

QSL Information

A2CED—To K4EBY
A6XB—To K1DRN
A9XB—To G3WW
C5AZ—To OH2BAD
C5AAB—To K4UTE
C21ME—To WA5OCN
CR3AGD—To SM3CXS
CT2BS—To WA4CAD
CT4IK—To W8CNL
CT9AT—To OH2BAD
D2AFW—To W8CNL
D6AC—To F6BBJ
FHØBKZ—To F6BBJ
FMØDEL—To WB6UAG
FOØRS—To N6NA (ex W6MAR)
FRØDCK—To F6EOG
FY7AQ—To WD8CDU
FYØAYO—To W2JFN
HB4FF—To HB9AAA
HBØAZD—To OH2BAD
HM2JN—To JA1HBC
HR4BBA—To I3CYG
HW6ADB—To F6EEM
JA1PIG/PZ—To JARL
JA6GDQ/S2—To JAØCUV
JTØOAQ—To UY5LK
JW1SO—To LA1SO
JY9CS—To K5OEA
KA1IWO—To W7BUN
KA6DX—To N1DX
KC6KO—To WA2EOQ
KG6RE—To
KG6RI—To WA7JCB
KM6FC—To K5YMY
NP4A—To KP4BDL
OD5LX—To SMØGMG
P29CD—To ZL2FA
P29DV—To W8PD
PJØA—To VERONA
S79FC—To ON4CH
S79OM—To DJ1TO
ST0RK—To DL7FT
TA1MB—To WA1EUO
TA1ZB—To W5QPX
TF3PT—To DJ9ZB
TI9AEL—To TI2AEL
TR8BJ—To DJ5DA
TU2GA—To W9KXA
VE2ZN/SU—To VE2YM
VE7DRY/SU—To VE1APY
VKØRH—To VK5WV
VP1MPW—To W5QPX
VP2GEB—To GC2CNC
VP2KJ—To WB2TSL
VP2KN—To W7OK
VP2LDI—To W3HNK
VP2MAR—To WØNA
VP2MNK—To WAØONK
VP2MNR—To WA6VNR
VP2VDQ—To W3HNK
VP5A—To K4UTE
VP5SF—To WB4SHB
VP8HZ—To GM3ITN
VP8NX—To GM3ITN
VP8PL—To G3LIK
VR3AR—To WA7GQA
W9ABA/ZF1—To W4KA
WA7UVU/KW6—To K7SFN
WB5LBJ/DU6—To K7LAY
YJ8KW—To K6KIJ
ZB2BM—To W1JFL
ZK2AT—To INDXA
ZL5AL—To ZL3RK
ZS6DN—To WA4HHG
3AØFC—To G6ZO
3AØGS—To W2HSB
3AØGY—To WB2EZG
3D2DM—To W4UL
3D6AF—To K6KIJ
5B4DI—To WA4APD
5T5CJ—To W4BAA
5W1AB—To W4KA
8J1ITU—To JARL
8P6GT—To W2PEO
8QØA—To I2AXC
9J2AB—To W3HNK
9L1CD—To SM5CD
9M2GV—To K6LAE
9Q5DM—To WB5OAV

(Continued on page 85)

George Jacobs Awarded Marconi Gold Medal

George Jacobs, Director of Engineering for the Board for International Broadcasting, has been awarded a 1977 Marconi Memorial Gold Medal of Achievement by the Veterans Wireless Operators Association (VWOA).

The presentation was made by Jack R. Poppele, VWOA President, to honor Mr. Jacobs for his leadership in developing international broadcasting systems and for his demonstrated ability as an effective negotiator at numerous international telecommunication conferences. (Mr. Jacobs is one of the few veterans of the 1959 World Administrative Radio Conference of the International Telecommunication Union who expects to participate in WARC-1979.)

Mr. Jacobs is a graduate of Pratt Institute with a Bachelor's Degree in Electrical Engineering. He received his Master's Degree in Science from the University of Maryland. He is also a graduate of the Federal Executive Institute.

Mr. Jacobs, who joined the Board's staff last fall after twenty-seven years as an official with the Voice of America, is a Fellow in the Institute of Electrical and Electronics Engineers and a Registered Professional Engineer in D.C. Last year he received the U.S. Information Agency's Superior Honor Award for his accomplishments at VOA. He is also holder of the Air Medal for World War II Service.

The VWOA is an association of radio pioneers, many of whom got their start as shipboard wireless operators during and shortly after World War I. They were the first to open and explore the airwaves, and many are now among the world's foremost leaders in broadcasting and telecommunications.

The Board for International Broadcasting is responsible for granting Congressionally appropriated funds to Radio Free Europe and Radio Liberty, and for overseeing their operations. The Radios comprise one of the world's largest international broadcasting systems, and beam broadcasts in twenty-two languages to Eastern Europe and the Soviet Union.

George is better known to the radio amateur fraternity as W3ASK. Licensed since 1941, he is very active on the amateur bands. George has been Propagation Editor of *CQ* Magazine since 1951; is one of the originators of both Project OSCAR and AMSAT-amateur radio communication satellite projects. ■

YOU... AND AMSAT PHASE III

An exciting new era in amateur radio is about to begin... the era of AMSAT PHASE III OSCAR satellites.

Many of you are familiar with the benefits of the AMSAT OSCAR satellites, notably OSCAR 6 and 7. These satellites, with a combined total of over 8 years in orbit, have provided communications between amateurs throughout the world. They have also provided a capability for an educational program in space sciences and many interesting experiments.

AMSAT, with members and contributing groups worldwide, and headquarters in Washington, D.C., has been responsible for our current satellite program. Many people feel that perhaps the greatest value of the amateur satellite program is the dramatic demonstration of amateur resourcefulness and technical capability to radio spectrum policy makers around the world.

The value of this aspect of amateur radio as we prepare for the 1979 World Administrative Radio Conference (WARC) is enormous.

The AMSAT PHASE III satellite program promises a continuing demonstration that amateur radio is at the forefront of modern technology. PHASE III satellites will routinely provide reliable communications over paths of up to 11,000 miles (17,600 km) for 17 hours each day. You can think of them as a resource equivalent to a new band.

The cost of these PHASE III satellites is a projected $250,000. Commercial satellites of similar performance would cost nearly $10,000,000.

Your help is needed to put these PHASE III OSCAR satellites in orbit.

Your valued, tax-deductible contribution can be as small as one of the 5000+ solar cells needed. A handsome certificate will acknowledge the numbered cells you sponsor for $10 each. Larger components of the satellites may also be sponsored with contribution acknowledgements ranging to a plaque carrying your name aboard the satellites. Call or write us for the opportunities available.

Your membership in AMSAT is important to the satellite program, and will give AMSAT a stronger voice in regulatory matters concerned with satellites. At $10 per year or $100 for life, you will be making a most significant contribution to the satellite program and the future of amateur radio. You will also receive the quarterly AMSAT newsletter.

Clip the AMSAT PHASE III coupon below and send your support today, or call 202-488-8649 and charge your contribution to your BankAmericard (VISA) or Master Charge card.

AMSAT PHASE III
Radio Amateur Satellite Corporation
Box 27C Washington, D.C. 20044
202-488-8649

YES, I want to support AMSAT PHASE III OSCAR satellites. Enclosed is:

☐ $_____ in sponsorship of ____ solar cells (@ $10 each)
☐ $10 Annual membership ☐ $100 Life membership
☐ Send information on sponsoring larger satellite components.

Name Call AMSAT Member?

Street

City State Zip

The publisher has donated this space to AMSAT in support of AMSAT and the PHASE III program.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The August, "Story of The Month", as told by Bea, is:

BEATRICE A. DIETZ, WA2GPT

ALL COUNTIES #137, 9-18-75

"Bea is one of those busy women who manages to find time for family, home, community activity, service for others, and who really enjoys doing it.

A native New Yorker, she grew up in Detroit, Michigan, returned to New York, married and settled down to being a very busy lady.

While their two children (Suzanne and Steve) were growing up, Bea was naturally interested in PTA, but not as an ordinary member. She became involved in all the activities from the kitchen committee to finance chairman, and was a willing delegate to all outside events including the Greater New York Police Coordinating Council for Youth Activities.

As working with young people was her deep interest, she moved from PTA into volunteer Police Department work. Her many contributions to youth activity included track meets and picnics (where as many as 1000 children participated), morning movies, and Christmas parties for underprivileged children.

Among her other activities was Hobby Show Chairman where she was briefly introduced to amateur radio as one of the many exhibits.

Some of her functions were relinquished when the family moved to Valley Stream, N.Y.

*P.O. Box 73, Rochelle Park, N.J. 07662.

Bea & Harry Dietz, WA2GPT in Bermuda.

USA-CA Honor Roll

3000		**500**	
K2LFG	185	WB8ZRV	1170
2500		DL7CS	1171
WA4AUL	234	WB9OOE	1172
W1UYL	235	WA9CZI	1173

One day her son brought home an old radio that apparently did not work. Bea considered it nothing but a dust catching piece of junk until he hooked a piece of wire to a coat hanger, nailed that to the roof and turned the radio on. Then Bea knew the answer to, "What do you do with your spare time?".

First, fascinated by the amateurs talking, she became an avid S.W.L., but not for long. OM Harry was talked into getting a Hammarlund HQ-110 so she could hear things better.

The ARRL publications on becoming a ham followed. She built her own code practice buzzer and started in. As no one in the family could help, Bea called one of the amateurs she had heard, on the air, for the necessary help that resulted in getting her Novice license in 1959 and a year later her General license.

While her greatest reward comes from helping others, Bea's contributions have not gone unnoticed. ARRL, American Red Cross, the U.S. Embassy and the Peace Corps in Monrovia, Liberia (to name just a few) have all sent letters of appreciation.

Some other tangible evidence of her work include: Four Public Service Awards, over 50 BPL, Traffic Medallion, U.S. Navy Recruiting Certificate of Appreciation, A-1 Operator, named Operator of the Month in QST. She is or has been a member of the Mike Farad Net, North American SSB Net, NCS of the All Service Net, Assistant Manager of the NYC LI Emergency and Traffic Net, AREC, RACES, Navy MARS. Member of YLRL, and served as 2nd District Chairman for two years, also Vice President of the NYC-YLRL.

About 1967, when testing a new rig on 75 one night, and looking for a signal report, Bea found a bunch of stations swapping reports, she broke and asked for a report and was swamped with replies. The QSL cards poured in a short time later. As she did not like her transceiver, it drifted, it was replaced and on checking the new rig, found the same group and was again amazed with the multitude of reports and QSL cards. Verrrry interesting! Thereafter she sandwiched a little County Hunting in with all the traffic net schedules.

When Harry retired, some five years ago, it was necessary for Bea to give up all definite schedules. For awhile she dropped into various nets, but was bored, then she found the County Hunters on 20 meters and her interest in County Hunting was revived.

Bea worked very hard at County Hunting and completed them *all* in September of 1975. The final day was indeed thrilling, she had 4 left, one in North Carolina, two in Kentucky and one in Nebraska. Kim, WA7AIM, Aero/mobile, was flying from the East Coast to Seattle, Washington. While a multitude of County Hunters listened and silently used their ESP, Kim closed the gap using both 40 and 20 meters, as skip necessitated. Finally he was over the last of all, Sherman, Nebraska. He had a 20 over 9 signal but he said to the Control Station, "I do not hear GPT"—well, fortunately he was teasing and then did give Bea a fine report. There was immediate congratulatory bedlam on the frequency.

Life style has changed in the retirement years for Bea and Harry. They

The Chattanooga Choo Choo Award

travel a bit and spend much time with the grand children and families. Although Harry has no station call, he is a confirmed County Hunter. He enjoys taking mobile trips and special trips to help give out the Counties. He also induced Bea to try for a second-time-around.

It has been a pleasure keeping in contact with all of the beautiful people on the County Hunter Nets, and meeting many of them at the conventions.

In closing, Bea says, "Thank you, Ed., and *CQ* Magazine, for making the challenge and the Award possible, 73 to All," Bea, WA2GPT."

Awards Issued

Manuel Greco, K2LFG continues to run up his score (mostly c.w.) and was issued USA-CA-3000.

Ken Distel, WA4AUL made USA-CA-2500

Jim Carroll, W1UYL picked up some more and received USA-CA-2500.

Bob De Vore, WB8ZRV acquired USA-CA-500 endorsed ALL A-1.

Bruno Stangnowski, DL7CS qualified for USA-CA-500 endorsed ALL A-1.

James Latimer, WB9OOE won USA-CA-500 endorsed ALL A-3.

Dr. Gary Banks, WA9CZI gained USA-CA-500.

Awards

Chattanooga Choo Choo Award: This Award is sponsored by the Chattanooga Amateur Radio Club and is available to amateurs who submit proof of two-way communications with amateur radio stations in the greater Chattanooga, Tennessee area. It is issued in four catagories:

AWARD
CHOO CHOO 10-X (Ten meter contacts only)
CHOO CHOO FIREMAN (any band/mode)
CHOO CHOO ENGINEER (any band/mode)
CHOO CHOO CONDUCTOR (any band/mode)

STATION CONTACTS REQUIRED

DX Stations	USA & CANADA	Local Stations
3	5	10
6	10	15
8	20	30
10	30	50

For example: A Chattanooga Station must have a total of 50 different stations confirmed to earn the Choo Choo Conductor Award.

General Rules:

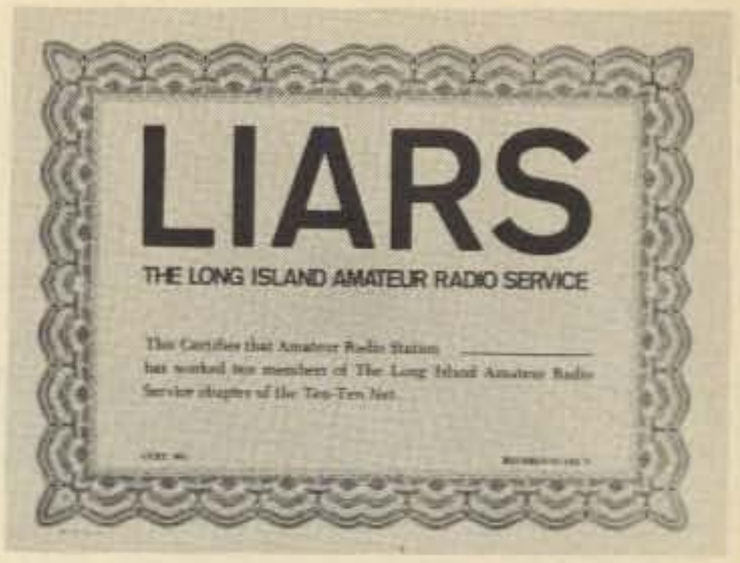
1. Contacts must have been made since January 1, 1977.
2. Contacts shall be valid on any mode or band with the following exceptions:
   a. No repeater contacts. (Satellite contacts OK).
   b. No local mobile contacts.
   c. Applications for the Choo Choo 10-X Award shall work Chattanooga 10-X members on 28 MHz.
3. A Chattanooga station (local station) shall be defined as an amateur radio station within the local Chattanooga, Tennessee telephone exchange.
4. Submission of application:
   a. Local Chattanooga amateurs should submit QSL cards, plus sufficient postage for their return by first class mail and $1.00 Award fee.
   b. All others should submit a log of contacts showing call, date, time, frequency (and 10-X number of Chattanooga stations worked, if applying for the Choo Choo 10-X Award).
5. The Award fee for each application shall be $1.00 U.S., or 5 IRCs.

The San Jose (California) Bicentennial Award

6. Decision of the Awards Committee regarding interpretation of the rules, unethical operating practices, etc., shall be final.
7. Send applications to: Chattanooga Amateur Radio Club, P.O. Box 13, Chattanooga, Tennessee 37401.

San Jose Bicentennial Award: The handsome 3-color certificate of award offered by the Santa Clara County Amateur Radio Association to celebrate the 200th anniversary of the founding of San Jose, California, will now be easier to earn for amateur radio operators outside the continental United States. For such stations, point values have been doubled over those originally announced when the certificate first became available.

The San Jose Bicentennial Award is issued to all stations requesting it, who accrue a total of 200 points, according to the table listed later. The list of stations worked must include a specified minimum number of



The 10-X Liars Award

SCCARA members (given in parentheses in the table) and may include contacts with either of the SCCARA Club stations, W6UU or W6UW, other stations in the San Jose area (Santa Clara County) and stations outside of Santa Clara County but in the Pacific Division of the ARRL.

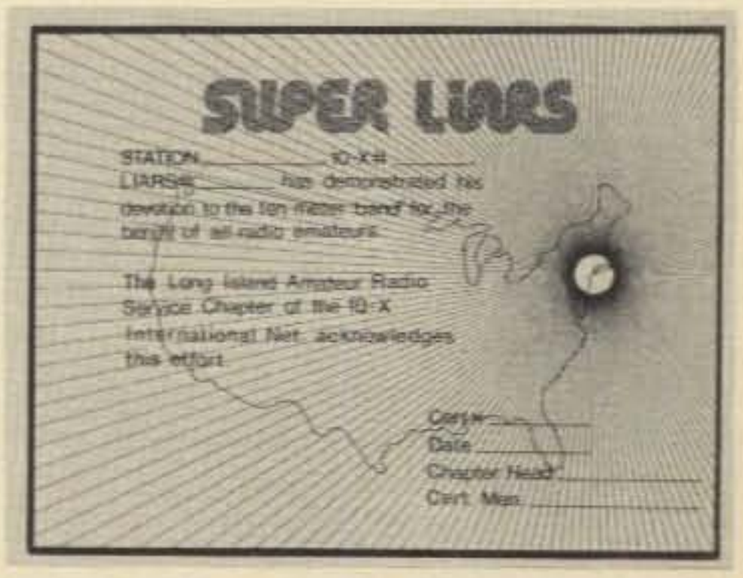
Table Of Points

From Outside Cont'l U.S.	
W6UU or W6UW	100 Points
SCCARA Members	50 (2)
Other S.C. County	4
Pacific Division	2
From 6th District outside S.C. County	
W6UU or W6UW	20 Points
SCCARA Members	10 (5)
Other S.C. County	2
In U.S. outside 6th Dist.	
W6UU or W6UW	50 Points
SCCARA Members	25 (2)
Other S.C. County	2
Pacific Division	1
From inside S.C. County	
W6UU or W6UW	10 Points
SCCARA Members	5 (10)
Other S.C. County	1

Applicants for the award should send their list of stations worked, with pertinent log data (no QSLs necessary) to the club secretary at SCCARA, P.O. Box 6, San Jose, California 95103. With the application, include $1.00 U.S. or 5 IRCs to cover part of the cost of preparation and mailing.

Ten-Ten International Net, Inc.: As mentioned in last months column, this organization was organized to

(Continued on page 85)



The 10-X Super Liars Award

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

This month's report from the Swiss Federal Observatory, the official keeper of sunspot records, is another indication that Cycle 21 may be a very slow riser. The Observatory reports a monthly sunspot number of 13.2 for April. This results in a smoothed sunspot number of 13.3 centered on October, 1976. This is a *drop* of almost one from September's smoothed number, as sunspot activity continues at a very low level despite the beginning of a new cycle.

A smoothed sunspot number of 19 is forecast for August, 1977.

On the optimistic side, band conditions are picking up a bit, despite the continued low level of solar activity.

During August, a few *10* meter DX openings should be possible to southern and tropical areas. Best bet is during the afternoon when conditions are expected to be HIGH NORMAL, or better. Frequent short-skip openings between distances of about 500 and 1400 miles can also be expected.

Look for an occasional *15* meter DX opening towards Europe and the east before noon, but chances should be much better during the afternoon hours, particularly towards Africa, South America, the South Pacific and Oceania. Expect frequent short-skip openings between distances of about 400 and 1400 miles.

During August, *20* meters should continue to be the best and for DX propagation. Openings are forecast to most areas of the world between sunrise and Midnight, when conditions are at least LOW NORMAL. Peak conditions should occur, with strongest signals, during a two-to-three hour window just after local sunrise, and again during the late afternoon and evening. When conditions are HIGH NORMAL or better, *20* meters may remain open through much of the period of darkness, particularly towards southern and tropical areas. Excellent short-skip openings are also expected to continue on *20* meters from shortly after sunrise to almost Midnight. These should range from a few hundred miles out to the one-hop limit of about 2300 miles.

Some fairly good *40* meter DX openings are forecast for the early evening hours towards the east and south. Conditions should improve towards the north, west and south after Midnight, with the band remaining open for DX until sunrise. Look for excellent short-skip openings between about 250 and 750 miles during most of the daylight hours, and between 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should also be possible on *80* meters during the hours of darkness. Expect conditions to peak towards the east and south about Midnight, and towards the north, south and west just before sunrise. For short-skip openings, *80* meters should be the best band for daytime openings up to about 250 miles. During the hours of darkness, look for short-skip openings between 250 and 2300 miles.

An occasional DX opening may be possible on *160* meters during the hours of darkness and at sunrise, but it's still too early for any openings on a regular basis. Short-skip openings up to 1300 miles, and possibly beyond, should be possible during the hours of darkness.

Since the summer propagation season usually ends by mid-September, this month's *DX Propagation Charts* cover only a *one month* period rather than the usual two month span. *Short-Skip Charts* for August appeared in last month's column.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For August, 1977

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Day				
Above Normal: 13-14, 25	A	A	B	C
High Normal: 3, 9, 12, 24, 26, 30	B	B	C	D
Low Normal: 2, 4, 7-8, 10, 16-17, 21-23, 29	B	C	D	E
Below Normal: 1, 5-6, 11, 15, 18, 20, 27-28	C	D	E	E
Disturbed: 19	D-E	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, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will open poor (D) on August 1st, improve to fair (C) on the 2nd, and to good (B) on the 3rd, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768.

V.h.f. Ionospheric Openings

Although sporadic-E ionization is expected to decrease during August, fairly frequent *6* meter short-skip openings still should be possible. These openings should normally extend over a range between approximately 750 to 1300 miles, but during periods of widespread sporadic-E ionization, *6* meter "two-hop" openings may be possible up to as great as 2500 miles. During periods of intense sporadic-E ionization also check for possible short-skip openings on *2* meters, over a range of about 1100 to 1300 miles.

What is likely to be the year's most prolonged and intensive meteor shower should take place btween August 10 and 14. Called the *Perseids*, it's expected to peak during the early morning hours of August 12th, with an average count of 50 meteors an hour. Ionization produced by these meteors as they enter the earth's atmosphere should make possible numerous meteor-scatter type openings on the *6* and *2* meter bands. The range of such openings could be up to several hundred miles, and at times somewhat greater.

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

August is not usually a good month for auroral-type propagation on the v.h.f. bands, but some could occur during times when the ionosphere is disturbed. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be BELOW NORMAL or DISTURBED. These are the days when chances are best for auroral-type openings on the v.h.f. bands.

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

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 (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

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

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

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

4. 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, 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.

August 15-September 15, 1977 Time Zone: EDT (24-Hour Time) EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	10-12 (1) 14-17 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (2) 02-04 (1)	20-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Northern Europe & European USSR	10-12 (1) 14-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	21-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern Mediterranean & Middle East	11-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1)	22-00 (1)
Western Africa	14-16 (1)** 10-13 (1) 14-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	20-23 (1) 23-02 (2) 02-04 (1)	22-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	14-16 (1)	15-17 (1) 17-19 (2) 19-20 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Southern Africa	12-14 (1)** 09-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	21-22 (1) 22-01 (2) 01-02 (1)	22-01 (1) 22-00 (1)*
Central & South Asia	*Nil*	08-11 (1) 20-23 (1)	06-08 (1) 18-21 (1)	07-08 (1) 17-21 (1)
Southeast Asia	*Nil*	08-11 (1) 19-22 (1)	06-08 (1)	06-08 (1)
Far East	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 18-19 (1)	06-08 (1)
South Pacific & New Zealand	16-19 (1)** 13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-07 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-07 (1)*
Australasia	17-19 (1)** 16-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-04 (1) 04-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
Caribbean, Central America & Northern Countries of South America	12-14 (1)** 14-16 (2)** 16-17 (1)** 09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1)	22-02 (1) 02-04 (2) 04-07 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-16 (1)** 16-17 (2)** 17-18 (1)** 09-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-11 (2) 11-16 (1) 16-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound, Antarctica	15-18 (1)	07-09 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

August 15-September 15, 1977 Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	09-11 (1) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-01 (2) 01-04 (1)	22-02 (1)
Northern Europe & European USSR	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-22 (1)	22-01 (1)
Eastern Mediterranean & Middle East	10-14 (1)	07-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-22 (1)
Western Africa	12-14 (1)** 10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-01 (2) 01-02 (1)	22-23 (1) 23-00 (2) 00-01 (1)
Eastern & Central Africa	13-15 (1)	07-09 (1) 15-17 (1) 17-19 (2) 19-20 (1)	21-00 (1)	*Nil*
Southern Africa	12-14 (1)** 10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 12-15 (1) 15-18 (2) 18-19 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1)	22-00 (1)
Central & South Asia	18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)	07-08 (1) 20-21 (1)
Southeast Asia	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	06-08 (1)	06-08 (1)
Far East	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-06 (1) 06-07 (2) 07-08 (1)	05-07 (1)
South Pacific & New Zealand	16-18 (1)**	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-23 (3) 23-01 (2) 01-05 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	02-04 (1)
Australasia	17-19 (1)** 15-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-16 (1) 16-18 (2) 18-20 (1) 20-00 (2) 00-03 (1)	02-04 (1) 04-07 (2) 07-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-01 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-06 (2) 06-07 (1)	21-00 (1) 00-03 (2) 03-06 (1) 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-15 (1)** 15-16 (2)** 16-17 (1)** 08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-01 (1) 01-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound, Antarctica	15-18 (1)	08-10 (1) 18-20 (1) 20-21 (2) 21-23 (3)	01-03 (1) 03-06 (2) 06-07 (1) 23-00 (1)	03-06 (1)

August 15-September 15, 1977 Time Zone: PDT (24-Hour Time) WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	22-23 (1)
Central & Northern Europe & Northern USSR	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 21-23 (1)	19-20 (1) 20-22 (2) 22-23 (1)	21-23 (1)
Eastern Mediterranean & Middle East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 20-22 (1)	20-23 (1) 06-08 (1)	21-22 (1)
Western Africa	12-14 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	21-01 (1)	21-23 (1)
Eastern & Central Africa	*Nil*	12-15 (1) 15-17 (2) 17-18 (1)	20-22 (1) 06-08 (1)	*Nil*
Southern Africa	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1) 18-20 (1)	06-07 (1)

(Continued on page 85)

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

A funny thing happened on the way to the "Hospitality Suites" at the Dayton Hamvention. We got stuck in the elevator for over half an hour, 18 of us in a car designed for 12 occupants.

Among those stuck were Bernie W8IMZ, Don, W3AZD, and Butch, W9-EWC, who handled the emergency phone, but to no avail. (What can you expect from a QRP c.w. man?) We were finally rescued thru the efforts of one of the fellows who happened to have a 2 meter "walkie-talkie" with him. A contact with another 2 meter fan in the lobby brought the local Fire Dept. Rescue Squad to the scene.

It was worth walking up the six additional floors to the North Jersey and Capitol Radio "Suites" to be greeted by wall to wall DXers and Contesters, and a tall refreshing drink.

Bob and Ellen White and Sig, W3WJD, had the last laugh, they just missed our ill-fated elevator.

Having a nice chat with Lloyd and Iris Colvin, and an impromptu presentation of Contest Trophies to the VP5M group and Don Riebhoff of CT4AT and other worldwide DX operations, were added highlights of a very interesting weekend.

Responding to the many verbal queries of "When are we going to organize a WPX C.W. Contest?", I would like to receive some written requests to back me up when I approach the "Boss Man" with the idea. How about it?

73 for now, Frank, W1WY

Romanian Contest

Starts: 1800 GMT Saturday, August 6
Ends: 1800 GMT Sunday, August 7

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. However 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 bands 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 QSOs, 6 points if it's with a YO station.

For others—Two points for European QSOs, 10 points if it's with a YO station.

The multiplier for Europeans is DX countries and YO countries worked on each band. Others will use European countries and YO counties.

Final Score: Total QSO points times 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.

Mailing deadline is Sept. 1st to: Romanian Amateur Radio Federation, P.O. Box 1395, 7000 Bucuresti 5, Romania.

Canadian-American Contest

Phone: 0200 to 2400 GMT
Sat. Aug. 20
C.W.: 0400 to 0200
Sun./Mon. Aug. 21/22

Two full 22 hour periods with a rest period of 4 hours between each section.

As announced last month this is a new contest to increase communication and friendship between amateurs of the two countries. It could develop into quite an activity.

Contacts may be made on all bands, 1.8 thru 28 MHz. It is recommended that operation be confined to the General portions of each band. And it should be noted that QSO exchanges are not confined to W—VE but also can be made between W—W, and VE—VE, for QSO and multiplier credit.

Categories: Single operator, multi-operator and club competition.

Exchanges: RS(T), QSO no. and multiplier area. Postal abbreviations for 50 U.S. states, "CN" for U.S. possessions in the Caribbean, "PC"

Calendar of Events

†Aug.	6-7	Romanian Contest
*Aug.	6-7	Illinois QSO Party
*Aug.	13-14	European C.W. Contest
*Aug.	20-21	SEANET Phone Contest
*Aug.	20-21	SARTG RTTY Contest
*Aug.	20-21	Canadian/U.S.A. Contest
Aug.	20-22	New Jersey QSO Party
Aug.	27-28	Kentucky QSO Party
Aug.	27-28	Ohio QSO Party
Aug.	27-28	Trinidad & Tobago Party
**Aug.	27-28	All Asian C.W. Contest
Sept.	3-5	Four-Land QSO Party
Sept.	10-11	European Phone Contest
Sept.	10-11	Wash. State QSO Party
Sept.	10-11	Pennsylvania QSO Party
Sept.	10-11	Albatross SSTV Contest
Sept.	10-11	ARRL VHF QSO Party
Sept.	14-16	YLRL "Howdy Days"
Sept.	17-19	Maryland/DC QSO Party
Sept.	17-18	VE/W Contest
Sept.	17-18	Scandinavian C.W. Contest
Sept.	24-25	Scandinavian Phone
Sept.	24-25	Delta QSO Party
Oct.	1-2	VK/ZL/Oceania Phone
Oct.	8-9	VK/ZL/Oceania C.W.
Oct.	8-9	RSGB 21/28 MHz Phone
Oct.	12-13	YLRL Anniv. C.W. Party
Oct.	15-16	Manitoba QSO Party
Oct.	15-16	RSGB 7 MHz Phone
Oct.	**29-30**	**CQ WW DX Phone Contest**
Nov.	3-4	YLRL Anniv. Phone Party
Nov.	5-6	ARRL C.W. Sweepstakes
Nov.	5-6	RSGB 7 MHz C.W. Contest
Nov.	12-13	European RTTY Contest
Nov.	12-13	Int. Police Assoc. Party
Nov.	19-20	ARRL Phone Sweepstakes
Nov.	19-20	WWDXA C.W. Contest
Nov.	**26-27**	**CQ WW DX C.W. Contest**

†Not official
*Covered last month
**See June issue

1977 YL/OM Contest Winners

YL Phone		OM Phone	
I3MWP	57,750	W4CHK	1,538
HB9ARC	26,934	W7ULC	805
FG7XL	25,125	WØGNX	648
C.W.		**C.W.**	
WA5VJW	17,010	W4CHK	1,463
K8ONV	13,484	W7ULC	1,295
K1NEI	10,710	VE3EMA	990

*14 Sherwood Rd., Stamford, Conn. 06905

for Pacific possessions, and provinces for Canada. (example: 59001 CT, 599001 PQ).

Multiplier: 50 U.S. states, 2 U.S. possessions (Carib. and Pacific areas). 10 Can. provinces, 2 Can. territories (NWT and Yukon), 1 Can. island (Sable, St. Paul). Total of 65 per band, max. of 390 from all bands.

Points: W/K to W/K and VE to VE QSOs, 2 points. W/K to VE/VO QSOs, 3 points.

The same station may be contacted on each band and mode for QSO and multiplier credit. Stations operating outside their own call area must identify their location. (W6AM/7, etc.)

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from all bands.

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 on both modes and to the top 5 multi-operator stations. (Combined phone and c.w. scores will be considered).

There are 8 Trophies and Plaques:
Overall — Single Opr. — Can. and Amer. Champ.
Phone — Single Opr. — Can. and Amer. Champ.
C.W. — Single Opr. — Can. and Amer. Champ.
Multi-operator Champion.
Highest aggregate Club score.
(Same boundry rules as CQ WW Contest).

And a one year free subscription to "Long Skip" the *CANADX* monthly bulletin to the top 5 overall stations in both categories.

A disqualification clause will be strictly observed. Violation of amateur radio regulations, rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts or multipliers will lead to disqualification. So check your log carefully.

It is not necessary to use a separate log for each band. Indicate the multiplier only the first time it is worked on each band. However 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*. Be sure to enclose a large s.a.s.e. with your request.

Mailing deadline for all entries is Sept. 30th to: *CANADX* Contest Committee, P.O. Box 717, Station Q, Toronto, Ontario, Canada.

All Asian 1976 Contest Results

U.S.A.

All Band

WA6TLV/6	**74,298**
AC7YBX	**48,764**
AC6GEB	2,800
AD4BAI	**60**

1.9 MHz

W7QID	**6**

3.5 MHz

W6PVB	**7,491**
W6BIP	2,880
AB6PKA	2,369

7. MHz

W6PAA	**34,040**
W6PLH	28,880
K6DC	19,332
WA5YTX	3,150
AC6KYA	120
AA@KXJ/6	4

14 MHz

K6SDR	**17,466**
WB6AIN/6	**15,908**
W6RGG	7,801
AA7JCB	6,450
W2GXD	3,944
WA1STN	3,538
WA7TIM	2,808
W4WSF	2,156
WA2IDM	800
W9YT	420
AD9WEH	200
K9UIY	117
W3GID	117
W2CKR	104
K6CL	70
AA6BFL/4	16

21 MHz

K6BCE	**4**

Multi Opr.

WA6NGG	**71,380**
W6OKK	63,240
W1ARR/6	55,125
RL7IKG	**660**

Canada

14 MHz

VA7BC	**7,514**
VO1AW	1,458

Panama

7 MHz

HP1AC	**128**

Guam

All Band

AG6JFY	**161,854**

Hawaii

14 MHz

AA@KXJ/AH6	**40**

Continental Winners

KG6SW	**368,739**
UV9AX	**118,125**
UP2NK	**115,340**
W6TLV/6	**74,298**
CX9BT	**24,864**
ZS5ZI	**7,395**

Multi Opr.

UK9AAN	**169,021**
UK4HBB	**127,293**
WA6NGG	**71,380**

New Jersey QSO Party

Two Periods GMT
2000—0700 Sat./Sun. Aug. 20/21
1300—0200 Sun./Mon. Aug. 21/22

This is the 18th Annual Party sponsored by the Englewood ARA. Phone and c.w. are considered separate bands. The same station may be worked on each band and mode, and N.J. may work other N.J. stations for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for N.J., ARRL section or country for others.

Scoring: N.J. stations score 1 point for W/K and VE/VO contacts, 3 points for DX. Multiply total by ARRL sections worked. (max. of 75). KP4, KH6, KL7, KZ5, etc. and 3 point contacts and section multipliers.

Out-of-state stations multiply total N.J. QSOs by N.J. counties worked. (max. of 21).

Frequencies: 1810, 3535, 3905, 7035, 7135, 7235, 14035, 14280, 21100, 21335, 28100, 28600, 50-50.5, 144-146. Phone on even hours, 15 on odd hours and 160 at 0500 GMT.

Awards: Certificates to the top scorers in each N.J. county, ARRL section and DX country. Second place awards if 4 or more logs are received from that section. Also Novice and Technician awards.

Use GMT, indicate the multiplier only the first time it is worked and include a summary and QSO check sheet. Include a large s.a.s.e. if results are desired.

Stations planning activity in N.J. are requested to advise EARA by Aug. 6th so that coverage of all counties may be organized.

Logs must be received no later than Sept. 17th by the Englewood A.R.A., 303 Tenafly Road, Englewood, N.J. 07631

Kentucky QSO Party

Starts: 0000 GMT Saturday, August 27
Ends: 2400 GMT Sunday, August 28

The Bluegrass A.R.C. of Lexington is again sponsoring this Party. The same station may be worked on c.w. and one other mode per band.

Exchange: QSO no., RS(T) and QTH. County for Kentucky stations; state, province or country for all others.

Scoring: One point per contact. Kentucky stations use states, provinces and countries worked for their multiplier. Others use Ky. counties worked. (max of 120) There is also a power multiplier of 1.5 for stations using 250 watts input or less.

Final score: Total QSO points × QTH multiplier × power multiplier if any.

Frequencies: 70 kHz up from lower edge of band on c.w. And lower edge of General Class portions of phone bands. Also Novice bands. VHF limited to 2 and 6 meter simplex only.

Awards: Certificates to high scorers in each ARRL section.

Mailing deadline for logs October 1st to: Tom Fitzpatrick, WB4FOT, 3709 Niagra Drive, Lexington, Ky. 40502.

Trinidad & Tobago QSO Party

Starts: 0000 GMT Saturday, August 27
Ends: 2400 GMT Sunday, August 28

This activity has been organized by the Trinidad & Tobago A.R.S. to commemorate the 1st Anniversary of the Republic of Trinidad & Tobago.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Bands: All bands 10 thru 160, c.w. and s.s.b. including Oscar.

Awards: Certificates will be awarded to stations working 5 or more 9Y4 stations. Contacts may be made on different bands but must all be on the same mode. (Log only required).

Certificate with endorsement sticker and QSL card confirming contacts will be awarded to stations working 9Y4 on 5 bands, all on same mode. (Logs plus QSL cards required).

It is requested that a remittance of $1.00 or equivalent IRCs be in-

cluded with your log if you are applying for an award.

Entries must be postmarked no later than October 15th to: Trinidad & Tobago A.R.S., P.O. Box 1167, Port of Spain, Trinidad, West Indies.

Ohio QSO Party

1900 to 0300 GMT Saturday, August 27
1500 to 2300 GMT Sunday, August 28

This year's party is sponsored by the Farout A.R.C. of Dayton.

The same station may be worked on each band and mode, 160 thru 2 meters, and Ohio portables and mobiles in each county change.

Exchange: RS(T) and QTH. County for Ohio, ARRL section or country for others.

Scoring: *For Ohio*—Total QSOs times ARRL sections worked.

For others — Total Ohio QSOs times Ohio counties worked. (max. of 88).

Frequencies: C.W. — 50 kHz up from low edge of each band. S.S.B. — 5 kHz up from low edge of General portion of phone bands.

Awards: Certificates to winners in each ARRL section, each Ohio county and top DX station. Also out-of-state stations working 25 or more Ohio stations, and Ohio stations making 50 or more contacts. Trophies to the top Ohio and out-of-state stations.

A s.a.s.e. to the Committee will get you a supply of log and check sheets.

Mailing deadline for your entries is Sept. 30th to: Farout Contest Committee, 5326 Brainard Drive, Kettering, Ohio 45440.

Four-Land QSO Party

Starts: 1800 GMT
Saturday, September 3
Ends: 0200 GMT
Monday, September 5

This is the 8th annual party sponsored by the 4th Call District A.R.A. of the I.A.R.S. The same station may be worked on each band and mode and again if operating portable or mobile from each county change. 4th call area stations may work each other for QSO and multiplier credit.

Exchange: RS(T) and QTH. County and state for the 4th district; state, province or country for all others.

Scoring: *4th call area:* One point for W/VE contacts, 3 points if it's DX. (inc. KH6 & KL7). Final score: total QSO points × states and VE provinces worked. (counted once only).

All Others: Two points per QSO. Final score: total QSO points × (4th district states + 4th district counties). Also counted only once.

Frequencies: C.W. — 3575, 7060, 14070, 21090, 28090. Phone — 3940, 7260, 14340, 21360, 28600. Novice — 3710, 7110, 21110, 28110.

Awards: Certificates to the top scorers in each state, VE province and DX country, 2nd and 3rd place when warranted. Also county awards to 4th call area states, and special awards to Novices, s.w.ls and B/H. (Blind and Handicapped). There are also High Honor Awards to leaders in Four-Land, outside the 4th district, VE and DX.

Mail logs within 30 days of end of party to: Fourth Call District A.R.A., Bob Knapp, W4OMW/W4NP, 105 Dupont Circle, Greenville, N.C. 27834. Include large s.a.s.e. for results.

Washington State QSO Party

Three Periods GMT
0100 to 0700 Saturday, September 10
1300 to 0700 Sunday, September 11
1300 to 0100 Sun./Mon. Sept. 11/12

This is the 12th annual QSO party sponsored by the Boeing Employees' ARS (BEARS). The same station may be worked on each band and mode for QSO points and again if it's a new multiplier. Wash. stations may work other Wash. stations for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Wash., state, province or country for others.

Scoring: *For Wash.* — Two points per QSO, multiply by number of states, VE provinces and DX countries worked.

For others — Two points for each Wash. QSO, multiply by number of Wash. counties worked. (max. of 39). There is an extra multiplier of 1 for each group of 8 contacts with the same Wash. county.

Frequencies: C.W. — 1805, 3560, 7060, 14060, 21060, 28160. Phone — 1815, 3935, 7260, 14310, 21380, 28660. Novice — 3735, 7125, 21150, 28160.

Awards: Certificates to the top scorers, both single and multi-operator, in each state, VE province and DX country, and each Wash. county. Additional awards where warranted. The Worked Five Bears Award is available to any one working five club members, before, during or after the party. The Worked Three Bear Cubs is available for working three Novice members.

Sample log and summary sheets are available from the committee. Include a check sheet for entries with 100 or more contacts.

Mailing deadline is Oct. 10th to: Boeing Employees A.R.S. Contest Committee, Att: Willis D. Propst, K7RS, 18415 38th Ave. S., Seattle, WA 98188. (Results will be mailed to all entrants, no s.a.s.e. required.)

Pennsylvania QSO Party

Starts: 1700 GMT
Saturday, September 10
Ends: 2359 GMT
Sunday, September 11

This is the 20th annual party sponsored by the Nittany A.R.C. The same station may be worked on each band and mode for QSO points. Penn. stations may make in-state contacts for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for Penn. ARRL section for others.

Scoring: *For Penn.* — 3 points for out-of-state contacts, 1 point for in-state. Multiply total by ARRL sections worked. (inc. WPa. & EPa.). Also a multiplier of 1 may be taken for DX contacts, but 1 only regardless of DX worked.

For others — 1 point for each Penn. QSO multiplied by number of Penn. counties worked. (max of 67).

Frequencies: C.W. — 1810, 3550, 7050, 14050, 21050, 28050. Phone — 1815, 3980, 7280, 14315, 21380, 28560. Novice — 3715, 7160, 2115, 28115.

Awards: Certificates to section winners with 10 or more QSOs, and to outstanding Penn. entries.

Include a summary sheet with your entry showing the scoring, equipment description and other interesting information. A check list of counties worked is also required.

Mailing deadline is October 15th to: Douglas Maddox, W3HDH, 1187 S. Garner St., State College, PA 16801. (Include a s.a.s.e. for results).

Albatross SSTV Contest

1500—2200 GMT
Saturday, September 10
0700—1400 GMT
Sunday, September 11

This is the 2nd SSTV contest sponsored by the British Amateur Television Club and Advance Electronic s.r.l. or Bologna, Italy.

Entries will be classed in two sections, send/receive and receive only. (s.w.l.).

Exchange: Picture with call sign, signal report and contact number.

Scoring: One point for contacts on 14 MHz, 5 points on other bands, and 25 points via Oscar.

Multiplier: 5 points for each country, 10 points for each continent worked. W/K and VE call areas con-

sidered as separate countries in scoring.

Final Score: Total exchange points times the sum of multiplier points. (counted once only).

Frequencies: 3754, 7040, 14230, 21340, 28670.

Awards: The overall winner will receive an Amateur TV Camera (less lens) donated by the Advance Electronic s.r.l. firm. The 2nd and 3rd place winners a year's subscription to CQ TV magazine. There are s.w.l. awards too.

Include a dollar or its equivalent with your entry to cover mailing expenses for copy of results and future contest information.

Logs must be received no later than October 30th and go to: Prof. Franco Fanti, I4LCF, Via Dallolio n. 19, Bologna 40138, Italy.

Propagation *(from page 81)*

South-east Asia	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-23 (2) 23-00 (1)	02-05 (1)	06-07 (1)
Far East	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
South Pacific & New Zealand	16-18 (1)** 12-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1) 14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1)	23-02 (1) 02-06 (2) 06-07 (1) 02-06 (1)*
Austral-asia	15-18 (1)** 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2)	17-19 (1) 19-20 (2) 20-23 (3) 23-01 (2) 01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-13 (1)	00-02 (1) 02-03 (2) 03-05 (3) 05-07 (2) 07-08 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Carib-bean, Central America & Northern Countries of South America	11-13 (1)** 13-16 (2)** 16-17 (1)** 08-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-04 (2) 04-07 (1)	20-22 (1) 22-02 (2) 02-05 (1) 23-03 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argen-tina & Uruguay	12-13 (1)** 13-15 (2)** 15-16 (1)** 08-09 (1) 09-10 (2) 10-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (2) 10-15 (1) 15-17 (2) 17-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-05 (1) 02-04 (1)*
McMurdo Sound, Antarctica	13-16 (1) 16-18 (2) 18-19 (1)	08-10 (1) 17-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

*Indicates best times for 160 Meter openings.
**Indicates best times for 10 Meter openings.

Awards *(from page 79)*

keep 10 meters alive, and they issue some 110 10-X AWARDS to **Members!**

Prospective Members: On 10 meters, contact 10 present members (DX need 5), logging date, time, call, 10-X number, name and QTH. Send this list to your call area Vice President, along with $2.00 for dues and $1.00 for a roster. You will receive a certificate and be assigned a Ten-Ten number that belongs to you, personally, for life. Vice Presidents for all call areas and DX were listed in the column last month.

Liars Award: This AWARD is sponsored by the LIARS Chapter of the 10-X International Net—meeting Thursdays 8:00 PM ET on 28.620 MHz SSB. For those out of the 2nd call area, work 5 LIARS Certificate holders—Cost 50c. In 2nd call area, work 10 LIARS Certificate holders or join Chapter.

Super Liars Award: Issued FREE when your call is listed 25 times or more on LIARS Certificate applications, or, work a LIARS Certificate holder in any combination of 25 different states and/or countries. Cost $1.00 For those **Two** LIARS AWARDS, apply to: Award Mgr. Jack Banzer, W2KDI, 15 Langdon Blvd., Rockville Centre, N.Y. 11570.

Notes

For Mini-CH Conventions or the Yearly Conventions, I'll be glad to use data and photographs sent to me. How was your month? 73, Ed., W2GT.

DX *(from page 76)*

9O5ZZ—To DJ6RB
9V1SQ—To VE3FGA
A6XP—Bodo Schmidt, P.O. Box 1465, Sharhah, United Arab Empirates
AY8CW—(same as LU8CW) via LU1BAR/W3, 10743 Harding Road, Laurel, MD 20810
KM6EB/KH6—Box 14, USNS, FPO SFC 96614
UY5LK—Stan I. Sichow, P.O. Box 41, Essentuki 357600 U.S.S.R.
W3HNK—Box 73, Edgemont, PA 19028
WA6ICQ/9Q5—Jim Herrick, APO NY 09662
4X4TT—Box 22-572, Tel Aviv, Israel

Wanted

DX Station to QSL Manage for—WA4WTG
QSL info on—FM0BAH

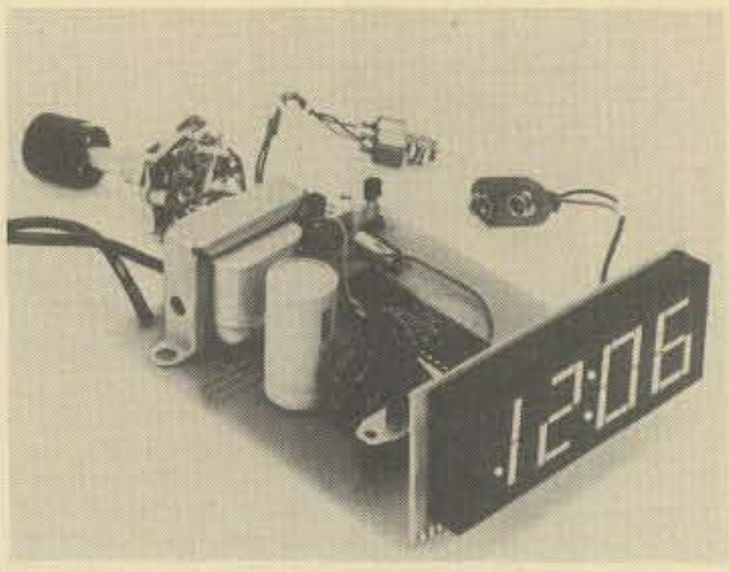
Fairchild Clock Kits

Two new solid state technology kits, a digital alarm clock-calendar and a digital wall clock, have been introduced by the Optoelectronics Division of Fairchild Camera and Instrument Corporation.

The 0100 alarm clock-calendar features a .8 inch, 3-1/2 digit LED display with am/pm indicator. The clock, which displays time for eight seconds and date for two seconds, has connections for radio applications and may be connected to a nine-volt battery.

The 0100 wall clock uses a 2-1/2 inch, 6 digit LED display comprised of 175 LED lamps. The display, visible at up to 50 feet under normal conditions, alternates between time and date. If desired, constant time or date readout can be selected. The clock contains programmable alarm features and may be connected to a radio to utilize the set's speaker for the alarm function.

Suggested retail for the 0100 alarm clock-calendar is $35.00, while the 0100 wall clock is priced at $55.00. For further information on the kits, contact Neal Rosen, Optoelectronics Division, Fairchild Camera and Instrument Corporation, 4001 Miranda Ave., Palo Alto, CA 94303, (415) 962-3615, or circle no. 34 on Reader Service Card.



Low-Cost Heath FSM Kit

The Heath Company has a new kit for amateur, CB and marine radio operators. The HD-1426 field strength meter measures the relative field strength of signals from transmitters running 1 to 1000 watts and covering 1.8 to 250 MHz. It can be used to check transmitter operation and to make transmitter and antenna adjustments.

The HD-1426 incorporates both a built-in printed circuit antenna and a whip antenna. It may be used as either a mobile or fixed station device and is

mail order priced at $10.95. For more information about the HD-1426, send for a free copy of the latest Heathkit catalog. Write the Heath Company, Dept. 350-23, Benton Harbor, MI 49022, or circle no. 35 on Reader Service Card.

CORRECTION

In the description of Telco Products Corporation's Channel Guard XL-1000 adjustable TVI filter in New Amateur Products, July **CQ**, it was stated that the XL-1000 will "attenuate all frequencies below 40 MHz by 100 dB." It should, of course, have read "attenuate all frequencies above 40 MHz by 100 dB."

THE CAPONE MOB'S GROWING

Natcherly by now youse recognize the gents in this here pictoor. On the right is the boss. Numero Uno. Big John by name. He's da guy what runs the CW ham radio sales and low pressoor cooker operashun. That's the outfit what comes up wit all the great prices and soivice and evryting.

On the left, dat's Alan de ape, better known as tough Al. Every mob's goota have a guy to keep the woikers in line. To make soitan you get da moichandise wat you order and get in real quick like. And wit no snags in delivry if you get de idea.

Now, in da middle, dats da latest addishun to da Capone gang name of Millie da moll. She smiles real pritty like and sounds like smooth sugar on da phone. A real lady if you get our meanin'. Millie's dere to smooth tings over wit your little lady. The YL wat raises your kids and such. No more worries dat the little woman will complain about dose nice new radio goodies dat you get real fast like from CW. Dose beauty little Yaesus and Kenwoods an' Dentrons an' Swans and Drakes and evryting else. Just let your little lady talk a few minutes wit our little lady. She'll be so happy she's got you for a provider dat she'll want to help you make de next poichase. Dat's what comes from real smooth salesmanship. Our people make offers nobody can refuse.

We're da Capone mob from CW. Da guys what make buyin' ham radio gear more fun. Give us a call. We're a very friendly groop of hams.

Antennas *(from page 64)*

if you are looking for weak signals. And most 160 meter DX signals are weak. Stew says if you use a vertical antenna for receiving, in a noisy location—like a city—it is very bad. In the country it is tolerable. Horizontal antennas, on the other hand, are much quieter and reject a lot of noise, but don't have the "Moxie" for the weak signals. He feels that any station using a vertical antenna should have a stand-by horizontal antenna for receivinig, with means to quickly switch from one to the other.

"In addition, W1BB says that the *greatest* asset for a 160 meter DXer is a quiet location. The DXers who do the best work all live in the country as far away from man-made noise as possible. Stew notices the difference. He lives near Boston under a blanket of "electronic smog" with a noise level that varies from S3 to S7, even under the best conditions.

"Stew also has a second location —a 35 acre farm in Maine—which is over 7 miles from the nearest little village with a population of 500. He says it is Heaven to operate from there.

"In summary, W1BB says that it is important to be away from local interference and to stay away from vertical antennas for DX receiving. And Stew must know—he has well over 100 countries on that band!"

"What's the solution for noisy areas?" asked my friend, as he jotted notes into his large, black notebook.

"Stew says a lot of 160 meter DXers have turned to loop antennas to fight local noise. He likes this idea, but says that sometimes a loop antenna can be susceptible to broadcast cross-modulation in high signal areas.

"Stew recommends the loop antenna used by W7DOL/6 and others (fig. 5). This simple loop is only three feet in diameter and uses a two-stage preamplifier mounted on the loop. It is very effective in phasing out noise and Loran signals. It should be mounted about 20 feet, or more, above the ground."

"Well, if Stew could only put up *one* antenna for 160 meters, what would he put up?" inquired Pendergast.

"He says if he was limited to a single antenna, he would put up an Inverted-L, such as shown in fig. 1. It has both vertical and horizontal components of radiation and is not too noisy on reception. His second choice would be an Inverted-V, if it was high enough."

"And what would the super-DX operator, the Big Gun, use on 160 meters," asked my friend.

"According to W1BB the most effective antenna for transmitting is a quarter-wave vertical tower, with a *large* system of radials under it. The antenna should be very close to the seashore, or located on marshy ground. The number of radials should be at least 200, or better.

"The super-DX operator would also have a number of receiving antennas. At one time W8LRL, an outstanding 160 meter DXer, had 11 receiving antennas. W1BB usually has four different ones. Unexplainably, 160 meter signals sometimes come in better on one antenna than on another one and you can never be sure which one is best. Once W1BB found that the European signals were coming in best on a 160 foot piece of wire *laying on the ground!*

"No doubt, the best 160 meter locations are close to the water, but inland DXers do a great job, in spite of the handicap they work under. They make up for the lack of seaside conditions by placing *plenty* of radials under their vertical antennas.

"The 160 meter band is the perfect place for testing unorthodox antennas. Remember all those "April Fool" articles in the past about underground antennas? Well, some fellows use them for receiving on 160 meters. Claim they cut down the noise more than they drop the signal, so you get a better signal-to-noise ratio.

"And I understand that KV4FZ experimented with an *underwater* receiving antenna. He heard ZE7JX on it during a test. Stew, W1BB, tried a 200 foot underwater antenna and heard VR3AH with a very good signal-to-noise ratio. Stew also tried a fence wire as a receiving antenna. It was a couple of hundred feet long and about 3 feet above the ground. Excellent results, he says."

Pendergast said, "I understand some fellows have 160 meter beams up in the air!"

"That's right," I replied. W1BB has a two element, Inverted-V bidirectional beam. He says he consistently gets one to two S-unit improvement with it on transmitting as compared to a single Inverted-V. And that's a lot of gain on 160 meters!"

"To sum it up, then, you need a quiet location for 160 meter DX so you can hear it. Then, you need a good, low-loss transmitting antenna. This usually means a vertical (loaded, probably, to save height) with plenty of radials, or a high inverted-V. The beginner, or 160 meter operator interested more in rag-chewing than DX, can profitably put up an end-fed wire (with a *good* ground connection) and do a good job. So the problem isn't insurmountable. And with more 160 meter sideband operation, it's a cinch that the band will be jumping this fall," concluded Pendergast.

"I couldn't have said it better myself," I remarked. ■

Math's Notes *(from page 57)*

of the amplifier is adjusted so that the output is at the required level.

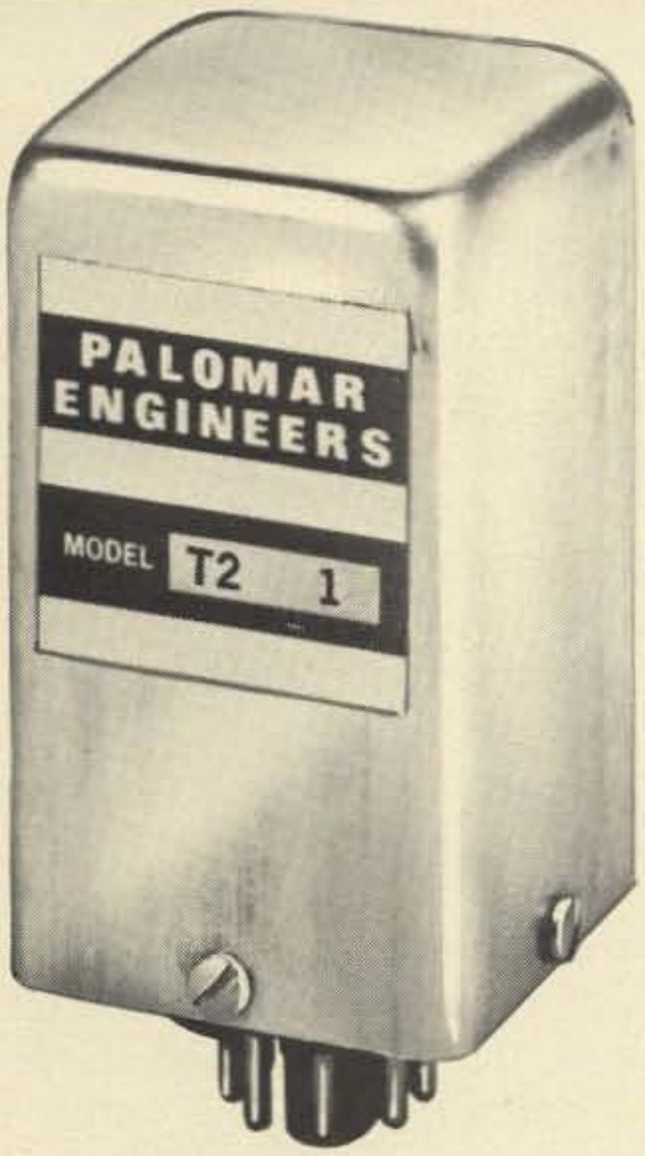
Referring to the discussion on op-amps in MATH's NOTES a few months ago, one should remember that the ratio of feedback resistor and input resistor in an op-amp determine the gain. Using this fact, the feedback resistor can be shunted or placed in series with a capacitor to achieve filtering action also. Again, in fig. 4 (a) shunting the resistor gives a low pass configuration where 50% frequency is the frequency. Where R_f is equal to the capacitive reactance of the shunting capacitor. In fig. 4 (b) a capacitor is placed in series with R_f. High pass filtering is the result. Note that this configuration does not have a DC feedback path and as a result will have no gain.

Finally, in fig. 5 we have presented the universal, single stage, low-pass or high pass relative gain chart. This chart will help understand the degree of filtering that can be achieved by the simple circuits given. To use the chart, one only has to determine the cutoff frequency (50% frequency). Then, at frequencies above or below cutoff, the relative gain can be determined.

The applications of the two filter configurations given here is straightforward. They may be used over the range of DC to a few megahertz and will only give non-calculatable results when stray inductances and capacities of significant values are present.

73, Irwin, WA2NDM

TOUCH-TONE DECODER



- Dual tone decoder decodes one Touch-Tone digit.
- Available for digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, # and *. Also for digits 13, 14, 15, and 16.
- Relay output SPST ½ amp. Relay closes when dual-tone digit is received. Opens when tones cease. Receiver AGC can be used to hold relay closed after tones cease.
- Operates on any dc voltage from +9 to +30 v.
- Octal plug-in case 1¾" square 3" high.
- Send for free brochure.

Model T-2 Touch-Tone Decoder. $39.95 postpaid in U.S. and Canada. Specify Touch-Tone digit or tone frequencies.

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This MFJ Antenna Tuner...

lets you operate all bands — 160 thru 10 Meters — with a simple random wire. Use virtually any transceiver — up to 200 watts RF power OUTPUT.

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Imagine being able to operate all bands — anywhere, with virtually any transceiver — using a simple random wire and an antenna tuner small enough to carry in your hip pocket. Size is only 2-3/16 x 3-1/4 x 4 inches.

Operate from your apartment with a makeshift wall to wall antenna. Tune a simple vertical for low angle, DX operation. Operate from your motel room with a wire dropped from a window. Tune out the SWR on your mobile whip. Enjoy ham radio on a camping or backpack trip with a wire thrown over a tree. Prepare for an emergency. Take it on a DX expedition or use it for Field Day.

Match both high and low impedances by interchanging input and output. SO-239 coaxial connectors are used.

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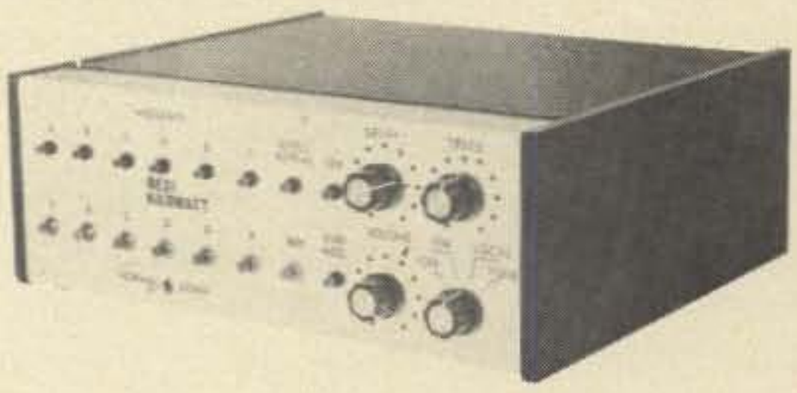

GENERAL INFORMATION

All solid-state reprogrammable memory keyer with six 25 character (512 bit) "MOS" memories with adjustable auto-repeat mode. Full IAMBIC keyer with triggered clock DOT & DASH MEMORIES operates from 2 to 50 WPM. Silent grid-block and cathode keyed output. Built-in monitor and speaker.

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(215) 357-9214

Ham's Environment *(from page 68)*

This group had no outside interference whatever! The source of their problem was internal in that it was their own device which was not properly tuned or, in a few instances, had internal electronic ills. These people were apologetic and sorry they were misled to sign the petition; they, too, *without exception*, released their names from the petition.

Group III. Outside Interference Other Than The Amateur. This group constituted about 20 percent of the signatures. They too signed due to false and misleading statements regarding the amateur and his equipment. However, they felt strongly that they did have interference of an outside nature, but, they did not know its source. From what they were told, they were convinced the amateur was their problem. Sometimes they heard CB type conversation and terms like "Jungle Bunny," and "Come On" After a brief explanation, most of these complainants were satisfied amateur signals were not what they had been receiving; others were skeptical. Tests run with the skeptics demonstrated to their satisfaction they were not receiving the amateur's signals. Again, *without exception*, another group withdrew their names from the petition. Many of them, too, were upset with the manner in which the licensee and his equipment had been misrepresented to obtain their signature.

Group IV. Outside Interference: Receiving The Amateur. This group represented about 6 percent of the complainants. They felt strongly that they did, in fact, have outside interference. Although they did not know its source, they were easily convinced it was the fault of the amateur and his equipment. Tests were conducted and, in fact, they were receiving the amateur's signals! Corrective measures were taken at their sets to eliminate receipt of the amateur signals to their satisfaction. The licensee advised them to contact him personally should the problem reoccur; he told them he would terminate his operation immediately, go to their home, and help correct the problem. All signatories in this category released their names from the petition and agreed to work directly with the amateur should they experience future difficulty. They, too, felt the picture painted of the amateur was most misleading and were generally disgusted with the usage of their names. Several months have passed and the licensee has heard nothing from any of the 80 signatories to the petition.

Group V. Interference Unknown. About 9 percent of those in this category had moved and it was not possible to speak with them. Another 5 percent refused to cooperate in any way! They refused to conduct any tests with the amateur or allow members of the TVI Committee to witness the alleged interference. It is questionable whether they did, in fact, have an interference problem. Perhaps they were afraid tests would reveal no interference and that such report would be made to the FCC. It is impossible to know. In any case, those particular individuals were most vocal regarding that "unsightly" antenna!

In summary, out of 80 signatories, with the exception of Group V above, they all signed the following statement addressed to the Engineer In Charge.

> "By affixing my signature hereto, I withdraw my name from any and all petitions directed against Thomas J. Owens, K7RSC, *and request any action against Mr. Owens be dropped*. I either had no interference and signed the petition against Mr. Owens as an accommodation to the person soliciting my signature; or, whatever interference known to have been the fault of Mr. Owens has been corrected to my satisfaction."

Shortly after submission of all documentation to the FCC, the amateur received another letter from the Engineer-In-Charge. It said:

> "In view of your own very thoroughly documented findings and those of the West Seattle Amateur Radio Club, received earlier, we know of no reason to retain this case in Open status. Consequently it is being Closed. The findings would indicate that amateur station K7RSC is operating within the guidelines relating to amateur stations and that some of the 80 or so petitioners were misguided in signing the petition.
>
> Thank you for your cooperation."

How about that, sports fans? No reprimand, no quiet hours, no revocation of license! Not bad for over a month's work. That concluded the saga of the harried ham. But, there is a moral to the story. When you're up to your butt in alligators, it is difficult to remember the objective is to drain the swamp. *Don't Loose Track of That Goal!* Apply the following life saving techniques and most likely you will solve anyone's interference problem to their satisfaction.

1. Approach the problem with an *open mind*.. and *sincere intention to solve it*.
2. Put yourself in the other guy's shoes.
3. *Consciously strive to make friends and involve the complainant in the solution.* Invite him to see your station. Who knows, maybe it will tune him in to your side of the problem and soften an otherwise hardline position.
4. Do everything reasonably expected—*and more.*
5. *Thoroughly document all actions taken and all conversations.*
6. *Enlist the support of technically competent fellow amateurs* who are more objective than either the licensee or complainant.
7. *Cooperate fully with the FCC.*

HAPPY HAMMING!!! ■

HAM SHOP

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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.

SALE: Atlas 210B complete with 110/220 V AC Console. Excellent condition. $550 PP. With mods (R.I.T., etc.) as per my Feb. CQ article and latest factory updates. Great rig. Only reason for sale is that am now in CN8 and CN8 will not issue license. Schultz, K3EZ, Box "L", FPO New York 09544.

SELL: 4-1000 A used, $30. Raytrack kw plate tank coil for 80 & 40, plus kw bandwitch, $16. UTC S-50 kv c.t. 300 ma, new, pick-up only, $75. Small (2 kw), $20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

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 '76. 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 W5RZJ, Louisa Sando, 9412 Rio Grande Blvd., N.W., Albuquerque, NM 87114. Please enclose $1 to cover 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.

SELL: Heath IM-28 VTVM Kit. New, perfect. Ordered by mistake, $40. Schultz, Box "L", FPO New York 09544.

WANTED: Antique Glass - Looking for old milk glass - 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.

WANTED: Manual and Schematic for Hallicrafters Receiver SX-28 "Super Skyrider". Barry Manfrina, 427 South D St., Lompoc, CA 93436.

AWARD CERTIFICATES for Public Service and Emergency Radio operations. Send $2.00 each, name, address, and event. Information FREE. 49'er Radio Club, Box 1400-CQ, Downey, CA 90240.

FREE Catalog. Solar Cells, Nicads, Kits, Calculators, Digital Watch Modules, Ultrasonics, Strobes, LEDS, Transistors, IC's, Unique Components. Chaney's, Box 27038, Denver, CO 80227.

WPX'ers: Now available, the most complete PX'ers record book. 33 pages of prefixes for quick easy reference. A must for prefix chasers. $4.95 U.S.A., $5.95 foreign. K6ZDL Publishers, Box 1351, Torrance, CA 90505.

SALE: SRR-13A receiver $275.00, URM-25F $165.00, TS-186D $60.00, URM-32 $65.00, TS-510A $300.00, HP-170A $300.00, Stamp for catalog. E. French, 10 Afton, Aurora, IL 60538.

ENJOY THE BEST DXing at Paradise Hotel, Ambergris Cay 35 miles off coast of Belize, Central America. Guaranteed zero noise level and perfect operating conditions. While off air, enjoy best of fishing, diving & swimming in the clear white sand Carribean. Antenae on premises. USA Office, 9225 Katy Frwy., Houston, Texas 77024. (713) 461-2027.

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PERSONALIZED BADGES - $1.50 Send Name and Call. 4-Line Rubber Stamps - $2.95. W5UTT, Box no. 1171-E, Garland Texas 75040.

CUSTOM EMBRODERED EMBLEMS, your design, low minimum, Emblems, Dept. 10, Littleton, New Hampshire 03561.

QSL CARDS PRINTED - Sample 20 cents - Print Shop, P.O. Box 13, La Grange, IL 60525.

HAMS/CBers - Join the NATIONAL HIGHWAY PATROL OBSERVERS, (Free Information) WB6OHK, Box 374, Visalia, CA 93277.

CORRESPONDENCE: Present Owner/Operators of used Weatherfax RJ-4 facsimile, recorder. Your experiences to date, paper supply, spare parts, sources, recommendations in setting up equipment. Any wire photo or satellite pix copied? I can use all the help possible! Darcy Brownrigg, Chelsea, Quebec J0X IN0, CANADA.

FOR SALE: National Radio Co. HRO-500 receiver. Brand new condition in original carton. Cost $3000. Best offer. Kipling Vanderberg, 4902 Indiana Ave., Fort Wayne, IN 46807. (219) 456-4222.

SELL: Allied SX190 RECEIVER, ten xtal controlling bands 2.5-26 MHz LSB USB AM $50 including external speaker. EICO 330 SIGNAL GENERATOR 100 KHz - 54 MHz with audio modulation. Both in perfect condition with manuals. Anstey, P.O. Box 234, St. Augustine, FL 32084.

EMBROIDERED EMBLEMS - Custom Designed Club Pins and Medallions. Highest Quality, Fasest Delivery and Lowest Prices Anywhere. Free Info: NDI, Box 6665J, Marietta, GA 30065.

Atronics M 101 Code reader-$125.00. Collins "S" Line-Mint Rec. 75S-3B, Trans.-32S-3, Power Supply-516F-2, Linear 30L-1, Spectronics-DD-1C Display, with manuals—$1800. New Heath-SB-614 Station Monitor-with manuals-$140. Heath-SB-620 Scanalyzer-with manuals-$85. Golden eagle New-D104-$75. New Spectronics-DD-1 Display Yaesu-$135. Kenwood (mint) TS-520, SP520, VFO520 and new DD-K Display $750. Yaesu FL2100 new-$385. Heath SB-610 monitor-$75. Heath SB-634 (mint)-$160. SP520-New speaker-$21. Ronald L. McAfee, P.O. Box 909, Henryetta, OK 74437. (918) 652-3541.

WANTED: Kenwood TR7400 and TR2200 and Webster Bandspanner mobile antenna. Trade Drake DC-4 for ur SB-610. F.H. Kauppi, Rt. 1, Box 171, Gilbert, MN 55741.

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: Hardbound edition of the 1947 ARRL Radio Amateur's Handbook, $10.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

FOR SALE: First edition (May 1935) of The Radio (magazine) Handbook, $10, Three G.E. Bound volumes plus spare issues of G.E. Ham News, from. Vol. 1, No. 1 to Vol. 15, No. 6. This is from May-June to Nov.-Dec. 1960 and includes index and supplement information, $30. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promply.

LOOKING FOR old Lionel trains. Interested only in "O" guage, excellent to like new condition. Primary interest is locomotives prior to 1952, but will consider complete 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.

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.

BUY-SELL-TRADE: Write for free mailer. Give name, address, and call letters. Complete stock of major brands new and reconditioned equipment. Call for best deals. We buy Collins, Drake, Swan, etc. SSB & FM. Associated Radio, 8012 Conser, Overland Park, Kansas 66204. (913) 381-5901.

WANTED: Round Emb CP1 xtal pack, Bird no.43 wattmeter and elements, 30S1 Collins linear, call Marty, WA3IFQ, 215/884-6010 a 24 hour answering service machine.

WANTED Hy-Gain 8 and 15 element 2 mtr. beams. Clem, K8HWW, 33727 Brownlea, Sterling Heights, MI 48077.

DRAKE L-4 finals (8163) brand new in original boxes, $45 for two. ST-6 boards with mounted components, meter and transformer, $100. WA8VFK, 513/324-3065.

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 Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Millen 60672 antenna bridge and manual, also FV101 VFO. Condition and prices. Peter Posnikoff, VE3BBN, RR 1, Port Hope, Ontatio, Canada L1A 3V5.

SELL: Sonar 3601, 2 meter, mint condx, 10 watts, with companion AC, PS. fully crystalized. W4MGL, 7010 SW 16th St., Plantation, FL 33317. (305) 792-4600.

FOR SALE: Earphones. Large-Pico, WE 509, Trim-Brush-Triangle; per set plus postage. Samll; Cannon Alnico, $4. Telephonic, Sog Corps RI4, 49456, 39AU, $2.50 per set plus postage. Douglas, 2254 Pepper Dr., Concord, CA 94520.

NEED: SPDT and SP4T coax relays, DPDT and SP6T coax switches all with "N"-type connectors. Charles T. Huth, 1233 1/2 W. State, Fremont, OH 43420.

TRADE: 375 pfd vacuum variable for Eddystone dial. Or sell for $29.50. Jess Speer, 1400 Melrose, Norman, OK 73069.

NOVICE SPECIAL: The double-D ham antenna, work the world, out performed in all comparative testing. Installs in minutes, VSWR 1:1 easily obtainable. Tunable to any band. Reg $59.95 only $36.95. Yaesu FT-101 available too. Complete listing 50 cents. Sideband Specialty, Box 573-Q, Oak Harbor, WA 98277.

ARRL HANDBOOK donation appreciated. 1975 or 1976 ed. for Korean Amateur Radio League. M. Bae, Box 246, Flagtown, NJ 08821.

FOR SALE: National NC-190, drifts during warm up but in excellent condx otherwise. $60. William Snow, WB1AGZ, 14 Harvard St., Natick, MA 01760.

AMPEX 601-2 PRO stereo recorder with new motor and heads, factory aligned. Trade for FT 101-E or similar. Dave Sites, WB8UNN, Box 293, Goshen, OH 45122.

FOR SALE: IM 4100 frequency counter, good to 40 MHz, $110. Wallace Domier, Rural Route, Buxton, No. Dak. 58218.

Gift Horse Bonanza!

CQ

You've followed the signs for years, but we're here to tell you that there is a pony out there just waiting for you. Hitch your wagon to CQ's Gift Horse (but don't look in his mouth) and cash in on our FREE CLASSIFIED ADS.

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14 Vanderventer Ave.
Port Washington, N.Y. 11050

Please run this in the next available issue of CQ: _____

_____

_____

Name _____ Zip _____

Address _____ City _____ State _____

WANTED: Heath-Kit power transformer for OL-1 Oscilloscope or Junker OL-1 with good transformer. Richard Dawson, 1308 F St., The Dalles, OR 97058.

WANTED: 1930-1950 Callbooks; any quantity. State price. Donald WPE6DIQ, 6059 Essex, Riverside, CA 92504. (714) 687-5910.

QST 1922-1975 one lot, CQ 1945 (1) thru 1975 one lot, Ham Radio 1965 (1) thru 1975 one lot, in binders, reasonable. Clifford Storch, Astorloid, 65 19th St., Brooklyn, NY 11232.

NOVICE ALL-AMERICAN certificate: Work a novice in all 10 areas. Send list and $1. WB6QBJ, 25 Rudnick Ave., Novato, CA 94947.

MORROW AC PS-RTS 600S for a MB5GOA, TX. R.W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

SELL: HW22 txcvr. HP23 Heath DC power supply, Hustler mobile antenna spur, mic, $150. Robert Field, WA3INW, 1002 Prospect, Melrose Park, PA 19126.

WILL TRADE "Moonraker-4" new in box for Bearcat 101. Wanted: SP-520 Kenwood speaker. Bobby Benningfield, Route 1, Elkhorn, KY 42733.

SASE My crystal list. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

R390A with spare tubes and manual, $350. RME VHF-126 converter, $45. Robert V. Blaney, RR 4, Decatur, IN 46733.

WANTED: To borrow: A Heathkit VHF-1 "Seneca" for about 1-2 months. Stuart L. Ballinger, WA2BSS, 57 S. Clinton St., Poughkeepsie, NY 12601.

FOREIGN HAMS please donate straight key from your country. R.W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Schematic of a home brew 10m or 40m linear. J. Elliot, 2447 Old Bermuda Hd Rd., Chester VA 23831.

WANTED: Swan TV2B 2 meter transceiver, or equal. 50 MC, IF. Price? R. Mollentine, WA0KKC, 7139 Hardy, Overland Park, KS 66204.

SELL: Regency AR-2 amplifier for 2 meters, $75. Lee F. Jamison, WB6KTM, 3461 Via Barba, Lompoc, CA 93436.

WANTED: Philmore transmitter (6V6-6L6) circulation 1952. G.W. Egbert, 17333 Tramonto Dr., Pacific Palisades, CA 90272.

GREAT QSL SWAP CLUB: Get beautiful certificate, card, CPQ unit number, QSL cards and more for $3.50. Cornpatch QSL Club, 807 N. Court St., Toledo, Iowa 52342.

FLOPPY DISCS FOR MINICOMPUTER: $3 each. Control box for Ham-2, $40. Brand new. Want linear for about $180. Gabe Gargiullo, 17 Whitney St., E. Hartford, CT 06118.

CAPACITORS: Fixed vacuum, Jennings pfd/20KV, $6. 150 pfd/20KV, $9. Postpaid. Stuart P. Stephens, W8KAJ, 2386 Queenston Rd., Cleveland, OH 44118.

FREE Catalog: Solar Cells, Nicads, Kits, Calculators, Digital Watch Modules, Ultrasonics, Stobes, LEDS, Transistors, IC's, Unique Components. Chaney's Box 27038, Denver, CO 80227.

WANTED: Scott 1941 Special Communications Receiver. Gene Mottern, 313 Royal Dr., Kingsport, TN 37663.

SELL: Hallicrafters HA6 with power supply, $175. Central Electronics MM-2 monitor oscilloscope, $85. Gold Line Signal Hunter Antenna "new", $6.50. Telephone amplifier, $8.50. W3CUH, T.K. Brown, RD 1, Forksville, PA 18616.

SB200, mint, $300. plus shipping. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamond, CA 93560.

MUSEUM PIECE: Conelrad Radio from World War II. Conalert II like new, $150. Should be in every radio museum. Chas. W. Boegel, Jr., W0CVU, 1500 Center Pt. Rd., Cedar Radips, Iowa 52402.

SELL: All brand new, never been used, Hy-Gain 14AVQ/WB vert (40-10), $65. Heath HP-23B fixed power supply (wired), $58. Heath SBA-301-2 c.w. xtal filter, $25. I ship. Steve Torma Jr., 11 Ironstone Drive, Reading, PA 19606.

ICOM 21A with DV-21 scanner scans, 146-148 in mint condition, 5 months old, $500. J.P. Johnson, 135 W. 9th St., Jacksonville, FL 32206.

FOR SALE: HW-202, $130. 1296 Kilowatt amplifier, $175. VPX 6, 1015 MHz transceiver, $50. Heath IM4100 freq. counter, $110. Wallace Domier, Rural Route, Buxton, No. Dak 58218.

MILLEN SOLID STATE DIPPER and case, 1.7-300 MHz, perfect condx., make offer, new cost-$138. Ray Andrews, K4FEI, Rt 1, Box 795, Sunset Rd., Punta Gorda, FL 33950.

SELL OR TRADE: 4 xcvr $500. Elec bass & amp, Gibson EB-3 w/hard case & Haynes 100 + w xstr Bass King amp w/access. J.L Davis, W3FBT, 802 Chain St., Morristown, PA 19401.

WANTED: Navy receiver type R-1, ARR-1. J. Glendening, WB6WTJ, 11414 E. 215th St., Lakewood, CA 90715.

ATTENTION: 10 meter AM activity in Detroit area on 28.850 MHz (using converted C.B. rigs). Listen for us. Thanks. C.N. Duval, K8HWW, 33727 Brownlea, Sterling Hgts., MI 48077.

GOVERNMENT SURPLUS ELECTRONICS: You can buy directly from Uncle Sam. Booklet shows how. $2.00. H.L. Collins Jr., Box 198, Tiburon, CA 94920.

YAESU FTDX-100 AC/DC P.S. 5 Band xcvr w/speaker. Wanted: HRO receivers, any condition. T.N. Colbert, WA8MLV, 1008 Englewood, Parma, OH 44134.

SELL: SBE-33 xcvr, mobile supply, PTT manual, $150. Rick Dill, WA0EDH/7, 2008 South 9th West, Missoula, MT 59801.

SELL: National NC44 RX, offer. Wanted: Eimac 8873. Mann, WA2MAJ, Box 3, Port Chester, NY 10573.

WANTED: Collins filters, F455FA-15, F455 FA-08 and F455FA-05. Ed H. Nadolny, W9BM, 888 E. Schirra Dr., Palatine, IL 60067.

WANTED: HP 410 C and Sencore Big Henry meters, reasonable. Paulmer Williams, 106 S. Jefferson St., Lewisburg, W. Va 24901.

US & DX QSLs forwarded for 5 cents or less per card. Send SASE for details. W7IZH, QSL Service, Box 17987-C, Tucson, AZ 85731.

KWM-2/A mount for boat or airplane, $25. Circuit board, most parts for variable speed electronic keyer, $10. Heinlein, 107 Wyoming, Boulder City, NV 89005.

WANTED TO BUY: Back copies of "The Novice Magazine" all or some (published 1972-74). H. Basch, WB2JOH, 335 Carnegie Ave., Wenonah, NJ 08090.

SELL: Mod 28 TT, 570 TD, $125, ASR, $550, KSR, $200. Manuals SASE list. Priemer, Box 550, Winter Harbor, Maine 04693.

FOR SALE: DX Engineering speech processor for KWM-2, almost new, $75. Jim Dawson, W9NNE, 119 Reno Ave., East Alton, IL 62024.

R-390A with spare tubes and manuals, $350. Robert V. Blaney, R.R. 4, Decatur, IN 46733.

WILL BUY YOUR JUNK - Galaxy V or will sell you mine, sell or swap SB 650 counter. James Lueck, W5LWU, 7435 Lancewood, San Antonio, TX 78227.

SELL: First 5 and only issues of "Radio Today" mags, $50. Charles Klawitter, W9VZR, 4627 N. Bartlett Ave., Milwaukee, WI 53211.

3-1000Z, SK-510 socket, SK-516 chimney wanted. Will pay cash or trade prop pitch. F. Donovan, W3LPL, 1015 Omar Dr., Crownsville, MD 21032.

OVERSEAS ASSIGNMENT FORCES SALE! W2DAP, one of the finest stations on the east coast ready for you! Alpha 77S, the conservative KW with pair 8877's. EZ way remote controlled electrically powered telescopic tower with tiltover feature. Fully galvanized. Hy-Gain 4 el. 20, Telrex balun, mast and Ham II rotor and all cables. Atlas 210X w/blanker, AC console, and digital VFO9 all bands 80-10 inc. foreign 11). Alpha/Vomax processor, FL-1 audio filter, Tymmeter digital 24 hour clock, electronic surety alarms, muffin fans and many more accessories. Tower new, Spring, 1976, all other major items new 1977! Everything mint and " as new". An offer to serious hams only. R. Winslow, 226 Maple Pl., Mineola, NY 11501. (516) 742-1520.

WANTED: Drake T4XC, Swan TB4H, Beam-Rohn 25G sections, Ham-M 11 rotor, Heath SB610 scope. Trade Drake twins for Kenwood 820. F.H. Kauppi, Rt. 1, Box 171, Gilbert, MN 55741. (218) 865-6541.

INSULATORS Pyrex, 3 for $15. plus shipping, want test gear. Hamilton, WB9OEQ, 6050 No. Oakley Ave., Chicago, IL 60659.

SELL: Heathkit laboratory 5-inch oscilloscope, model 10-18, excellent condition, $40. FOB, E. Stacy, 103 E. Bartlett Ave., Selah, WA 98942.

WANTED: SSTV monitor, send price and condition. Paul Klein, 71-07 147th St., Flushing, NY 11367.

NEW ASTATIC Model 10-C high impedance, single sideband microphone, $15.00. 100 KHz or 1000 KHz crystals, $5.00 each. Heinlein, 107 Wyoming, Boulder City, NV 89005.

WANTED: Table top cabinet for R-390, CY-917/URR or CY-979/URR. Trade Heathkit 1 kw load and meter. Gerald Myers, WB7AVO, 4417 E. Ash Ave., Las Vegas, NV 89110.

WANTED: Cabinet for radio receiver R-338/Collins 51J. Lee F. Jamison, WB6KTM, 3461 Via Barba, Lompoc, CA 93436.

BOOKS WANTED: "Electro Magnetic Waves and Radiating Systems" by Jordan. Also "Antennas" by Kraus. Peter Posnikoff, VE3BBN, RR1, Port Hope, Ontario, Canada L1A 3V5.

HEATH HW32A, HP13A, Hustler Antenna. Absolutely mint, professionally built, $100 or offer. John, WB8IPG, 26316 Falmouth Dr., Warren, MI 48089.

LOW PASS FILTER: Home brew, $8.00 postpaid. Robert G. Criag, 4950 Sunshine Ave., Santa Rosa, CA 95405.

WANTED: HG10 B VFO and also HW16. (507) 288-2249, Peter Cross, 2430 Riverview Hgts., Rochester, MN 55901.

MINT MINOX IIIs, meter, flash, $65. New RCA cassette recorder, $27.50. T400 Delco 8 track player, $35. 2-3 FP7's, 1-5 FP11, 2-5CPI's, 2-new Hitachi 8507 Vidicon, $18. Chester Benson, 732 So. 14th, Richmond, IN 47374.

RUBBER STAMPS: For hams, 3 or 4 lines, call, name, address, etc., $2.00. Les Belyea, WB7FBV, Box 372, Belgrade, MT 59714.

SELL: Realistic DX-160 receiver, .150 MHz to 30 MHz w/speaker. Excellent condx, used very little, $100. WB5UZU, Rt. 1, Box 137, Hatfield, AR 71945.

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 72 and 73, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. 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.

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30	Yaesu Musen USA Inc.	Cov. III

Results CQ W.W. DX Phone Contest *(from page 24)*

where I thought it was going to be easy. Calling CQ and working 10-15 an hour can be very arduous but it was all worthwhile. Happy to get new prefixes for WPX. 805, AY2, CT9, 4J9, and 10 new countries for *5BDXCC*... *VE3GCO.* Not geared up for this era of amplifiers, beam antennas, etc., but participated in my small way as I have been doing since CQ WW first started. That is close to 30 years now as I have certificates from the late 40's. Over 70 years old now... *VE1EK.* Other operators: Lizard, mosquitos, crawly bugs and a stray rat. Had great shot to USA but was blocked by 1500' mountain to Europe, S.A., Africa. Was surprised how well a small station gets out, but guess the call helped... *VP2VDH* operated by *K6SDR.* Biggest thrill: Contacting *W7OK* on 28 MHz. For Nevada, last continental state for 5BWAS after trying for 9 months. Still need Alaska on 7 and 28 ... *W4EV/VP9.* This was my first contest and as one can imagine, as a beginner I experienced a few frustrations like two or three stations trying to work me at the same time. All in all I thoroughly enjoyed the contest and now have the fever!!! . . . *VP1PTL.* Personal satisfaction from completing *5BWAC* with Europe on ten. Getting ready for CW spread. 300 watt limit sort of squeezes us between the US and SA QRO guys . . . *VP1MPW.* (Ed Note: Mark, your log and checksheet were beautiful, nice going.

Many thanks for nice contest . . . *VO5ODX.* Had to play two Basketball games that weekend . . . *UP2PX.* A nice contest with so little power, especially on EU-80 meterband . . . *UR2CW.* Nice conditions during first day on 21 MHz to Central America and USA. *VP5M* and *W2PV* coming in S9 and 40 to 50dB . . . *UR2RJ.* It became difficult to break through Europeans on 20. Enjoyed 10 meters after a long time . . . *UB5WE.*

I really enjoyed competing against *JA2JW* and *JH1ECG* in the contest. Both are good friends of mine . . . *JA1KSO.* Before the contest, my antenna broke because of strong winds, so . . . *JHØBQJ.* No contacts on 1.8 because we are only authorized c.w. operation on that band. Biggest surprise was to have *OH1AA*

(Continued on page 96)

Results CQ W.W. DX Phone Contest *(from page 28)*

Germany (FRG)				
DLØWU	**3,056,760**	**2,353**	**113**	**391**
DLØKQ	**1,168,297**	**1,385**	**101**	**302**
DLØJK	968,506	1,252	86	245
DLØUE	757,008	1,010	87	249
DJ6OL	452,445	903	62	155
DL8DC	433,152	761	63	193
DKØKU	399,006	735	70	173
DK4CL	307,008	617	68	140
Hungary				
HA5KFN	**891,408**	**1,425**	**85**	**251**
HA7KLG	**823,037**	**1,377**	**81**	**212**
HA9KOB	717,355	1,696	68	197
HA5KKC/5	630,921	1,267	71	196
HA4KYH	466,932	903	61	172
HA6KVB	270,053	831	60	163
HA2KRL	262,008	809	58	156
HA6KNB	197,632	590	52	141
HA6KNI	160,512	675	43	135
Italy				
I1GJC	**2,069,188**	**2,066**	**104**	**303**
I1KN	**1,311,095**	**1,484**	**89**	**284**
I3AWW	**1,108,100**	**1,385**	**99**	**251**
II4FGM	933,488	1,289	88	240
IØGPP	475,236	889	79	228
IA5AT	413,750	1,280	59	191
I4JEK	376,774	937	59	147
I.T.U.				
AU1ITU	**658,735**	**1,199**	**78**	**240**
Leichtenstein				
HBØBHA	**1,976,850**	**2,375**	**84**	**257**
Luxembourg				
LX1ML/P	**68,634**	**369**	**32**	**97**
The Nethelands				
PAØSMK	**357,205**	**863**	**53**	**146**
PI1ARS	93,168	359	37	107
PI1PT	18,130	240	13	36
Norway				
LA5X	**914,228**	**1,562**	**78**	**239**
LA1K	478,136	1,132	62	174
Poland				
SP5PWK	**925,143**	**1,208**	**98**	**261**
SP9KRT	348,210	1,042	55	164
SP9PDF	278,913	785	64	175
SP9PTC	150,722	649	48	139
SP9PTR	50,440	268	35	95
SP5KOH	24,726	306	16	62
SP9ZAZ	19,404	228	18	59
SP9KDC	6,435	112	11	34
SP2ZHB/2	506	14	10	13
Scotland				
GM3ZRC	82,502	340	37	105
Sicily				
IG9PLN	**4,016,432**	**3,185**	**99**	**337**
Sweden				
SK3AH	**518,400**	**832**	**76**	**248**
SK5AA	318,045	936	62	171
SK2AU	208,222	609	60	154
SK6JZ	73,931	337	34	87
SM5AZU	63,840	237	43	117
(Oprs.: SM5AZU, SMØATN, SMØMC)				
SM5DLR	37,407	251	29	82
SK6HA	25,482	234	28	65
Wales				
GW4ENT	**1,337,700**	**1,800**	**93**	**271**
GW4FCG	174,303	594	45	136
Yugoslovia				
YU3CM	**519,777**	**879**	**78**	**200**
YU2CB	228,912	553	68	182
YU6KOP	126,707	496	46	115
YU2AAU	59,568	244	45	101
U.S.S.R.				
Byelo-Russia				
UK2AAA	**246,654**	**859**	**50**	**163**
UK2WAO	103,917	557	31	110
UK2WAR	13,110	162	16	53
UK2AAB	6,251	120	10	37
Estonia				
UK2RAH	7,248	73	17	31
European Russia				
UK6APA	**3,348,150**	**3,020**	**118**	**324**
UK6LAZ	**1,809,625**	**1,912**	**112**	**355**
UK3SAB	**1,411,594**	**1,923**	**89**	**273**
UK4HBB	900,055	1,454	77	228
UK4WAB	753,984	1,396	68	204
UK3AAI	661,168	1,178	84	259
UK6LAA	510,160	1,169	70	210
UK3QAA	459,008	1,046	68	188
UK3DBG	374,768	849	63	168
UK3QAE	326,040	910	60	190
UK6LKA	307,655	838	50	135
UK3DAH	252,948	815	46	151
UK3TBF	246,566	688	58	168
UK4LAC	198,744	588	49	133
UK3AAC	173,720	480	59	113
UK4PAA	160,476	604	43	129
UK4ABZ	133,132	554	46	120
UK6AJA	112,644	533	39	110
UK4NAA	89,600	340	41	99
UK6YAB	50,456	303	28	91
UK3IBA	49,995	356	30	71
UK6LAI	43,500	283	28	72
UK4AAB	32,334	260	26	76
UK4YAN	29,928	249	24	63
UK6AAJ	25,990	99	42	71
UK6AJN	17,425	130	27	58
UK3WAC	13,938	146	17	50
UK3DBE	11,163	132	13	48
UK4YYY	10,797	156	16	45
UK3ABO	10,624	115	17	47
UK3IBB	5,490	99	12	33
UK4SAM	4,662	95	8	29
UK3ACR	1,100	18	10	12
Latvia				
UK2GKW	**1,373,314**	**1,813**	**91**	**276**
UK2GDZ	463,487	1,002	68	201
UK2GCF	200,622	744	43	131
UK2GAB	57,933	395	27	96
Lithuania				
UK2BBB	**1,352,792**	**1,910**	**93**	**299**
UK2PCR	**925,243**	**1,450**	**92**	**269**
UK2BAS	745,682	1,207	84	259
UK2PAP	446,576	1,039	54	172
UK2PAD	439,793	974	69	224
UK2BAG	308,448	877	49	174
UK2PAT	153,970	769	38	135
UK2PAO	78,110	404	36	110
UK2PBK	59,696	524	20	92
UK2PRC	8,176	129	12	44
Ukraine				
UK5MAF	**1,785,240**	**2,052**	**104**	**331**
UK5IAZ	**916,995**	**1,336**	**85**	**254**
UK5MAG	618,651	1,199	76	221
UK5MAA	429,733	1,744	71	176
UK5QBE	376,068	816	63	196
UK5EDB	209,053	769	42	127
UK5WAA	207,009	785	39	114
UK5QAV	197,064	798	38	123
UK5HAA	117,810	560	39	126
UK5WAZ	110,316	440	48	126
UK5IAN	95,265	477	36	109
UK5LAS	48,700	377	20	80
OCEANIA				
Western Samoa				
5W1AU	**2,355,435**	**3,201**	**80**	**175**
SOUTH AMERICA				
Argentina				
AY2DNC	**1,421,880**	**1,991**	**79**	**167**
LU1D	**1,024,479**	**1,338**	**86**	**181**
Brasil				
PY3AHS	**1,450,185**	**1,897**	**68**	**187**
PY1DBE	147,672	404	42	84
Multi-Op. Multi-Xmtr.				
NORTH AMERICA				
U.S.A.				
W7RM	**5,137,431**	**3,602**	**137**	**370**
W3AU	**4,375,000**	**2,500**	**141**	**484**
W2PV	**4,276,140**	**2,878**	**125**	**445**
W3WJD	4,159,205	2,446	137	476
K2GM	4,144,280	2,667	129	445
W4BVV	4,065,413	2,422	141	476
K6BCE	4,065,057	2,995	140	349
WB5OOE	3,537,288	2,226	144	440
K6RR	2,033,890	1,895	118	252
W3FRY	1,956,020	1,408	123	400
W3BWZ	1,876,672	1,368	117	380
W3GM	1,726,263	1,184	115	402
W3DHM	1,392,147	1,113	105	354
K4CG	949,554	886	101	325
W3FA	943,138	860	95	311
K2CW	655,161	716	72	249
W3TV	493,986	554	88	246
K3WX	236,586	346	71	187
Canada				
VE3DU	**3,025,269**	**2,777**	**109**	**250**
Turks & Caicos Islands				
VP5M	**10,533,172**	**7,783**	**136**	**462**
ASIA				
JA3YKC	**1,432,860**	**1,518**	**117**	**217**
JA3YDS	**1,015,881**	**1,258**	**99**	**192**
JA7YRR	717,656	1,149	82	136
JA1YXP	251,658	571	73	113
JA4YBU	245,824	498	67	117
JA2YEF	239,232	492	70	108
JA8YAU	183,456	465	58	89
JA1ZLO	137,920	308	67	93
JH1YDT	103,600	328	41	71
JA6YBR	82,832	250	50	74
EUROPE				
Germany (FRG)				
DKØZZ	**6,658,943**	**4,630**	**136**	**495**
DLØPG	**5,406,381**	**4,151**	**128**	**465**
DKØKX	3,213,976	3,367	107	375
DLØWW	2,892,753	2,894	112	391
DLØII	506,562	992	73	221
Finland				
OH2AW	**3,357,369**	**3,193**	**126**	**417**
OH1AA	**2,951,550**	**2,962**	**120**	**405**
Sweden				
SK1AQ	69,044	265	46	118
Switzerland				
HB9H	**2,417,241**	**2,855**	**124**	**385**
Yugoslovia				
YU1BCD	**4,246,176**	**3,797**	**123**	**406**
SOUTH AMERICA				
Netherland Antilles				
PJØA	**7,346,444**	**6,036**	**104**	**309**

CHECK LOGS

Our deep thanks to the following stations who sent in check logs.

EA3YM, FE4580, FE5460, FE-5962, I3-52235, K9NA, K3DR, LA6UI, LA7TM, LZ1CY, OK2-BNK, OK3CAW, OZ5BS, PAØ-, CLN, PAØGBY, PAØLEG, PAØ-TV, PI1PT, SM2ALU, SM4AZD, SM5BFJ, SM5CVC, SM5QG, SM7ASN, SM7BBV, SP3CQP, SP3CUQ, SP3DAH, SP3GUA, SP4AS, SP5EBK, SP5IFU, SP5-IMD, SP5JB, SP5PZK, SP6-AGK, SP6DNS, SP6JLL, SP7-HT, SP9CSU, UA9FBM, UA9-VX, VAØJAY, UK9AAQ, UKØ-AAC, VP8PI, W3MDJ, W3NQ, WA3VKZ, WA4GZT, YO3QK, YO6LV, 9H1FC, DM's 2ARA, 2AUF, 2AWF, 2BUD, 2BPF, 2-BSF, 2BYO, 2COJ, 2CTB, 2-CXD, 2ERH, 2EXH, 2FGN, 2FLN, 2FQN, 3NGB, 3QN, 3-SIC, 3UFJ, 3YPE, 3XM, 3ZC, 4CF & DM-8662/C, DK5OS, DK9NH, DL7HU, G3RZI, SM-0CXM.

Results CQ W.W. DX Phone Contest *(from page 95)*

answer my CQ on 80 meters. I almost didn't go back to my call . . . *KA6YL*. Fine opening! I worked 6 continents in a day . . . *JH3UBF*. There is a 500 watt station just 80 meters from my house, so I'd like to move somewhere to a better location next year . . . *JE1XRZ*. I worked my 100th country. It's remarkable! Very nice contest...*JJ1EEW*. I was glad to QSO with two new countries during this contest...*JR2AQP*. Very glad to work first 5W1 and YB...*JA1DSI*. The antenna rotor went wrong at 0630Z... *JA1HVS*. Last year, 200w; this year, 100w; still weak in pile-ups. Need more power . . . *JF1INA*. First time in the WW contest. Would like to be QRV every year . . . *JG1BUB*. I could receive all of the stations from the West Coast 5-9 + 30 or 40 dB. So strong, we couldn't even make local QSO's, hi . . . *JE1BSD*. There were lots of pile-ups of JAs on many frequencies . . . *JE3UET*. Never say die, apartment dwellers! I got this score with my miniature antenna, no beam . . . *JF1XRB*. Rotator locked up . . . *KA6JC*. I want to have many more QSOs with EU stations next year . . . *JH4IFF*. Much fun to confirm DXCC on 14 MHz during this contest . . . *JA9MYR*. I got nine new countries in my first experience to join the big contest . . . *JA7CLM*. I want 80 meter beam antenna . . . *JA4BKL*. Think you should list KA scores with JA scores instead of separately, as we are all in the same country and operate under the same regulations . . . *KA6DX*.

STATION OPERATORS

Multi-Operator Single-Transmitter

AA1SQB & KH6HQG, WB8PBC, WA2GBC, WB2CHO. **AB2YKG** & AB2SJG. **AA4AXT** & WA4WKY. **AA4LZR:** Club. **AA4UFW** & AA4MFK. **AJ4EAS** & KP4EBC, KP4EBV, KP4ECH, KP4EDX, KP4EEY, KP4DSD. **AY2DNC** & LU6EF. **K4IIF/C6A** & WA4RVC. **W6KG/AJ3** & W6QL. **DJ6QL** & DK5HH. **DK4CL** & DK8DB, DK8DV, **DKØTU:** Club. **DL8DC** & DL8HA, DL8CM, DL8CH. **DLØJK:** DK2XX, DK6FT, DK8ZK, DK8ZL, DF2FK. **DLØKQ:** DL7JP, DL7SP, DL7RT, DL7KT, DL7RV, DC7CW. **DLØUE:** DL3LU, DJ4GO, DL8RL, Haugrund. **DLØWU:** DJ4AX, DJ8SW, DK4EM, DK4TP, DK5EZ, DK8EQ, DL9DY. **DM2BHC** & DM2BGC, DM3SIC, **DM2DUK** & DM2AYK, DM2CEK. **DM3MJ** & DM3VMJ, DM3WMJ. **DM3RF:** DM2BRF, DM4WFF. **DM4CO:** DM2CUO, DM2CYO, DM4UCO, DM4ZCO. **DM4HJ:** DM2AUJ, DM4ZHJ, DM3ZCK. **DM6AJ:** DM6MAJ, DM3BJ, DM6OAJ. **F6KBU** & F8TM **FGØMM:** WA1JKJ, WA1JYY. **FP8DX** & FP8DH. FGØCXV/FS7: FG7AR, W4GSM, WA4DUS, W4PRO. **G2ASF:** G2FTK, G3FOH, G4CFG, G4DSF, G8DMI. **G3FVA:** G3WVZ, G3FNM, G3SVW, G4AUR, G3VIW, G3WFT, **G3LNS** & G3KDB. **G3RCV:** G3RZP, G3XMD, G3ZAY, G4FAM. **G8JC:** 10 Operators. **GM3ZRC:** GM3LRG, GM3HZN, GM3LYI, GM3XNJ. **GW4ENT:** GW3NWS, GW4BLE, GW4EXM. **GW4FCG:** GW3XNS, GW3YFO, G4EVN. **HA2KRL:** Kubola, Kum Pecsuvacz, Tar. **HA4KYH:** HA4YO, HA4YQ, HA4YL, HA4YX, Harsanyi. **HA5KFN:** HA5HY, HA5FN, HA5GF, Szecn, Horvath, Srdlar. **HA5KKC/5:** HA5MD, HA5MO, HA5MA. **HA6KNB:** HA6NN, HA6NP, HA6ON, HA6OR, HA6NZ. **HA6KNI:** HA6OH, HA6-073, Denes, Tozser, Habony. **HA6KVB:** Kulcsar, Suszter, Simon. **HA7KLG:** H-7015, H-7032, H-7033, H-7079, HA7MO. **HA9KOB:** HA9PV, HA9RB, HA9RU, Laki. **HBØBHA:** DJ2EH, DJ4PX, DK7NM, DK9NV, DL8NE, DK6NN, HB9BHA. **WBØQFB/HR2** & K0YVR. **I1GJC** & I1ANF, I1DSC, I1GUB, I1PCT, I1RBP, I1VVZ, I1UW. **I1KN** & I1FNX, I1ANP, I1SBU, I1LBH, IW1PDP, Lorenzelli. **I3AWW** & I3AWK, I3FGX, I3RDU, I3MMY, Mario. **I4JEK** & I4DZ, I4NLO, I4OMO, I4MNY, I4XTD, **IØGPP** & IØPNJ, IØGPY. IA5AT: I2TIG, I2TUJ, I2BJS, I5WWW, I2AT. **IG9PLN:** I6FLD, I6PLN, IØIJ, IT9PUG, IT9SKO, IT9ZGY. **II4FGM** & I4USC, I4LEC, I4RYC, I4VEQ. **JA1YYE:** Club. **JA2YFC:** Club. **JA3YBF:** Club. **JA6YDH:** Club. **JA7YAA:** JA7LUR, JA7LMU, JA8FTW, JA7KPK, JH2DVX. **JA7YFB:** JA7LPX, JA7UMD, JA7IBJ. **JE1YTF:** Club. **JR3YDA:** Club. **K1RQF** & W1DKU. **K1VBL** & WA1ABV, WA1GUD, WA1LNH, K1CGJ, WA1RPQ. **K2BMI** & WB2RWY, WB2WID. **K2GXT:** WA2FQE, WA1RYL, WA3YBT, WA1UPF, WA2PTW. **K2USA:** WA2UOA, WB2DHG, WB2NYK. **K3AVT &** WA3KOC, WA3LQV. **K3BNS** & WB6KVA. **K3GJD** & WB3AVN, WA3VUQ, Repeater. **K4BGF** & WB4EDD. **K4EG** & WA4CAO, WB4BHQ, WA4FFW, WB4VHE, WA4KAW, K4NV, WB4SGB. **K5PFL** & WB5QWX, K5KYU. **K6HIH** & WA6DGX. **K6MA** & K6YGS. **K6QZ/6** & K6QX. **K6ZM** & K6RM, K6VY. **K7RSC** & W7YTN, WAØGQI, WA7UQG. **LA1K:** LA3BO, LA4CQ, LA5CT, LA5KO, LA5MK, LA6MP, LA7DS, LA7OU, LA9KL, LA9ST. **LA5X:** LA1EC, LA1SL, LA3RT, LA3TK, LA6JG, LA7XK, LA9DL, LA9ZO. **LX1ML/P:** LX1ML, LX1HP. **LZ2KKZ:** Dan, Nien, Chris, Dimiter. **LU1D:** LU3DGX, LU9DVA, LU5DDZ. **OE4SZW** & OE3GSA, OE7UU. **OH2AA:** OH2HR, OH2TW, OH2BKH, OH2BNP. **OH2AG:** OH2KQ, OH2SS, OH2LU. **OH2BFJ** & OH2BQA, OH2EQ, OH2LP. **OH2TI:** OH4SF, OH6IJ, **OH3EW** & OH2BHL, OH2BHN, OH2BMO, OH2DS, OH2UG. **OHØDX:** OH5MJ, OH3ZH. **OK1KCU:** Club. **OK1KOK** & OK1-15088, OK1-11861. **OK1KSL:** OK1FAK, OK1AHG. **OK1KSO:** OK1WT, OK1SF, OK1ADH, OK1AMF, OK1JWA, OK1AEZ. **OK2KOS:** OK2HZ OK2RZ, OK2SIR, OK2AOP, OK2BU, OK2SSS. **OK3KJJ:** OK3CKY, OK3TAY. **OX3JUL:** OX3CS, OX3RA, OX3PN, OX3ZM. **PAØSMK** & PAØSPD, PAØOKE. **PI1ARS:** PA0HTR, PA0GUN. **PI1PT:** Club. **PY1DBE** & PY1CHP, PY1BAR. **PY3AHS** & PY3APH. **SK2AU:** SM2DQS SM2DYS, SM2BNS, SM2GZY, SM2ALV. **SK3AH:** SM3AFT, SM3AJL, SM3COL, SM3FUA, SM3PZ, SM3RL, SM3EAP. **SK5AA:** SM5FUG, SM5EOS, SM5ACQ. **SK6HA:** SM6HLZ, SM6HID, SM6HYE, SM7FCG, Roger, Lars, Siv. **SK6JZ:** Club. **SM5DLR** & WB4NDR/SM5. **SP5KOH:** SP5IVU, SP5GNG, SP5GNI, SP5IXE. **SP5PTR:** SP5ENM, SP5GMW. **SP5PWK:** SP5DZJ, SP5DZI, SP5BSV. **SP9KDC:** SP9IFQ, SP9-2291. **SP9KRT:** SP9HMF, SP9FKQ, SP9HNB, SP9-2854. **SP9PDF:** SP9BMQ, SP9DFH, SP6FIH, SP4FUY. **SP9PTC:** SP9EFP, SP9CTY. **SP9ZAZ:** SP9-3051, SP9HZP, SP9IFD, SP9ENC, SP9BVZ, SP9-3020, SP9ECB, Wtodzimierz, Bogdan, Mariusz. **TGØAA:** TG9MP, TG9IZ, TG9KU, TG9HZ, TG9GI, VE2AQS, YS1MAE. **UK2AAA:** UC2-9-357, UC2-6-42, UC2ACA. **UK2AAB:** Konopelko, Krushinsky. **UK2BAG:** UP2BAA, UP2BAE, UP2BZ, UP2MC. **UK2BAS:** UP2PAJ, UP2PAO, UP2-38-609. **UK2BBB:** UP2BBB, UP2BAS, UP2-38-517. **UK2GAB:** UQ2-37-155, UQ2-37-29, UQ2-37-31. **UK2GCF:** UQ2-37-76, UQ2GGB, RQ2GEE, RQ2GEF. **UK2GDZ:** UQ2GA, UQ2-37-27. **UK2GKW:** UQ2ON, UQ2-37-83, UQ2OC, UQ2-37-1035, UQ2RJ. **UQ2PAD:** UP2BCT, UP2PAQ, UP2PAV, UP2PCI. **UK2PAO:** RAØADC, UP2-38-574, UP2-38-624, UP2-38-1524. **UK2PAP:** UP2OX, Abramavichius. **UK2PAT:** UP2-38-521, UP2-38-603, UP2-38-599. **UK2PBK:** Arunas, Arvydas, Juazas, Valius. **UK2PCR:** UP2NK, UP2BCI, UP2BCR. **UK2PRC:** UP2BDI, UP2-38-665. **UK2RAH:** Viskov, Laanepere. **UK2WAO:** UC2WAE, UC2WAS, UC2WAN. **UK2WAR:** Sokolov, Guga, Stracholes. **UK3AAC:** UA3AGX, UA3HK, UA3-170-954. **UK3AAI:** UA3-170-1091, UA3-170-389, UA3AFQ, UA3AJA. **UK3ABO:** Zaushitcin, Shablygin, Beliakoo. **UK3ACR:** Shkodkin, Motyakov. **UK3DAH:** Urzhumtcev, Ponomarev, Baranov, Eliseev, Kosarev, **UK3DBE:** UV3DN, UA3DAO, Evow. **UK3DBG:** Voronin, Bzuk, Vorobijv. **UK3IBA:** Kantor, Chuhachev, Berezkin. **UK3IBB:** Club. **UK3QAA:** UA3QCR, UA3QDW, UA3QBS, UA3QCU, UA3QFG. **UK3QAE:** UA3QO, UA3QBJ, UA3QDC, UA3-121-831. **UK3SAB:** UA3SAQ, UA3SBX, US3SCR. **UK3TBF:** Zinchenko, Sidorov, Kuznetchov. **UK3WAC:** Borisoglebskij, Hardikov, Pikkiev, Basov. **UK4AAB:** Grichin, Kiselew, Hudykin. **UK4ABZ:** Martchenco, Ivaneev, Puzin. **UK4HBB:** UA4HBW, UA4HCW, UA4-133-92, UA4-133-32. **UK4LAC:** UA4-164-175, UA4-164-212, UA4-164-213, Zotova. **UK4NAA:** Vasilev, Kozerodov. **UK4PAA:** UA4-94-388, RA4SAK, UA4-94-457. **UK4SAM:** Raspopin, Zhdanov, Bachtin. **UK4WAB:** Boris, Vlad, Gene. **UK4YAN:** Aljakin, Pavlov, Alexandrov. **UK4YYY:** Leontyev, Drjablov, Filippov. **UK5EDB:** UY5RT, UB5-60-1376, UB5-60-1218. **UK5HAA:** Budanov, Menuilo, Kulinich. **UK5IAN:** UB5-73-1732, UB5-73-1726, UB5-73-2584. **UK5IAZ:** UB5IDZ, UB5-73-202, UB5-73-342, UB5-73-1151, UB5-73-1277, UB5-73-1757. **UK5LAS:** UB5LYL, UB5-77-604, UB5-77-603. **UK5MAA:** UB5MCI, UB5MGY, UB5MDA, UB5MDD. **UK5MAF:** UY5LK, UB5MDC, UB5MAK, UB5-59-22. **UK5-MAG:** UB5MBP, UB5MDL, UB5MDP, UB5-59-121. **UK5QAV:** Dedysh, Shakhmatov, Zlenko, Tihomirov. **UK5QBE:** Club. **UK5WAA:** UB5WAD, UB5WAL, UB5-68-243. **UK5WAZ:** UB5-68-436, UB5WAO, UB5-68-395. **UK6AAJ:** UA6-101-60, UA6-101-720, UA6ADU. **UK6AJA:** Babenko, Zhizov, Dubogryzov, Bezezhnoy. **UK6AJN:** RA6ALE, RA6ALO. **UK6APA:** UA6APP, UA6APW, UA6DL, UA6-101-89. **UK6FAC:** UF6FCR, UF6FCX, UF6FCZ. **UK6LAA:** UA6LBQ, UA6LED, UA6LEW. **UK6LAI:** UA6-150-78, UA6-150-789, UA6LAS. **UK6LAZ:** UB5-73-1024, UA6-150-262, UB5-60-650, UA6-101-152, UB5-73-113, UB5-73-470. **UK6LKA:** UA6LLT, UA6-150-331, UA6-150-330. **UK6QAA:** Valery, Bobrov, Serge, Pavluchenko. **UK6YAB:** Grechnikov, Kuznecov. **UK7AAF:** Vacheslav, Dokudovski, Alexandr, Saschenko, Nick Piatahin. **UK7LAF:** Petrovich, Piktorovich, Borisovich. **UK7LAH:** UL7LEZ, UL7-26-177, UL7-26-199. **UK8BAJ:** Zemskov, Kholodov, Solokousov. **UK9ACP:** UA9AAP, UA9ACO, UA9AFO, UA9AGY, UA9-165-797. **UK9HAF:** Komzuyk, Dedvrin. **UK9QAA:** RA9QAQ, UA9QAX, RA9QBE, UA9RR, UA9-134-11. **UK9WAP:** UA9WAC, UA9WBY, UA9WCC, UA9WDN, UV9WF, UA9-84-32. **UK9WBI:** UW9WR, UA9-84-262, Korovin, Egorov. **UKØAAB:** RAØAAN, RAØABJ, UAØAEE, UAØAFA, UAØ-103-259, UA9-103-294. **UKØCBE:** UAØCAF, UAØCBR, UAØCCR, UAØCCW. **UKØFAA:** UAØFBA, UAØFBE, UAØFBW, UWØFZ, UAØ-153-1. **UKØIAJ:** Krajnev, Dzuba. **UKØSAJ:** UAØSDU, RAØSER, UAØ-124-191. **UKØSAR:** UAØSDA, UAØ-124-121, UAØ-124-179. **VE1BU/3** & K4JSI. **VE1UNB:** VE1QT, VE1BCZ, VE1BEC, VE1BHA, VE2BVD. **VE3AKG** & VE3BVD. **VE6AO:** 12 Operators. **WBØSMS/VO1** & WA4TWE. **VP2G:** W5MYA, WB5IZN. **W1FMK** & K1FWE. **W1MX:** WA1RJX, WB2MZE, WA4TTG, WA7ETN. **W1UQ** & WA1KZE, WA1TAQ, WA1RGW. **W1ZA** & K1LPA, K1PKQ. W5UDK/1 & W1JFL, W1FJJ, K1FIR, WA1TAI. **W2UI** & WA3KRD. **W3ABT:** WA2BFW, WA2AJN. **W3NX** & W3DRD, K3NEZ. **LU1BAR/W3** & LU2DX, WB4OZH. **W9SZR/3** & W4EVG. **W4MYA** & K4ZRX, WB4BVY. **W5BJA** & WA5UCT, W5ZSX, WB5OFP. **W5RRR:** W5LSZ, W5OBR. **W5RU:** W5NO, W5WQI, W5RTX, WA5AWF, WA5KND, K5FVA, K5YMY. **W6BH** & WA6IQM. **W6BIP** & WA6DJI. **W6MUR** & WA6GSN. **W6OKK** & WB6DSV, WB6LPK. **W6ONV** & WA9UCE, W6MAR. **W6UA** & W6UM. **W6VLD:** WA6DPQ, WA6EUM, WA6HJK, K6TXA, W6NLE, WA6GAT. **W7JEG** & WB7DRP. **W7PHO** & W7OTO, WA7TLK. **W7TML** & WA7ELW. **WØSIP/7** & K7NXH, WB7DKU, WA7TCJ, WB7ASR. **W9YH:** WB9IJV, WB9NPB, WB9MEK, WB9OEP, WB9LVC. **WA1NRF** & WA1MAO, WA1OCU, Repeater. **WA3YGH** & W2RHE, W3TWZ. **WA4PYF** & WA4SPY. **WA4YBV** & WA2CJK, WB4EBM, WA4GUT. **WA5RTG** & WB8DCR, WA5SDT, W5DRW, W0LBP, Palmer. **WA6AHF** & W6BJH, K6OP. **WA6JUD** & WB6KNU. **WA6NGG** & K6PJY, WA6FWJ, WB6HDH. **WA6WXP** & WB6JDM. **WA7RVA** & WA7RUY. **WA7VYJ** & Jarvis. **WA8MOA** & WB8LUI, W8CNL, WB8LDH, WB8RXN. **WA8ZDF** & WB8RIJ, WA8RWU, W8KFL, K8RMK, WB8AKU, W8QXQ, K8EHU, W8OEM. **WAØDCB** & KØVYH, WBØNQO. **WAØVPN** & WBØHCH, WBØLZR, WAØFQF. **WB5MXS** & WB5SFS. **WB5NQS/5** & WB5HVY, WA4BPK, WA5EZQ, WB5NSC. **WB6GFJ** & W6OAT, WØAW. **WB6JOD:** W6KHS, WA6OSQ, WA6HCL, K6QJZ, W6AD, WB6IFO. **WB8WHS** & WA8OGS, K8SJE. **WB9SOR** & W9RX, K9HDE, Repeater. **WB9TXO:** WA8RXN, WA9SIW, WA9WHB, WB9KXP, WB9AGY, WB9SBD, WB9UNZ. **YU2AAU:** Sado, Igor, Goran. **YU2CBV:** YU2RTG, YU2RKE, YU2RPY. **YU3CM:** YU3TTB, YU3TXU. **YU6KOP:** YU6ZAN, Djurica. **ZF1RE:** WB5URN, WA5KLF, VE7SV. **ZS6BNX** & ZS6BNZ, ZS6BPL. **4J3AM:** UW3BO, UW3FI, UV3CC, UV3CO, RA3AKQ, UV3AK, UA3-170-888, UA3-170-227, UA3-170-885, UA3-170-1009, UA3-170-834. **4J9B:** UA9AN, UA9AEN, UA9ACZ, UW9BY, UA9-165-516, UA9-165-582, UA9-165-686, UA9-165-965, UL7-26-71. **4U1ITU:** F6DFQ, F6BDN, F6DKJ, F6EGW, F6DYK, F6DQX, F6DQG. **5W1AU** & 5W1AT. **WB4SJG/6Y5** & K4QMQ, K4DBV.

Multi-Operator Multi-Transmitter

DKØKX: DF3QL, DF6QJ, DF7QD, DF8QC, DJ1FG, DJ7YP, DK1QL, DK3RG, DK4QT, DK5QV, DK6QD, DK8BF, DK8BH, DL8OH, DL8QE, DL9NC. **DKØZZ:** DK9WB, DK6WL, DK5WL, DK2B1, DK5WK, DK5WM, DK5WN, DK5WO. **DLØII:** DJ2YE, DK7JC, DK8EY, DJ4TJ, DK8JV. **DLØPG:** DK2QL, DK3BJ, DK3XS, DJ41E, DK5J1, DK1FW, DK1HV, DJ1FC, DK3HA, DK7QC, DJ9TQ, DK1QV, DF3QG, DF1QQ. **DLØWW:** DF4FR, DJ5NR, DK32C, DK7FQ, DL3ZA, DL6NK, DL6OE, DL8EZ, W7UGM, DC6VD, DC6FF, DB6PA, DB5ZC. **HB9H:** HB9LG, HB9AF1, HB9AFZ, HB9AGC, HB9A1B, HB9A1G, HB9AJM, HB9ALM, HB9ALX, HB9AUS, HB9BAL, HB9BC1, HB9BFM, HB9MAD, + 10 SWL's. **JA1YXP:** Tom, Sei, Hitomi, Masa, Hiro, Masa, Shinich. **JA1ZLO:** JR1FIG, JR1SWB, JE1JJI, JH2CKX, JR3EDE, JH4EBN, JH6HDL, JA9FUU. **JA2YEF:** JH2IRH, JH2NTZ, JA2-5168, JH2VOR, JH2XQY, JR2LDM. **JA3YDS:** JF1MJK, JH2AZY, JA3UOQ, JA3WWJ, JH3ESM, JH3GBD, JH3HRW, JH3QLF, JH3WOJ, JR3PYW, JA4KPJ, JA5HHM, JA9EBA, JA9FOR, JA9GLT. **JA3YKC:** JA3ODC, JA3REU, JA3UPK, JH3AIU, JH3BBQ, JH3HBF, JH3JRB, JH3KWQ, JH3NYM, JH3PLE, JH3VJF, JR3AFH, JH3VES, JR3BVX, JE3KKC, JA2VUP. **JA4YBU:** JH4CBM, JH4CQQ, JH4DIT, JH4EOI, JH4HNI, JH4HVA. JH4LHK, JA4SQG, JA4CDP, JA4XKL. **JA6YBR:** CLUB. **JA7YRR:** JA7CFB, JA7CLE, JA7CLN, JA7CXV. **JA8YAU:** JA8UXL, JA8FPX, JA8JTZ, JA8XMU. **JH1YDT:** JH1AGH, JR1IMM, JH1BBT, JH1GNU, JR1LYT, JR1EYB, JR1FNR, JR1BSM. **K2GM** & W1GYE, W1MDO, K2B20, K2GL, K2KUR, K2TT, W2SKE, WA2FCA, WB2SQN, WB2VYA, K6SSS, Robert Walsh. **K2CW** + W2DA, W2ZA, K2LP, K2BPP, K2JAO, K2JQR, W2BCU, WB2BYW, WA2EMG. **K3WX** & WA3TOE. **K4CG:** WB4BQX, W4RVE, K5OGU, K4EBY, W3IDT, WB2CTK, K3WUW. **K6BCE** & WB6YBL, WB6PXP, W6PVB, W6RTT, K6QPH, WA6LBP, W6YB, K6YRA, K6YNB, K6PBI. **K6RR** & WA6CXK, K6LL, W6IRD, WB6DJP, WA6OTU, WB6KJI, WB6EHT, K6MYY, K6OZL, WB6JYQ, **OH1AA:** OH1HU, OH1MD, OH1NH, OH1NK, OH1NM, OH1SY OH1TV, OH1XX, OH2FS, OH2QV, OH2SB, OH3ZE, OH5MG. **OH2AW:** OH2BR, OH2BAD, OH2BCV, OH2BGD, OH2BPN, OH2ED, OH2KA, OH2VB, OH3YI, OH3XZ, OH5UX, OH7RF. **PJØA:** PJ2ARI, PJ2BT, PJ2CW, PJ2FR, PJ2LA, PJ2VD, PJ3BB, PJ3BW, PJ3DB, PJ3DO, PJ3IDP, PJ3EC, PJ3EK, PJ3TH. **SK1AQ:** SM1CJV, SM1CXE. **VE3DU** & VE3ENM, VE3FFA, VE3MV, VE3BBH, VE3ABG. **VP5M:** K4UTE, W4ZR, WA4DRU, WA4EYR, W8IMZ, W4DRT, WA4SGF, WB4QKE, W4GDG, WB4EYX, WB4DIU. **W2PV** & K10ME, K1YKT, K1ZND, W1GNC, W1NJL, WA1QZH, WA1UIK, WA1YDJ, WA2EAH, WB2GXW, WB2OEU. **W3AU** & K3EST, W3ZKH, W3AZD, W3ZDK, WB4SGV, WA3IAQ, WA3TAI, CX1EK/W4. **W3DHM** & K3JGI, W3DQG. **W3FA** & WA3ZAS, WA3SXH, WA3QIA, W3FCI, WA3VPI, W3ABC. **W3FRY** & K3HTZ, K3DZB, WA3LNM, WB3CJS, WA3RID. **W3GM** & W3JSX, K3WJV, WA3JYB, K3ZOL. **W3TV** & W3AOH, K3GL. **W3WJD** & K3YUA, K3OIO, WA3LRO, WA3YHT. **W4BVV** & WA3AMH, W3BQV, K3NPV, WA4CSE, K4GKD, W4QCW, WB4UKA, LU8AGT. **W7RM** & WA6HAF, K7RA, K7VPF, W5QQQ, K7JCA, VE7ZZ, WA7OTT. **W8NGO** & W8CLR, W8SRK, K8YEI, WD8AMW. **WB5OOE** & WS5JMK, WA5RXT, WB5SFX, W5QWF, W5EQT, W5LUJ, WB55BH, WB5KVM, W5COA. **YU1BCD:** YU1NZV, YU1ODO, YU1PCF, YU1QBC, and 6 others.

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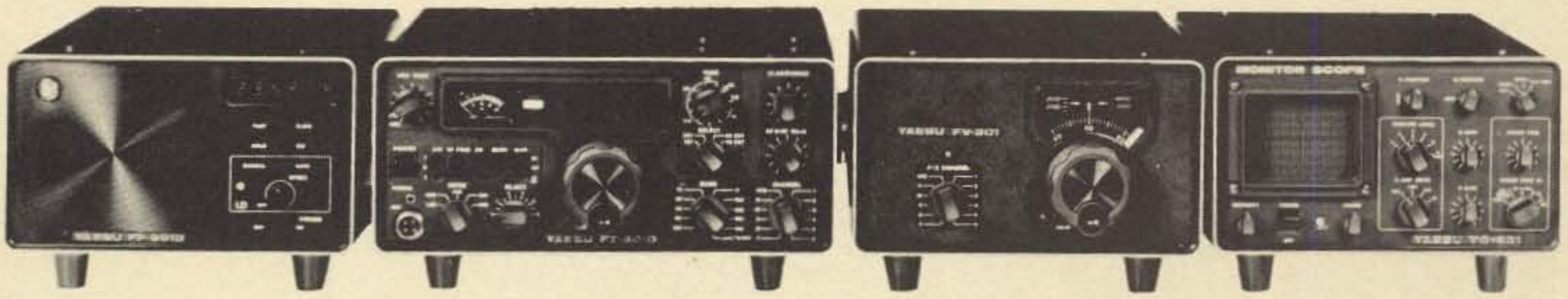

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For information about power tubes for your transmitter, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or call any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

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